TSI P/N 2800157

CERTIFICATE OF CALIBRATION AND TESTING

TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA
Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 http://www.tsi.com

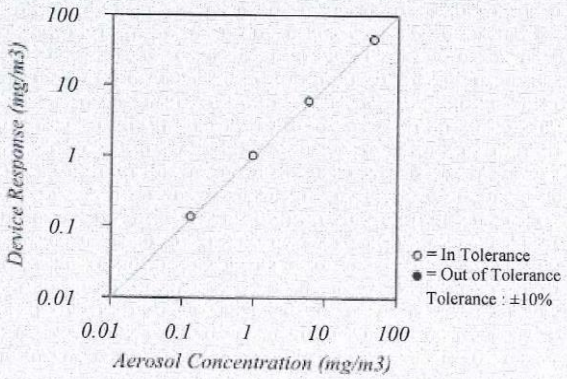
Environment Conditions		
Temperature	74.8 (23.8)	°F (°C)
Relative Humidity	26	%RH
Barometric Pressure	29.22 (989.5)	inHg (hPa)

Model	**8532**
Serial Number	**8532114409**

☒ As Left ☐ As Found

☒ In Tolerance ☐ Out of Tolerance

Concentration Linearity Plot



System ID: DTII01-02

FLOW AND PRESSURE VERIFICATION — **SYSTEM DTII01-02**

Parameter	Standard	Measured	Allowable Range	Parameter	Standard	Measured	Allowable Range
Flow lpm	3.0	3.1	2.85 ~ 3.15	Pressure kPa	98.9	98.9	93.96 ~ 103.85

TSI Incorporated does hereby certify that all materials, components, and workmanship used in the manufacture of this equipment are in strict accordance with the applicable specifications agreed upon by TSI and the customer and with all published specifications. All performance and acceptance tests required under this contract were successfully conducted according to required specifications. There is no NIST standard for optical mass measurements. Calibration of this instrument performed by TSI has been done using emery oil and has been nominally adjusted to respirable mass per standard ISO 12103-1, A1 test dust (Arizona dust). Our calibration ratio is greater than 1.2:1

Measurement Variable	System ID	Last Cal.	Cal. Due
Temp/Humidity	E005656	03-07-17	03-31-18
DC Voltage	E003314	05-03-17	05-31-18
Photometer	E003319	07-27-17	01-31-18
1 um PSL	679755	n/a	n/a
10 um PSL	167947	n/a	n/a
Flowmeter	E002471	04-20-17	04-30-18

Measurement Variable	System ID	Last Cal.	Cal. Due
Temp/Humidity	E005657	03-06-17	03-31-18
DC Voltage	E003315	05-03-17	05-31-18
Microbalance	M001324	11-02-16	11-30-18
3 um PSL	180387	n/a	n/a
Pressure	E003511	10-02-17	10-31-18

Calibrated

December 20, 2017
Date

TISCH Environmental

RECALIBRATION DUE DATE:
February 2, 2019

Certificate of Calibration

Calibration Certification Information				
Cal. Date:	February 2, 2018	**Rootsmeter S/N:** 438320	**Ta:** 294	°K
Operator:	Jim Tisch		**Pa:** 754.4	mm Hg
Calibration Model #:	TE-5025A	**Calibrator S/N:** **3465**		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4360	3.2	2.00
2	3	4	1	1.0140	6.4	4.00
3	5	6	1	0.9070	7.9	5.00
4	7	8	1	0.8680	8.8	5.50
5	9	10	1	0.7180	12.7	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H\left(Ta/Pa\right)}$ (y-axis)
1.0018	0.6977	1.4185	0.9958	0.6934	0.8829
0.9976	0.9838	2.0061	0.9915	0.9778	1.2486
0.9956	1.0977	2.2429	0.9895	1.0910	1.3959
0.9944	1.1456	2.3524	0.9883	1.1386	1.4641
0.9892	1.3777	2.8371	0.9832	1.3693	1.7657
QSTD	**m=**	**2.08721**	**QA**	**m=**	**1.30698**
	b=	**-0.04206**		**b=**	**-0.02618**
	r=	**0.99995**		**r=**	**0.99995**

Calculations			
Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	**Va=**	ΔVol((Pa-ΔP)/Pa)
Qstd=	Vstd/ΔTime	**Qa=**	Va/ΔTime
For subsequent flow rate calculations:			
Qstd=	$1/m\left(\left(\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}\right)-b\right)$	**Qa=**	$1/m\left(\left(\sqrt{\Delta H\left(Ta/Pa\right)}\right)-b\right)$

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H2O)	
ΔP: rootsmeter manometer reading (mm Hg)	
Ta: actual absolute temperature (°K)	
Pa: actual barometric pressure (mm Hg)	
b: intercept	
m: slope	

RECALIBRATION
US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

Tisch Environmental, Inc.
45 South Miami Avenue
Village of Cleves, OH 45002
www.tisch-env.com
TOLL FREE: (877)263-7610
FAX: (513)467-9009

InnoTech Instrumentation Co. Ltd.
創新科儀有限公司

HIVOL SAMPLER CALIBRATION DATA SHEET (TSP)

Site Information

Location:	Tsoi Kung Po Secondary School	Site ID:	M-A3	Date:	24-Feb-2018
Serial No:	1048	Model:	TE-5170X	Operator:	Chris

Ambient Condition

Corrected Pressure (mm Hg):	764.3	Temperature (deg K):	293.2

Calibration Orifice

Model:	TE-5025	Slope:	2.08721
Serial No.:	3465	Intercept:	-0.04206
Calibration Due Date:	2-Feb-19	Corr. Coeff:	0.99995

Calibration Data

Plate or Test #	In,H2O (In)	Qa, X-Axis (m3/min)	I, CFM (chart)	IC, Y-Axia (corrected)
1	1.00	0.505	29.0	29.32
2	2.70	0.816	37.0	37.41
3	4.60	1.059	43.0	43.48
4	4.90	1.092	44.0	44.49
5	5.30	1.135	45.0	45.50

Sampler Calibtation Relationship (Qa on x-axis, IC on y-axis)

m= 25.6306 b= 16.4196 Corr. Coeff= 0.9999

Sampler set point(SSP) 47 CFM

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
(1.21*m+b)/[Sqrt(298/Tav)(Pav/760)]

m = sampler slope
b = sampler intercept
I = chart response
Tav = average temperature
Pav = average pressure

Checked by: _____ Date: 24-Feb-18