Annex D1

Calibration Certificates for Dust Monitoring Equipment

TSP SAMPLER CALIBRATION CACULATION SPREADSHEET

Location ID: AM1	Date of Calibration: 26-Jun-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date: 25-Aug-23
	Operator: P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1009	Corrected Pressure (mm Hg)	756.8
Temperature (°C)	30.0	Temperature (K)	303

CALIBRATION ORIFICE

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

CALIBRATION

Plate No.	H2O(L) (in)	H20(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.1	5.1	10.2	1.548	55	54.44	Slope= 32.147
13	4.1	4.1	8.2	1.390	50	49.49	Intercept= 4.931
10	2.8	2.7	5.5	1.142	43	42.56	Corr. Coeff.= 0.9987
7	2.0	1.9	3.9	0.965	36	35.64	
5	1.2	1.1	2.3	0.746	29	28.71	

Calulations:

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)

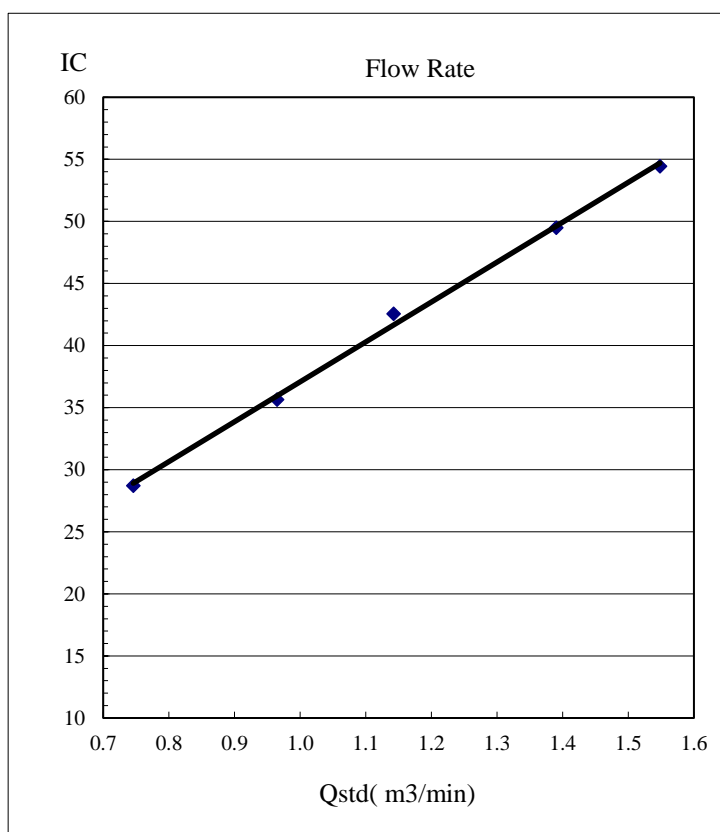For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate

TSP SAMPLER CALIBRATION CACULATION SPREADSHEET

Location ID: AM2	Date of Calibration:	26-Jun-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	25-Aug-23
	Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1009	Corrected Pressure (mm Hg)	756.8
Temperature (^{o}C)	30.0	Temperature (K)	303

CALIBRATION ORIFICE

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

CALIBRATION

Plate No.	H2O(L) (in)	H20(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.1	6.0	12.1	1.684	53	52.46	Slope= 26.059
13	4.5	4.4	8.9	1.448	48	47.51	Intercept= 8.709
10	3.5	3.5	7.0	1.286	42	41.58	Corr. Coeff.= 0.9952
7	2.2	2.3	4.5	1.035	35	34.65	
5	1.2	1.3	2.5	0.777	30	29.70	

Calulations:

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

$IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]$

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)

For subsequent calculation of sampler flow:
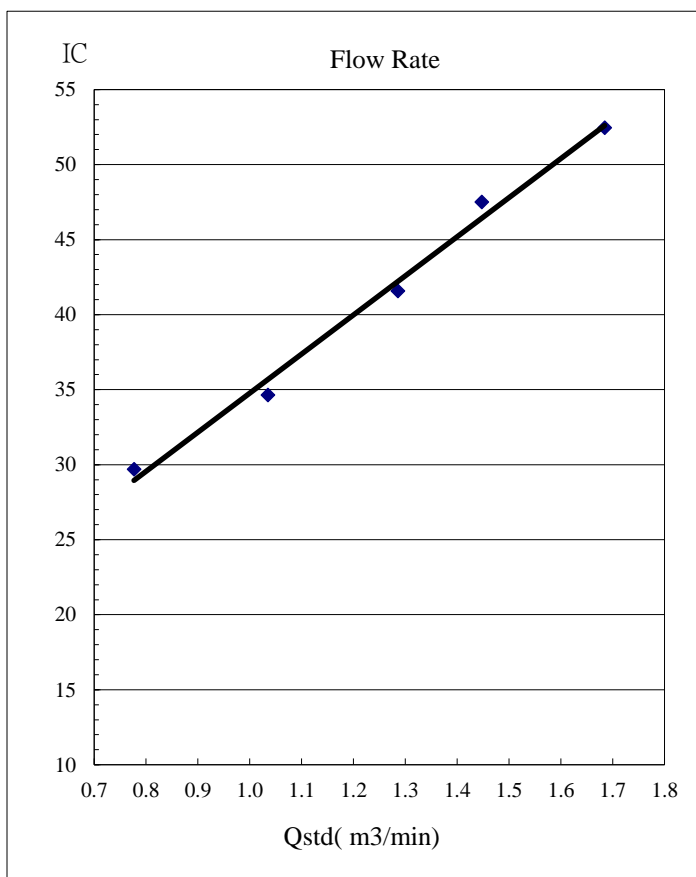
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate

