



ANNEX D1

CALIBRATION CERTIFICATES FOR DUST
MONITORING EQUIPMENT

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM1	Date of Calibration:	9-Apr-25
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	9-Jun-25
	Operator:	P.F.Yeung

CONDITIONS

	1013	Corrected Pressure (mm Hg)	759.8
Temperature (°C)	25.0	Temperature (K)	298

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.0	5.0	10.0	1.542	52	52.01	Slope= 32.896 Intercept= 0.2523 Corr. Coeff.= 0.9960
13	4.0	4.0	8.0	1.382	45	45.01	
10	2.9	2.9	5.8	1.180	38	38.00	
7	1.9	1.9	3.8	0.960	32	32.00	
5	1.4	1.4	2.8	0.827	28	28.00	

Calculations:

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

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)

For subsequent calculation of sampler flow:

$$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

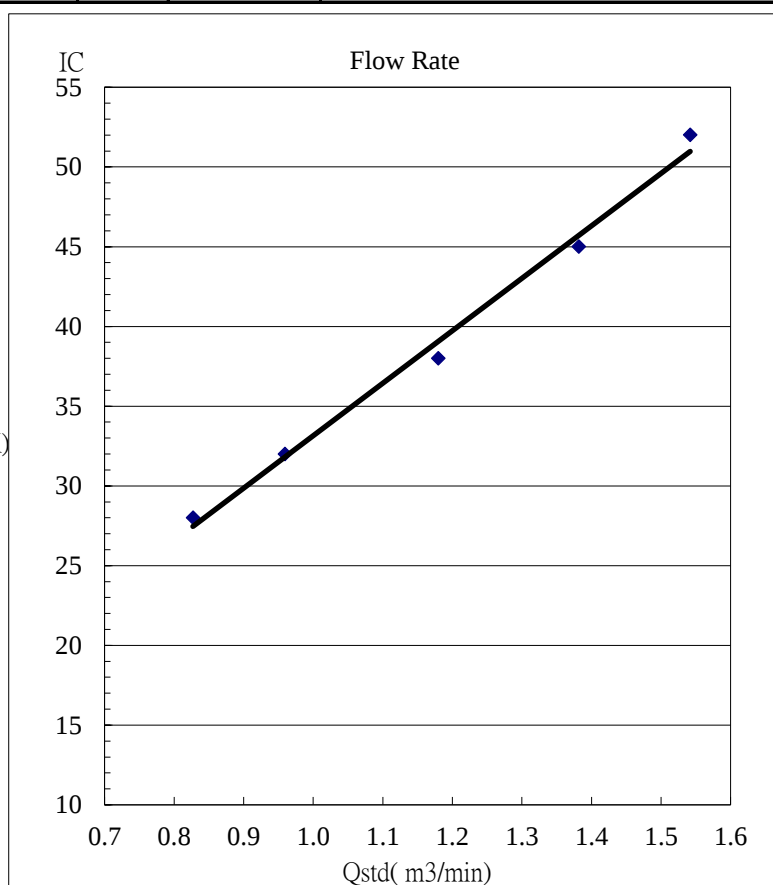
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM2	Date of Calibration:	9-Apr-25
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	9-Jun-25
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1013	Corrected Pressure (mm Hg)	759.8
Temperature (°C)	25.0	Temperature (K)	298

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.9	6.0	11.9	1.680	55	55.01	Slope= 28.738 Intercept= 6.645 Corr. Coeff.= 0.9961
13	5.0	5.0	10.0	1.542	50	50.01	
10	3.6	3.5	7.1	1.303	45	45.01	
7	2.4	2.3	4.7	1.065	38	38.00	
5	1.5	1.4	2.9	0.841	30	30.00	

Calculations:

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

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)

