

High-Volume TSP Sampler 5-POINT CALIBRATION DATA SHEET

CINOTECH

File No. MA11050/65/001

Station ASR 9A - Siu Ho Wan MTRC Depot Operator: WK
 Date: 18-Oct-11 Next Due Date: 17-Dec-11
 Equipment No.: A-01-65 Serial No. 3221

Ambient Condition			
Temperature, Ta (K)	299.8	Pressure, Pa (mmHg)	761.7

Orifice Transfer Standard Information					
Equipment No.:	A-04-01	Slope, mc	0.0568	Intercept, bc	-0.0432
Last Calibration Date:	9-Oct-11	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	8-Oct-12	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler					
Calibration Point	Orifice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) X - axis	ΔW (HVS), in. of oil	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ Y-axis
1	12.0	3.46	61.63	8.3	2.88
2	10.2	3.19	56.88	7.1	2.66
3	7.3	2.70	48.24	5.1	2.25
4	5.1	2.25	40.44	3.3	1.81
5	3.1	1.76	31.70	1.9	1.38

By Linear Regression of Y on X

Slope, mw = 0.0505 Intercept, bw : -0.2169

Correlation coefficient* = 0.9994

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; $W = (mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ 3.83

Remarks: _____

Conducted by: Wk Tang Signature: [Signature]
 Checked by: [Signature] Signature: [Signature]

Date: 18/10/11
 Date: 18 October 2011

High-Volume TSP Sampler 5-POINT CALIBRATION DATA SHEET

CINOTECH

File No. MA11050/66/001

Station ASR 9C - Siu Ho Wan MTRC Depot Operator: WK
 Date: 18-Oct-11 Next Due Date: 17-Dec-11
 Equipment No.: A-01-66 Serial No. 3217

Ambient Condition			
Temperature, Ta (K)	299.7	Pressure, Pa (mmHg)	761.5

Orifice Transfer Standard Information					
Equipment No.:	A-04-01	Slope, mc	0.0568	Intercept, bc	-0.0432
Last Calibration Date:	9-Oct-11	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	8-Oct-12	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler					
Calibration Point	Orifice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) X - axis	ΔW (HVS), in. of oil	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ Y-axis
1	11.2	3.34	59.57	7.7	2.77
2	9.6	3.09	55.21	6.3	2.51
3	7.7	2.77	49.52	5.0	2.23
4	4.8	2.19	39.26	3.2	1.79
5	3.3	1.81	32.68	2.0	1.41

By Linear Regression of Y on X

Slope, mw = 0.0490 Intercept, bw = -0.1742
 Correlation coefficient* = 0.9986

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM
 From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; $W = (mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ 3.75

Remarks: _____

Conducted by: Wk. Tang Signature: [Signature]
 Checked by: [Signature] Signature: [Signature]

Date: 18/10/11
 Date: 18 October 2011

TEST REPORT

Description Calibration Orifice
Serial No. 1536
Model No. G25A
Date 9 October 2011

Manufacturer Thermo Andersen
Temperature, Ta (K) 298
Pressure, Pa (mmHg) 762.3

Plate	Diff.Vol (m ³)	Diff.Time (min)	Diff.Hg (mm)	Diff.H ₂ O (in.)
1	1.00	1.3760	3.4	2.00
2	1.00	0.9740	6.4	4.00
3	1.00	0.8730	7.9	5.00
4	1.00	0.8320	8.6	5.50
5	1.00	0.6890	12.8	8.00

DATA TABULATION

Vstd	(X axis) Qstd	(Y axis)
0.9985	0.7257	1.4163
0.9946	1.0211	2.0030
0.9926	1.1370	2.2394
0.9917	1.1919	2.3487
0.9861	1.4313	2.8326

Y axis= $\text{SQRT}[\text{H}_2\text{O}(\text{Pa}/760)(298/\text{Ta})]$
Qstd Slope (m) = 2.00766
Intercept (b) = -0.04318
Coefficient (r) = 0.99999

Va	(X axis) Qa	(Y axis)
0.9955	0.7235	0.8842
0.9916	1.0181	1.2505
0.9896	1.1336	1.3981
0.9887	1.1884	1.4664
0.9832	1.4270	1.7685

