

High-Volume TSP Sampler  
5-Point Calibration Record

Location : ASR 5  
Calibrated by : P.F.Yeung  
Date : 11/10/2016

Sampler

Model : TE-5170  
Serial Number : S/N 0816

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
Service Date : 14 Mar 2016  
Slope (m) : 2.10326  
Intercept (b) : -0.06696  
Correlation Coefficient(r) : 0.99989

Standard Condition

Pstd (hpa) : 1013  
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1008  
Ta(K) : 300

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1	18 holes	9.8	3.112	1.512	46	45.73
2	13 holes	7.4	2.705	1.318	40	39.77
3	10 holes	5.6	2.353	1.150	34	33.80
4	7 holes	3.6	1.886	0.929	28	27.84
5	5 holes	2.2	1.475	0.733	22	21.87

Notes:  $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$ ,  $X = Z/m - b$ ,  $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship (Linear Regression)

Slope(m): 30.599      Intercept(b): -0.722      Correlation Coefficient(r): 0.9992

Checked by: Magnum Fan

Date: 16/10/2016

High-Volume TSP Sampler  
5-Point Calibration Record

Location : ASR10  
Calibrated by : P.F.Yeung  
Date : 11/10/2016

Sampler

Model : TE-5170  
Serial Number : S/N 8162

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
Service Date : 14 Mar 2016  
Slope (m) : 2.10326  
Intercept (b) : -0.06696  
Correlation Coefficient(r) : 0.99989

Standard Condition

Pstd (hpa) : 1013  
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1008  
Ta(K) : 300

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1	18 holes	11.0	3.297	1.600	60	59.65
2	13 holes	8.4	2.881	1.402	54	53.69
3	10 holes	6.6	2.554	1.246	50	49.71
4	7 holes	4.0	1.988	0.977	42	41.76
5	5 holes	2.6	1.603	0.794	36	35.79

Notes:  $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$ ,  $X = Z/m - b$ ,  $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship (Linear Regression)

Slope(m): 29.330 Intercept(b): 12.813 Correlation Coefficient(r): 0.9995

Checked by: Magnum Fan

Date: 16/10/16

High-Volume TSP Sampler  
5-Point Calibration Record

Location : AQMS1  
Calibrated by : P.F. Yeung  
Date : 11/10/2016

Sampler

Model : TE-5170  
Serial Number : S/N 1253

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
Service Date : 14 Mar 2016  
Slope (m) : 2.10326  
Intercept (b) : -0.06696  
Correlation Coefficient(r) : 0.99989

Standard Condition

Pstd (hpa) : 1013  
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1008  
Ta(K) : 300

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1	18 holes	11.8	3.415	1.656	57	56.67
2	13 holes	9.2	3.016	1.466	50	49.71
3	10 holes	6.8	2.593	1.264	44	43.74
4	7 holes	4.4	2.085	1.023	37	36.79
5	5 holes	2.8	1.664	0.823	30	29.83

Notes:  $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$ ,  $X = Z/m - b$ ,  $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship (Linear Regression)

Slope(m): 31.561 Intercept(b): 4.011 Correlation Coefficient(r): 0.9991

Checked by: Magnum Fan

Date: 16/10/2016

High-Volume TSP Sampler  
5-Point Calibration Record

Location : ASR 1  
Calibrated by : P.F.Yeung  
Date : 11/10/2016

Sampler

Model : TE-5170  
Serial Number : S/N 0146

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
Service Date : 14 Mar 2016  
Slope (m) : 2.10326  
Intercept (b) : -0.06696  
Correlation Coefficient(r) : 0.99989

Standard Condition

Pstd (hpa) : 1013  
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1008  
Ta(K) : 300

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1	18 holes	11.8	3.415	1.656	52	51.70
2	13 holes	9.6	3.080	1.496	46	45.73
3	10 holes	7.0	2.630	1.282	39	38.77
4	7 holes	4.6	2.133	1.046	31	30.82
5	5 holes	2.8	1.664	0.823	22	21.87

Notes:  $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$ ,  $X = Z/m - b$ ,  $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship (Linear Regression)

Slope(m): 35.235      Intercept(b): -6.638      Correlation Coefficient(r): 0.9993

Checked by: Magnum Fan

Date: 16/10/2016

High-Volume TSP Sampler  
5-Point Calibration Record

Location : ASR 6  
Calibrated by : P.F. Yeung  
Date : 11/10/2016

Sampler

Model : TE-5170  
Serial Number : S/N 3957

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
Service Date : 14 Mar 2016  
Slope (m) : 2.10326  
Intercept (b) : -0.06696  
Correlation Coefficient(r) : 0.99989

Standard Condition

Pstd (hpa) : 1013  
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1008  
Ta(K) : 300