For subsequent calculation of sampler flow:

$$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

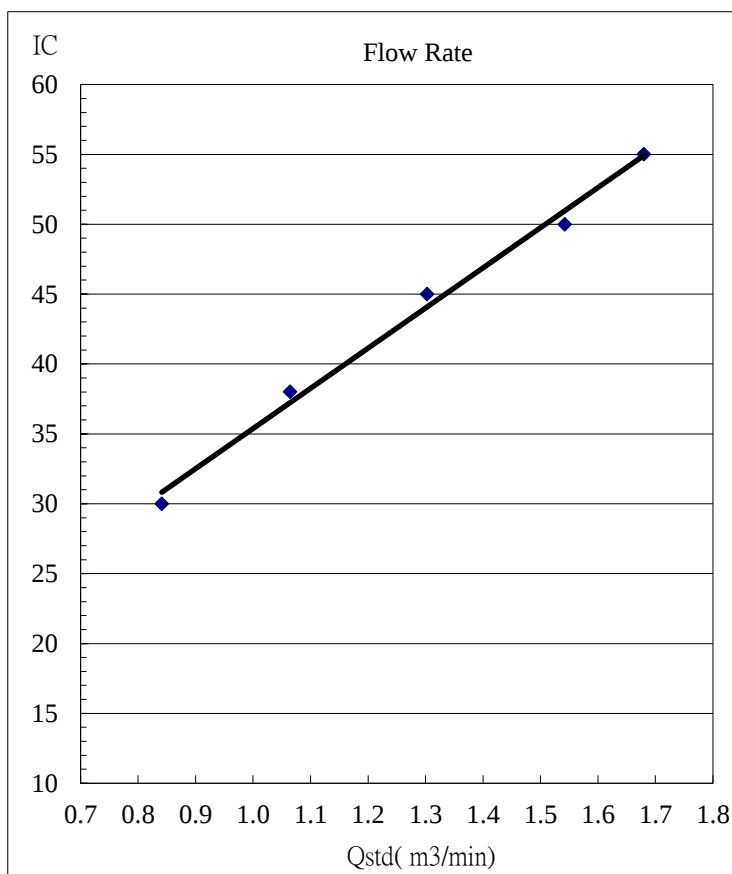
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM3	Date of Calibration:	9-Apr-25
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	9-Jun-25
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1013	Corrected Pressure (mm Hg)	759.8
Temperature (°C)	25.0	Temperature (K)	298

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.8	5.8	11.6	1.659	57	57.01	Slope= 31.353 Intercept= 5.3438 Corr. Coeff.= 0.9995
13	4.4	4.4	8.8	1.448	51	51.01	
10	3.5	3.5	7.0	1.294	46	46.01	
7	2.2	2.2	4.4	1.031	38	38.00	
5	1.3	1.3	2.6	0.798	30	30.00	

Calculations:

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

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)

For subsequent calculation of sampler flow:

$$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

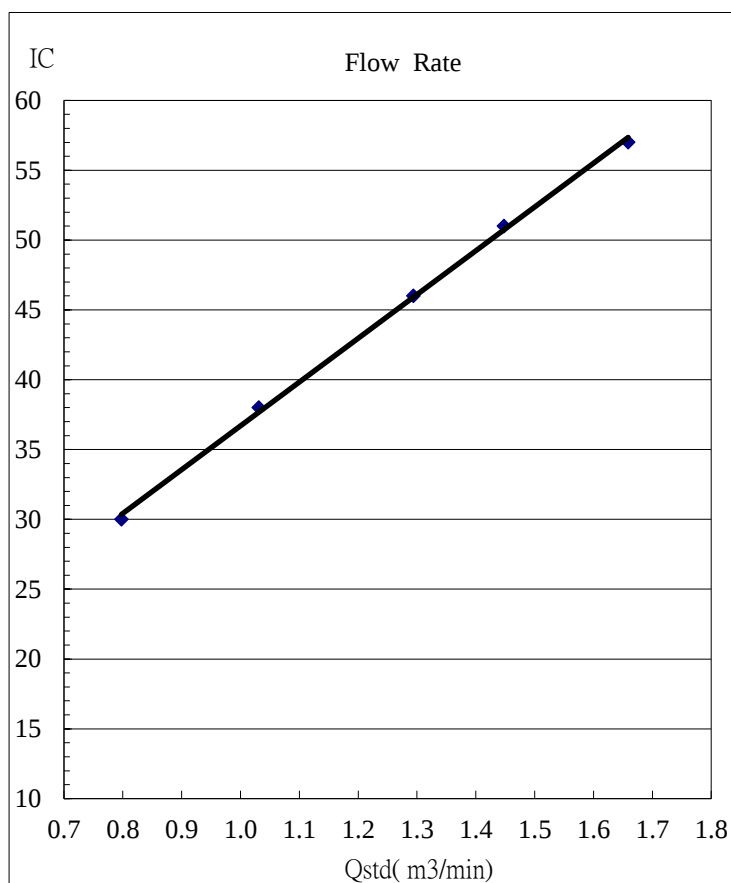
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM4	Date of Calibration:	9-Apr-25
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	9-Jun-25
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1013	Corrected Pressure (mm Hg)	759.8
Temperature (°C)	25.0	Temperature (K)	298

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.9	6.0	11.9	1.680	57	57.01	Slope= 31.260 Intercept= 4.1528 Corr. Coeff.= 0.9983
13	4.9	4.9	9.8	1.527	51	51.01	
10	3.5	3.5	7	1.294	45	45.01	
7	2.4	2.3	4.7	1.065	38	38.00	
5	1.4	1.5	2.9	0.841	30	30.00	

Calculations:

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

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)

For subsequent calculation of sampler flow:

$$1/m((I) [\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

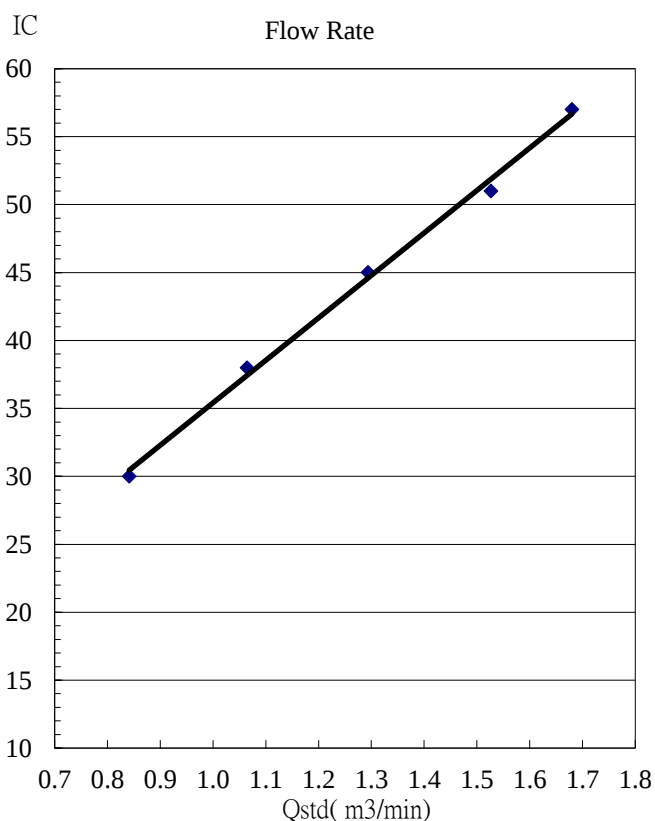
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM1	Date of Calibration:	9-Jun-25
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	9-Aug-25
	Operator:	P.F.Yeung

CONDITIONS

	1004	Corrected Pressure (mm Hg)	753.1
Temperature (°C)	32.7	Temperature (K)	305.7

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	4.9	4.9	9.8	1.501	52	51.12	Slope= 31.180 Intercept= 3.8458 Corr. Coeff.= 0.9951
13	3.9	3.9	7.8	1.342	46	45.22	
10	2.9	2.9	5.8	1.160	40	39.32	
7	1.6	1.6	3.2	0.868	33	32.44	
5	1.1	1.1	2.2	0.724	26	25.56	