Y axis= $\text{SQRT}[\text{H}_2\text{O}(\text{Ta}/\text{Pa})]$
Qa Slope (m) = 1.25716
Intercept (b) = -0.02696
Coefficient (r) = 0.99999

CALCULATIONS

$V_{\text{std}} = \text{Diff. Vol}[(\text{Pa} - \text{Diff. Hg})/760](298/\text{Ta})$
 $Q_{\text{std}} = V_{\text{std}}/\text{Time}$
 $V_{\text{a}} = \text{Diff. Vol}[(\text{Pa} - \text{Diff. Hg})/\text{Pa}]$
 $Q_{\text{a}} = V_{\text{a}}/\text{Time}$

For subsequent flow rate calculations:

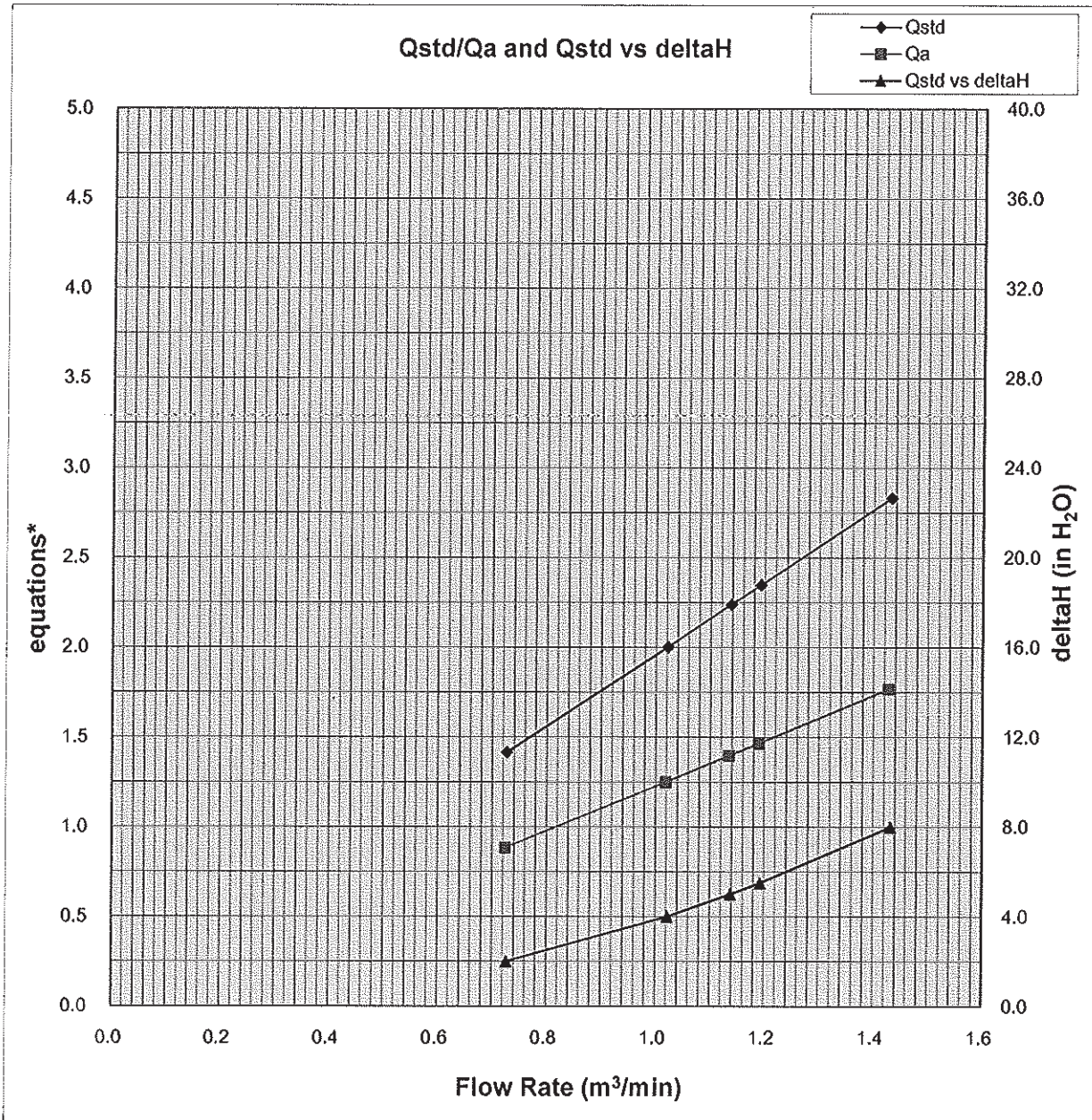
$Q_{\text{std}} = l/m\{[\text{SQRT}(\text{H}_2\text{O}(\text{Pa}/760)(298/\text{Ta}))] - b\}$
 $Q_{\text{a}} = l/m\{[\text{SQRT} \text{H}_2\text{O}(\text{Ta}/\text{Pa})] - b\}$

PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**

Patrick Tse

PATRICK TSE
Laboratory Manager

TEST REPORT



Y-axis equations:

Qstd series: $\text{SQRT}[\Delta H(\text{Pa}/\text{Pstd})(\text{Tstd}/\text{Ta})]$

Qa series: $\text{SQRT}[\Delta H(\text{Ta}/\text{Pa})]$

TEST REPORT

APPLICANT: Cinotech Consultants Limited
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/111021/1A
Date of Issue:	2011-10-24
Date Received:	2011-10-21
Date Tested:	2011-10-21
Date Completed:	2011-10-24
Next Due Date:	2011-12-23

ATTN: Mr. Henry Leung

Page: 1 of 1

Certificate of Calibration

Item for Calibration:

Description	: Laser Dust Monitor
Manufacturer	: Sibata
Model No.	: LD-3
Serial No.	: 251634
Sensitivity (K) 1 CPM	: 0.001 mg/m ³
Sen. Adjustment Scale Setting	: 550 CPM
Equipment No.	: A-02-01

Test Conditions:

Room Temperature	: 21 degree Celsius
Relative Humidity	: 68%

Test Specifications & Methodology:

1. Instruction and Operation Manual High Volume Sampler, Andersen Samplers, Inc.
2. In-house method in according to the instruction manual: The Laser Dust Monitor was compared with a calibrated High Volume Sampler and the result was used to generate the Correlation Factor (CF) between the Laser Dust Monitor and High Volume Sampler.

Results:

Correlation Factor (CF)	0.0032
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PREPARED AND CHECKED BY:

For and On Behalf of **WELLAB Ltd.**


PATRICK TSE
Laboratory Manager

TEST REPORT

APPLICANT: Cinotech Consultants Limited
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/110901/2
Date of Issue:	2011-09-03
Date Received:	2011-09-01
Date Tested:	2011-09-01
Date Completed:	2011-09-03
Next Due Date:	2011-11-02

ATTN: Mr. Henry Leung

Page: 1 of 1

Certificate of Calibration

Item for Calibration:

Description	: Laser Dust Monitor
Manufacturer	: Sibata
Model No.	: LD-3B
Serial No.	: 853944
Sensitivity (K) 1 CPM	: 0.001 mg/m ³
Sen. Adjustment Scale Setting	: 685 CPM
Equipment No.	: A-02-04

Test Conditions:

Room Temperature	: 22 degree Celsius
Relative Humidity	: 66%

Test Specifications & Methodology:

1. Instruction and Operation Manual High Volume Sampler, Andersen Samplers, Inc.
2. In-house method in according to the instruction manual: The Laser Dust Monitor was compared with a calibrated High Volume Sampler and the result was used to generate the Correlation Factor (CF) between the Laser Dust Monitor and High Volume Sampler.

