

Annex D1

Calibration Certificates for Dust Monitoring Equipment

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM1	Date of Calibration:	24-Aug-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	23-Oct-23
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1007	Corrected Pressure (mm Hg)	755.3
Temperature (°C)	29.0	Temperature (K)	302

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.06918
Model:	TE-5025A	Qstd Intercept	-0.04220
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.7	5.7	11.4	1.637	55	54.48	Slope= 29.245 Intercept= 6.549 Corr. Coeff.= 0.9985
13	4.5	4.5	9.0	1.457	49	48.54	
10	3.1	3.1	6.2	1.212	43	42.59	
7	2.0	2.0	4.0	0.978	36	35.66	
5	1.3	1.2	2.5	0.777	29	28.73	

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:

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

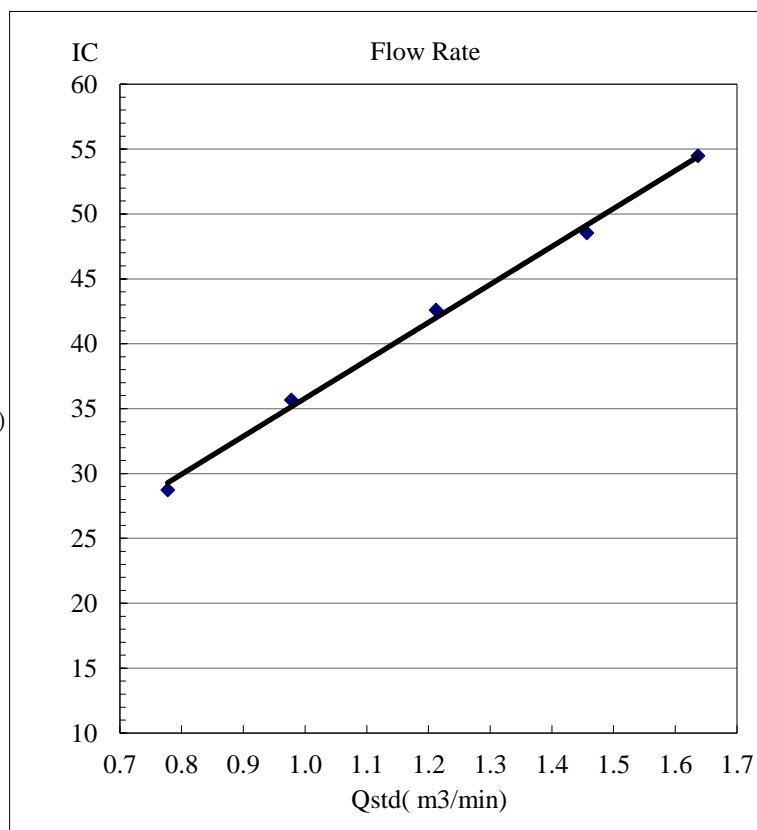
m = sampler slope

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:	24-Aug-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	23-Oct-23
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1007	Corrected Pressure (mm Hg)	755.3
Temperature (°C)	29.0	Temperature (K)	302

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.06918
Model:	TE-5025A	Qstd Intercept	-0.04220
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.1	6.1	12.2	1.692	53	52.50	Slope= 27.924 Intercept= 5.641 Corr. Coeff.= 0.9951
13	4.9	4.8	9.7	1.511	48	47.55	
10	3.1	3.2	6.3	1.222	41	40.61	
7	2.3	2.2	4.5	1.036	36	35.66	
5	1.4	1.5	2.9	0.836	28	27.74	

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:

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

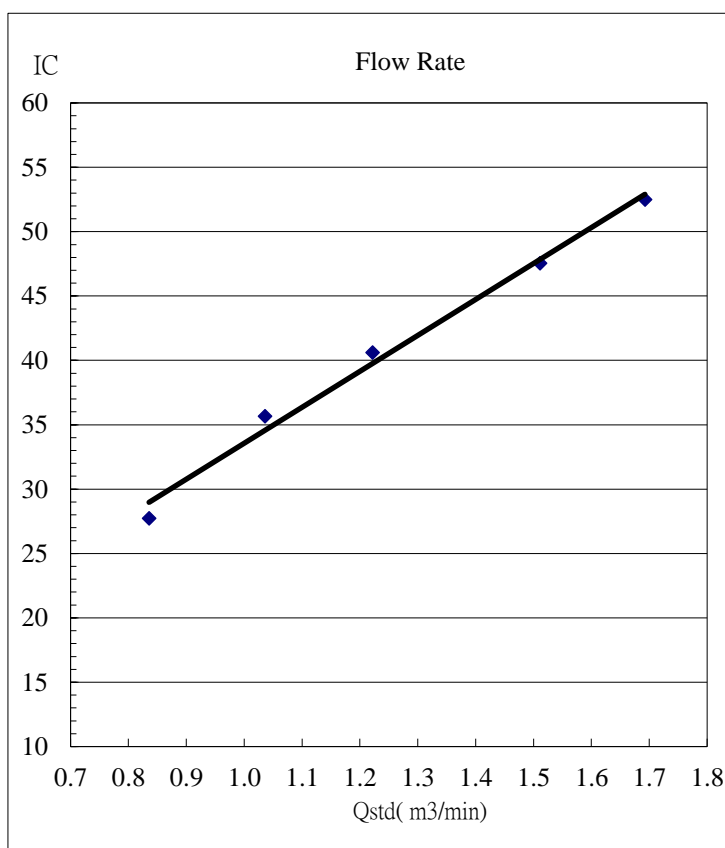
m = sampler slope

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:	24-Aug-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	23-Oct-23
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1007	Corrected Pressure (mm Hg)	755.3
Temperature (°C)	29.0	Temperature (K)	302

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.06918
Model:	TE-5025A	Qstd Intercept	-0.04220
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	5.9	11.9	1.672	61	60.42	Slope= 28.952 Intercept= 12.085 Corr. Coeff.= 0.9979
13	4.7	4.6	9.3	1.480	55	54.48	
10	3.5	3.4	6.9	1.278	50	49.53	
7	2.1	2.0	4.1	0.990	42	41.60	
5	1.4	1.3	2.7	0.807	35	34.67	

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:

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

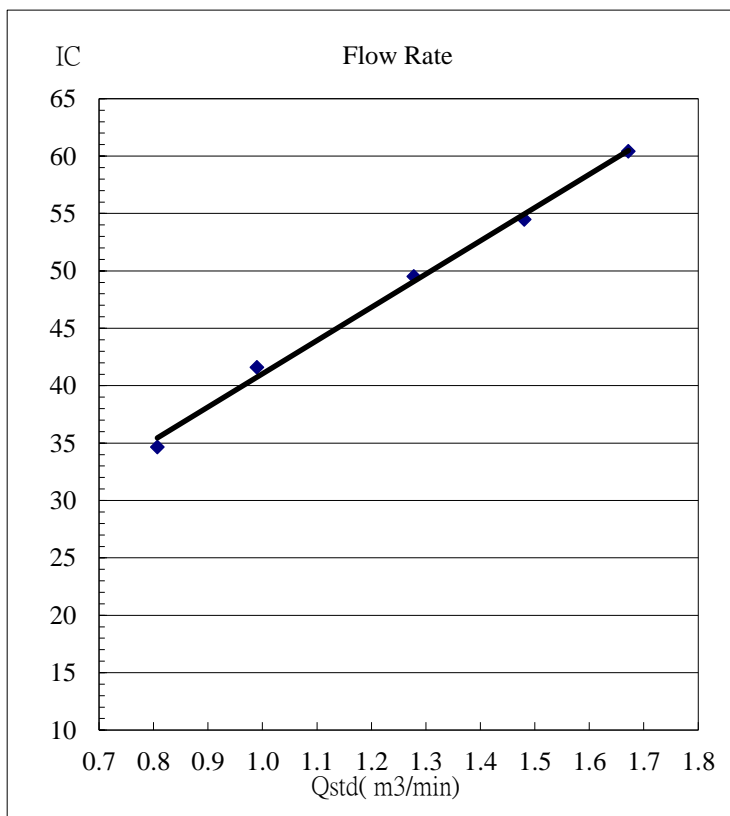
m = sampler slope

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:	24-Aug-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	23-Oct-23
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1007	Corrected Pressure (mm Hg)	755.3
Temperature (°C)	29.0	Temperature (K)	302

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.06918
Model:	TE-5025A	Qstd Intercept	-0.04220
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.1	6.1	12.2	1.692	57	56.46	Slope= 31.858 Intercept= 3.629 Corr. Coeff.= 0.9933
13	4.5	4.5	9.0	1.457	52	51.51	
10	3.6	3.6	7.2	1.305	45	44.57	
7	2.2	2.2	4.4	1.025	38	37.64	
5	1.3	1.3	2.6	0.792	28	27.74	

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:

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

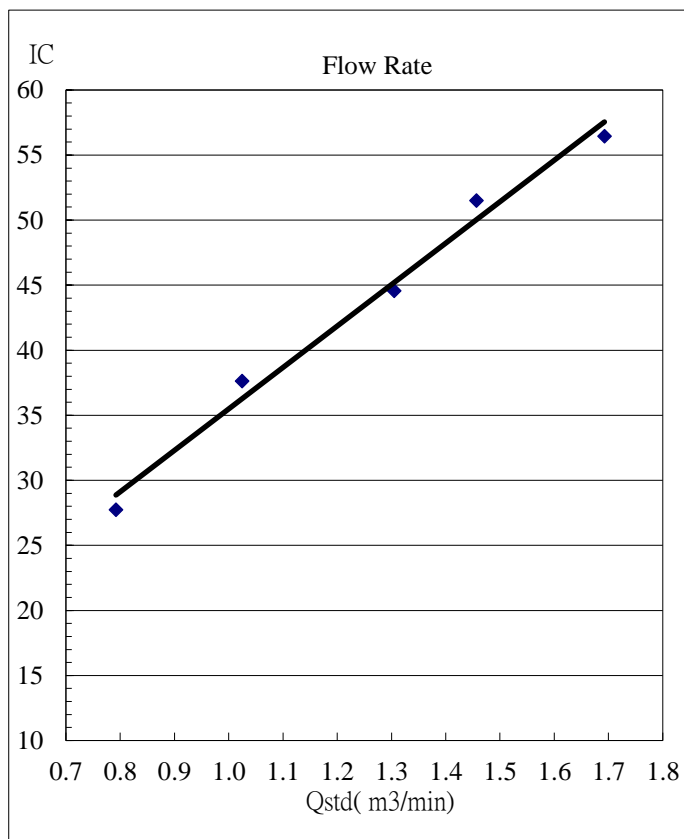
m = sampler slope

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:	24-Oct-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	23-Dec-23
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (°C)	20.6	Temperature (K)	299

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.06918
Model:	TE-5025A	Qstd Intercept	-0.04220
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.6	5.7	11.3	1.645	56	56.00	Slope= 32.550 Intercept= 4.006 Corr. Coeff.= 0.9915
13	4.0	3.9	7.9	1.379	51	51.00	
10	3.1	3.0	6.1	1.214	44	44.00	
7	2.1	2.0	4.1	0.999	36	36.00	
5	1.4	1.3	2.7	0.814	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:

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

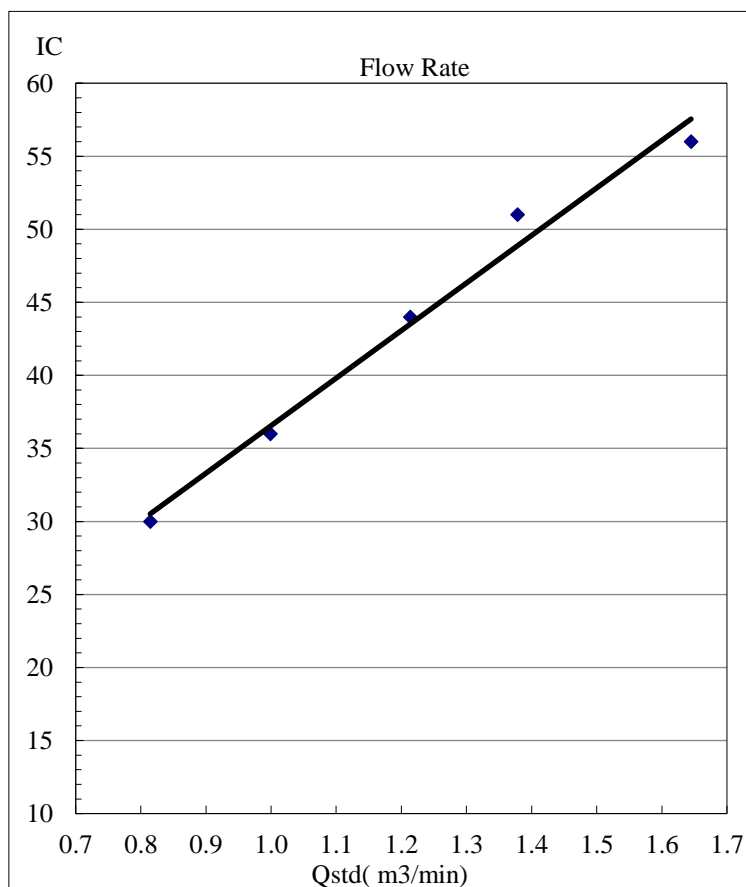
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID: AM2	Date of Calibration:	24-Oct-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	23-Dec-23
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (°C)	26.0	Temperature (K)	299

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.06918
Model:	TE-5025A	Qstd Intercept	-0.04220
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	5.9	11.9	1.687	53	53.00	Slope= 25.811 Intercept= 10.384 Corr. Coeff.= 0.9935
13	4.4	4.3	8.7	1.446	48	48.00	
10	3.0	3.0	6.0	1.204	43	43.00	
7	2.0	2.0	4.0	0.987	36	36.00	
5	1.3	1.3	2.6	0.800	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:

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

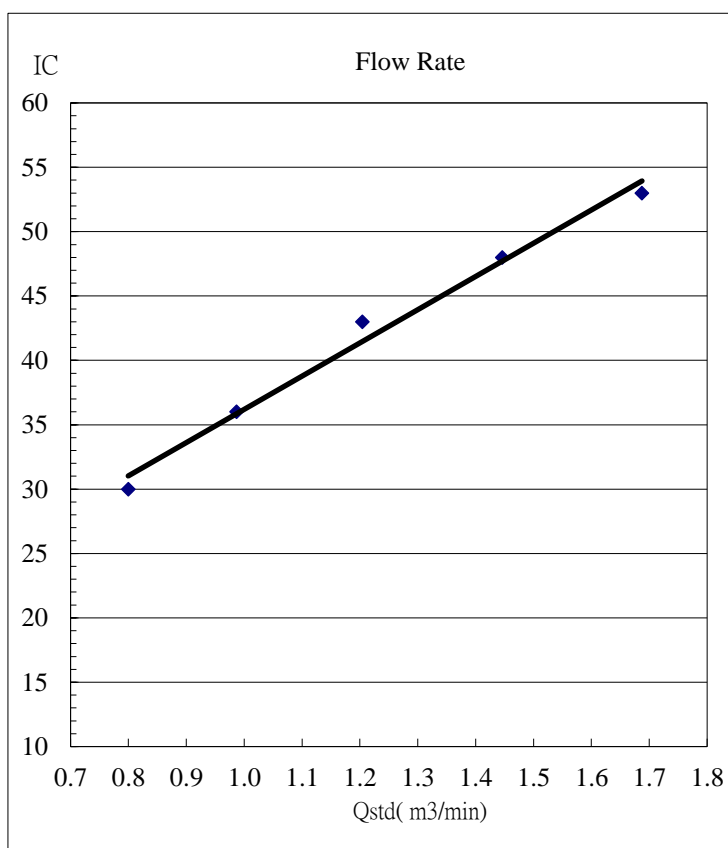
m = sampler slope

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:	24-Oct-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	23-Dec-23
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (°C)	26.0	Temperature (K)	299

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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	5.8	11.7	1.673	57	57.00	Slope= 27.980 Intercept= 10.675 Corr. Coeff.= 0.9964
13	4.6	4.5	9.1	1.478	52	52.00	
10	3.2	3.2	6.4	1.243	46	46.00	
7	2.1	2.1	4.2	1.011	40	40.00	
5	1.3	1.3	2.6	0.800	32	32.00	

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

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Pa = actual pressure during calibration (mm Hg)

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

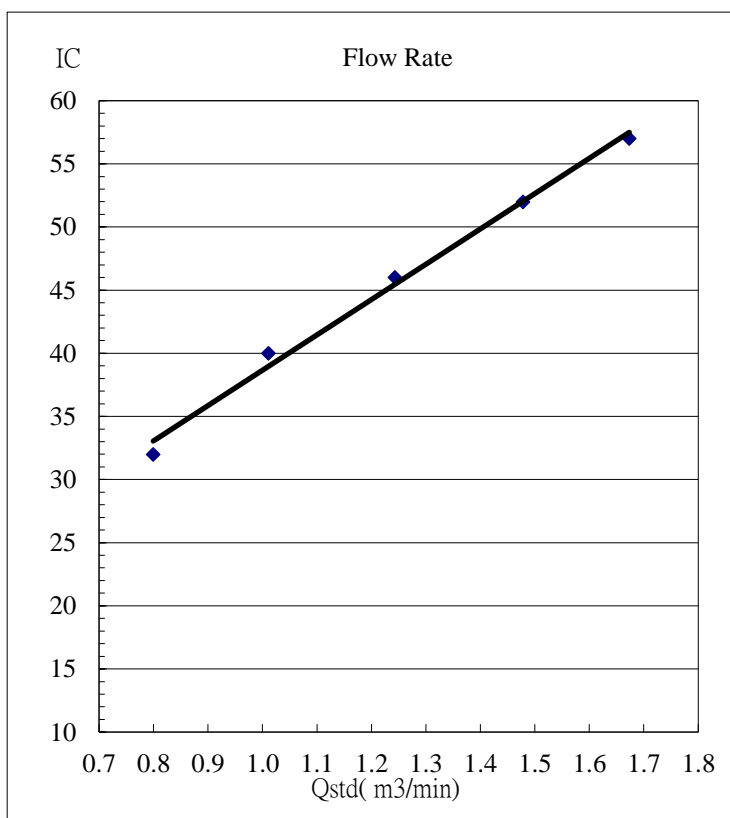
m = sampler slope

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:	24-Oct-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	23-Dec-23
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (°C)	26.0	Temperature (K)	299

CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.06918
Model:	TE-5025A	Qstd Intercept	-0.04220
Serial#:	2454		

CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.1	6.2	12.3	1.715	58	58.00	Slope= 31.691 Intercept= 3.979 Corr. Coeff.= 0.9991
13	4.8	4.8	9.6	1.518	52	52.00	
10	3.5	3.5	7.0	1.299	46	46.00	
7	2.4	2.4	4.8	1.079	38	38.00	
5	1.4	1.4	2.8	0.829	30	30.00	

Calculations:

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

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

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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