Calculations:

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

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)

For subsequent calculation of sampler flow:

$$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

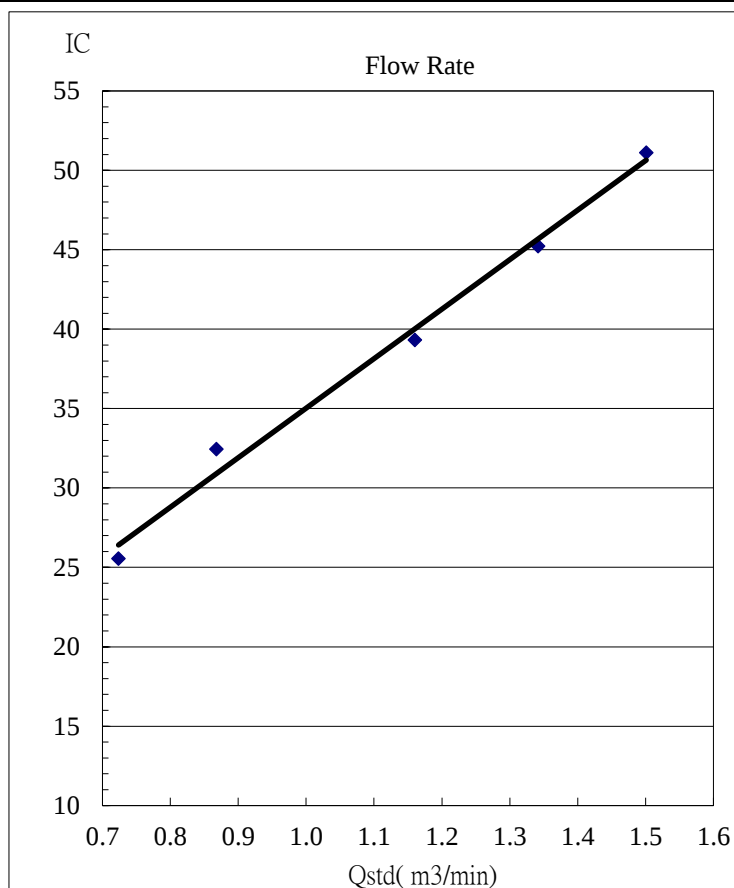
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM2	Date of Calibration: 9-Jun-25
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date: 9-Aug-25
	Operator: P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1004	Corrected Pressure (mm Hg)	753.1
Temperature (°C)	32.7	Temperature (K)	305.7

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.0	6.0	12.0	1.658	54	53.09	Slope= 29.964 Intercept= 4.0069 Corr. Coeff.= 0.9982
13	4.6	4.6	9.2	1.455	49	48.17	
10	3.4	3.4	6.8	1.254	43	42.27	
7	2.3	2.3	4.6	1.036	35	34.41	
5	1.3	1.3	2.6	0.785	28	27.53	

Calculations:

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

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)

For subsequent calculation of sampler flow:

$$1/m((I) [\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

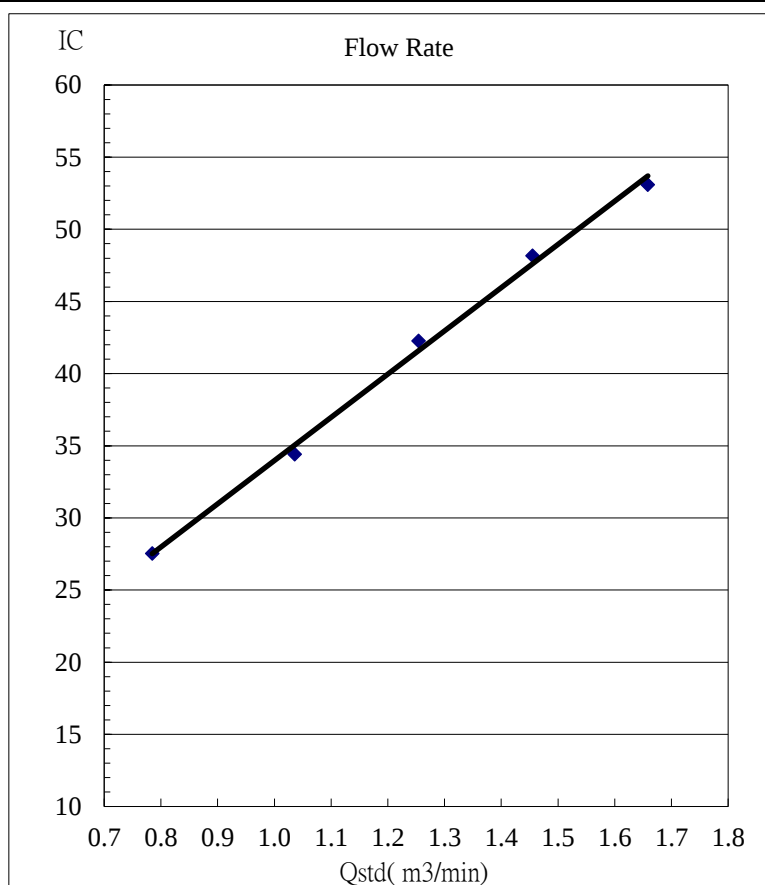
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM3				Date of Calibration:		9-Jun-25	
Name and Model : TISCH HVS Model TE-5170				Next Calibration Date:		9-Aug-25	
				Operator:		P.F.Yeung	

CONDITIONS							
Sea Level Pressure (hpa)				1004		Corrected Pressure (mm Hg)	
Temperature (°C)				32.7		Temperature (K)	
				753.1		305.7	

CALIBRATION ORIFICE							
Make:				TISCH		Qstd Slope	
Model:				TE-5025A		Qstd Intercept	
Serial#:				2454		-0.04938	

CALIBRATION							
Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.3	5.3	10.6	1.560	56	55.05	Slope= 28.897 Intercept= 9.6135 Corr. Coeff.= 0.9946
13	4.3	4.3	8.6	1.408	50	49.15	
10	3.0	3.0	6.0	1.180	45	44.24	
7	2.1	2.1	4.2	0.991	40	39.32	
5	1.3	1.3	2.6	0.785	32	31.46	

Calculations:

Qstd = $1/m[\text{Sqrt}(\text{H2O}(\text{Pa}/\text{Pstd})(\text{Tstd}/\text{Ta}))-b]$

IC = $I[\text{Sqrt}(\text{Pa}/\text{Pstd})(\text{Tstd}/\text{Ta})]$

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)

For subsequent calculation of sampler flow:

$1/m((I)[\text{Sqrt}(298/\text{Tav})(\text{Pav}/760)]-b)$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate

Qstd (m3/min)	IC
0.785	31.46
0.991	39.32
1.180	44.24
1.408	49.15
1.560	55.05

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM4	Date of Calibration:	9-Jun-25
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	9-Aug-25
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1004	Corrected Pressure (mm Hg)	753.1
Temperature (°C)	32.7	Temperature (K)	305.7

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.9	5.9	11.8	1.645	55	54.07	Slope= 31.445 Intercept= 3.3216 Corr. Coeff.= 0.9966
13	4.5	4.5	9.0	1.439	50	49.15	
10	3.4	3.3	6.7	1.245	44	43.25	
7	2.2	2.1	4.3	1.002	36	35.39	
5	1.4	1.3	2.7	0.799	28	27.53	

Calculations:

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

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)

For subsequent calculation of sampler flow:

$$1/m((I) [\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