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1	18 holes	12.4	3.501	1.696	52	51.70
2	13 holes	10.0	3.144	1.527	46	45.73
3	10 holes	7.2	2.668	1.300	39	38.77
4	7 holes	4.6	2.132	1.046	30	29.83
5	5 holes	3.0	1.722	0.851	23	22.87

Notes:  $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$ ,  $X = Z/m - b$ ,  $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship (Linear Regression)

Slope(m): 33.861      Intercept(b): -5.694      Correlation Coefficient(r): 0.9997

Checked by: Magnum Fan

Date: 16/10/2016

# ENVIROTECH SERVICES CO.

## Calibration Report of Wind Meter

Date of Calibration : 1 November 2016

Brand of Test Meter: Davis

Model: Vantage Pro 2 (s/n: AS160104014)

Location : ASR5

### Procedures :

1. Wind Still Test: The wind speed sensor was hold by hand until it keep still
2. Wind Speed Test: The wind meter was on-site calibrated against the Anemometer
3. Wind Direction Test : The wind meter was on-site calibrated against the marine compass at four directions

### Results:

#### Wind Still Test

Wind Speed (m/s)
0.00

#### Wind Speed Test

Davis (m/s)	Anemomete (m/s)
1.2	1.3
2.5	2.8
3.3	3.6

#### Wind Direction Test

Davis (o)	Marine Compass (o)
271	270
1	0
91	90
179	180

Calibrated by:

Fai  
Yeung Ping Fai  
(Technical Officer)

Checked by :

Fat  
Ho Kam Fat  
(Senior Technical Officer)

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Mar 14, 2016 Rootsmeter S/N 0438320 Ta (K) - 295  
Operator Tisch Orifice I.D. - 2454 Pa (mm) - 745.49

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	1.4020	3.2	2.00
2	NA	NA	1.00	1.0060	6.4	4.00
3	NA	NA	1.00	0.9010	7.9	5.00
4	NA	NA	1.00	0.8590	8.8	5.50
5	NA	NA	1.00	0.7090	12.8	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9866	0.7037	1.4078	0.9957	0.7102	0.8896
0.9824	0.9765	1.9909	0.9914	0.9855	1.2581
0.9803	1.0880	2.2259	0.9893	1.0980	1.4066
0.9792	1.1399	2.3345	0.9882	1.1504	1.4753
0.9738	1.3735	2.8155	0.9828	1.3862	1.7792
Qstd slope (m) = 2.10326			Qa slope (m) = 1.31703		
intercept (b) = -0.06696			intercept (b) = -0.04232		
coefficient (r) = 0.99989			coefficient (r) = 0.99989		
y axis = SQRT[H2O(Pa/760) (298/Ta)]			y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

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

$$Qstd = Vstd/Time$$

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

$$Qa = Va/Time$$

For subsequent flow rate calculations:

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

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

# Certificate of Calibration

## 校正證書

Certificate No. : C165934  
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC16-2438)      Date of Receipt / 收件日期 : 26 October 2016

Description / 儀器名稱 : Anemometer  
Manufacturer / 製造商 : Lutron  
Model No. / 型號 : AM-4201  
Serial No. / 編號 : AF.27513  
Supplied By / 委託者 : Envirotech Services Co.  
Room 113, 1/F, My Loft, 9 Hoi Wing Road, Tuen Mun,  
New Territories, Hong Kong

### TEST CONDITIONS / 測試條件

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$   
Line Voltage / 電壓 : ---

Relative Humidity / 相對濕度 :  $(55 \pm 20)\%$

### TEST SPECIFICATIONS / 測試規範

Calibration check


DATE OF TEST / 測試日期 : 27 October 2016

### TEST RESULTS / 測試結果


The results apply to the particular unit-under-test only.  
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :  
- Testo Industrial Services GmbH, Germany

Tested By  
測試

  
T L Shek  
Assistant Engineer

Certified By  
核證

  
H C Chan  
Engineer

Date of Issue : 28 October 2016  
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗所書面批准。

# Certificate of Calibration

## 校正證書

Certificate No. : C165934

證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
2. The results presented are the mean of 10 measurements at each calibration point.
3. Test equipment :

Equipment ID

CL386

Description

Multi-function Measuring Instrument

Certificate No.

S12109

4. Test procedure : MA130N.

5. Results :

### Air Velocity

Applied Value (m/s)	UUT Reading (m/s)	Measured Correction		
		Value (m/s)	Measurement Uncertainty	
			Expanded Uncertainty (m/s)	Coverage Factor
2.0	1.8	+0.2	0.2	2.0
4.0	3.8	+0.2	0.2	2.0
6.0	5.8	+0.2	0.3	2.0
8.1	8.0	+0.1	0.3	2.0
10.0	10.0	0.0	0.4	2.0

Remarks : - The Measured Corrections are defined as :

Value = Applied Value - UUT Reading

- The expanded uncertainties are for a level of confidence of 95 %.

Note :

Only the original copy or the laboratory's certified true copy is valid.

The values given in this 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 environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited 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 the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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