Results:

Correlation Factor (CF)	0.0031
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PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**


PATRICK TSE
Laboratory Manager

TEST REPORT

APPLICANT: Cinotech Consultants Limited
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/111007/1
Date of Issue:	2011-10-09
Date Received:	2011-10-07
Date Tested:	2011-10-07
Date Completed:	2011-10-09
Next Due Date:	2011-12-08

ATTN: Mr. Henry Leung

Page: 1 of 1

Certificate of Calibration

Item for Calibration:

Description	: Laser Dust Monitor
Manufacturer	: Sibata
Model No.	: LD-3B
Serial No.	: 954253
Sensitivity (K) 1 CPM	: 0.001 mg/m ³
Sen. Adjustment Scale Setting	: 685 CPM
Equipment No.	: A-02-05

Test Conditions:

Room Temperature	: 23 degree Celsius
Relative Humidity	: 65%

Test Specifications & Methodology:

1. Instruction and Operation Manual High Volume Sampler, Andersen Samplers, Inc.
2. In-house method in according to the instruction manual: The Laser Dust Monitor was compared with a calibrated High Volume Sampler and the result was used to generate the Correlation Factor (CF) between the Laser Dust Monitor and High Volume Sampler.

Results:

Correlation Factor (CF)	0.0032
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PREPARED AND CHECKED BY:

For and On Behalf of **WELLAB Ltd.**



PATRICK TSE
Laboratory Manager

TEST REPORT

APPLICANT: Cinotech Consultants Limited
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/110901/1
Date of Issue:	2011-09-03
Date Received:	2011-09-01
Date Tested:	2011-09-01
Date Completed:	2011-09-03
Next Due Date:	2011-11-02

ATTN: Mr. Henry Leung

Page: 1 of 1

Certificate of Calibration

Item for Calibration:

Description	: Laser Dust Monitor
Manufacturer	: Sibata
Model No.	: LD-3B
Serial No.	: 014750
Sensitivity (K) 1 CPM	: 0.001 mg/m ³
Sen. Adjustment Scale Setting	: 790 CPM
Equipment No.	: A-02-06

Test Conditions:

Room Temperature	: 22 degree Celsius
Relative Humidity	: 66%

Test Specifications & Methodology:

1. Instruction and Operation Manual High Volume Sampler, Andersen Samplers, Inc.
2. In-house method in according to the instruction manual: The Laser Dust Monitor was compared with a calibrated High Volume Sampler and the result was used to generate the Correlation Factor (CF) between the Laser Dust Monitor and High Volume Sampler.

Results:

Correlation Factor (CF)	0.0031
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PREPARED AND CHECKED BY:
For and On Behalf of **WELLAB Ltd.**


PATRICK TSE
Laboratory Manager

TEST REPORT

APPLICANT: Cinotech Consultants Limited
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/111021/1D
Date of Issue:	2011-10-24
Date Received:	2011-10-21
Date Tested:	2011-10-21
Date Completed:	2011-10-24
Next Due Date:	2011-12-23

ATTN: Mr. W. K. Tang

Page: 1 of 1

Certificate of Calibration

Item for Calibration:

Description	: Laser Dust Monitor
Manufacturer	: Sibata
Model No.	: LD-3B
Serial No.	: 095039
Sensitivity (K) 1 CPM	: 0.001 mg/m ³
Sen. Adjustment Scale Setting	: 764 CPM
Equipment No.	: A-02-08

Test Conditions:

Room Temperature	: 21 degree Celsius
Relative Humidity	: 68%

Test Specifications & Methodology:

1. Instruction and Operation Manual High Volume Sampler, Andersen Samplers, Inc.
2. In-house method in according to the instruction manual: The Laser Dust Monitor was compared with a calibrated High Volume Sampler and the result was used to generate the Correlation Factor (CF) between the Laser Dust Monitor and High Volume Sampler.

Results:

Correlation Factor (CF)	0.0031
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PREPARED AND CHECKED BY:

For and On Behalf of **WELLAB Ltd.**



PATRICK TSE
Laboratory Manager

TEST REPORT

APPLICANT: Cinotech Consultants Limited
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/110826/2
Date of Issue:	2011-08-29
Date Received:	2011-08-26
Date Tested:	2011-08-26
Date Completed:	2011-08-29
Next Due Date:	2011-10-28

ATTN: Mr. W. K. Tang

Page: 1 of 1

Certificate of Calibration

Item for Calibration:

Description	: Laser Dust Monitor
Manufacturer	: Sibata
Model No.	: LD-3B
Serial No.	: 095050
Sensitivity (K) 1 CPM	: 0.001 mg/m ³
Sen. Adjustment Scale Setting	: 577 CPM
Equipment No.	: A-02-09

Test Conditions:

Room Temperature	: 22 degree Celsius
Relative Humidity	: 69%

Test Specifications & Methodology:

1. Instruction and Operation Manual High Volume Sampler, Andersen Samplers, Inc.
2. In-house method in according to the instruction manual: The Laser Dust Monitor was compared with a calibrated High Volume Sampler and the result was used to generate the Correlation Factor (CF) between the Laser Dust Monitor and High Volume Sampler.

Results:

Correlation Factor (CF)	0.0031
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PREPARED AND CHECKED BY:

For and On Behalf of **WELLAB Ltd.**



PATRICK TSE
Laboratory Manager

TEST REPORT

APPLICANT: Cinotech Consultants Limited
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/110826/3
Date of Issue:	2011-08-29
Date Received:	2011-08-26
Date Tested:	2011-08-26
Date Completed:	2011-08-29
Next Due Date:	2011-10-28

ATTN: Mr. W. K. Tang

Page: 1 of 1

Certificate of Calibration

Item for Calibration:

Description : Laser Dust Monitor
 Manufacturer : Sibata
 Model No. : LD-3B
 Serial No. : 095029
 Sensitivity (K) 1 CPM : 0.001 mg/m³
 Sen. Adjustment Scale Setting : 551 CPM
 Equipment No. : A-02-10

Test Conditions:

Room Temperature : 22 degree Celsius
 Relative Humidity : 69%

Test Specifications & Methodology:

1. Instruction and Operation Manual High Volume Sampler, Andersen Samplers, Inc.
2. In-house method in according to the instruction manual: The Laser Dust Monitor was compared with a calibrated High Volume Sampler and the result was used to generate the Correlation Factor (CF) between the Laser Dust Monitor and High Volume Sampler.

Results:

Correlation Factor (CF)	0.0030
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PREPARED AND CHECKED BY:

For and On Behalf of **WELLAB Ltd.**



PATRICK TSE
Laboratory Manager

TEST REPORT

APPLICANT: Cinotech Consultants Limited
Room 1710, Technology Park,
18 On Lai Street,
Shatin, NT, Hong Kong

Test Report No.:	C/10/110510A
Date of Issue:	2011-05-10
Date Received:	2011-05-09
Date Tested:	2011-05-09
Date Completed:	2011-05-10
Next Due Date:	2011-11-09

ATTN: Mr. Henry Leung

Page: 1 of 2

Certificate of Calibration

Item for calibration:

Description : Weather Monitor II
Manufacturer : Davis Instruments
Model No. : 7440
Serial No. : MC20813A11

Test conditions:

Room Temperature : 22 degree Celsius
Relative Humidity : 64%

Test Specifications:

1. Performance check of anemometer
2. Performance check of wind direction sensor

Methodology:

In-house method with reference anemometer (RS232 Integral Vane Digital Anemometer)

PREPARED AND CHECKED BY:

For and On Behalf of **WELLAB Ltd.**


PATRICK TSE
Laboratory Manager

TEST REPORT

Test Report No.:	C/10/110510A
Date of Issue:	2011-05-10
Date Received:	2011-05-09
Date Tested:	2011-05-09
Date Completed:	2011-05-10
Next Due Date:	2011-11-09

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Results:

1. Performance check of anemometer

Air Velocity, m/s		Difference D (m/s)
Instrument Reading (V1)	Reference Value (V1)	D = V1 - V2
2.00	2.00	0.00

2. Performance check of wind direction sensor

Wind Direction (°)		Difference D (°)
Instrument Reading (W1)	Reference Value (W2)	D = W1 - W2
0.0	0.0	0
45.2	45.0	0.2
90.3	90.5	-0.2
135.1	135.0	0.1
180.2	180.0	0.2
224.6	225.0	-0.4
270.2	270.0	0.2
315.1	315.0	0.1
359.7	360.0	-0.3

*****END OF REPORT*****