TSP SAMPLER CALIBRATION CACULATION SPREADSHEET

Location ID: AM3	Date of Calibration:	26-Jun-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date:	25-Aug-23
	Operator:	P.F.Yeung

CONDITIONS

| Sea Level Pressure (hpa) | 1009 | Corrected Pressure (mm Hg) | 756.8 |
| Temperature (^{o}C) | 30.0 | Temperature (K) | 303 |

CALIBRATION ORIFICE

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

CALIBRATION

Plate No.	H2O(L) (in)	H20(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	5.3	5.3	10.6	1.578	60	59.39	Slope= 29.708
13	4.6	4.5	9.1	1.464	54	53.45	Intercept= 11.211
10	3.4	3.4	6.8	1.268	49	48.50	Corr. Coeff.= 0.9953
7	2.2	2.2	4.4	1.024	42	41.58	
5	1.3	1.2	2.5	0.777	35	34.65	

Calulations:

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

$IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]$

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)

For subsequent calculation of sampler flow:

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

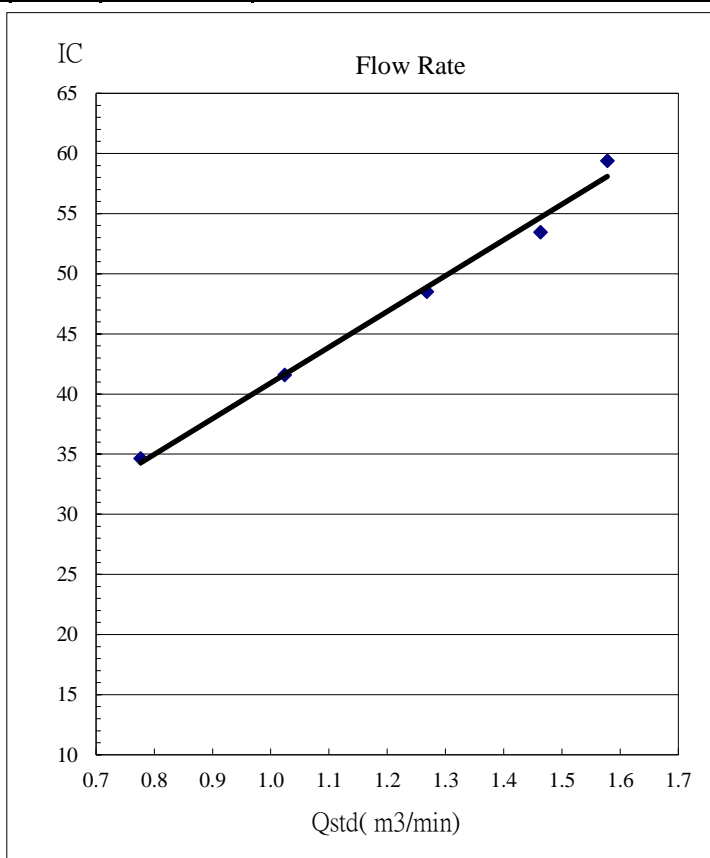m   = sampler slope

b   = sampler intercept

I   = chart response

Tav = daily average temperature

Pav = daily average pressure

IC

Flow Rate

Qstd(m3/min)

TSP SAMPLER CALIBRATION CACULATION SPREADSHEET

Location ID: AM4		Date of Calibration:	26-Jun-23
Name and Model : TISCH HVS Model TE-5170		Next Calibration Date:	25-Aug-23
		Operator:	P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1009	Corrected Pressure (mm Hg)	756.8
Temperature (^{o}C)	30.0	Temperature (K)	303

CALIBRATION ORIFICE

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

CALIBRATION

Plate No.	H2O(L) (in)	H20(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.1	6.1	12.2	1.691	57	56.42	Slope= 31.719
13	4.6	4.5	9.1	1.464	51	50.48	Intercept= 3.367
10	3.6	3.6	7.2	1.304	45	44.54	Corr. Coeff.= 0.998
7	2.2	2.2	4.4	1.024	37	36.63	
5	1.4	1.4	2.8	0.821	29	28.71	

Calulations:

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

$IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]$

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)

For subsequent calculation of sampler flow:
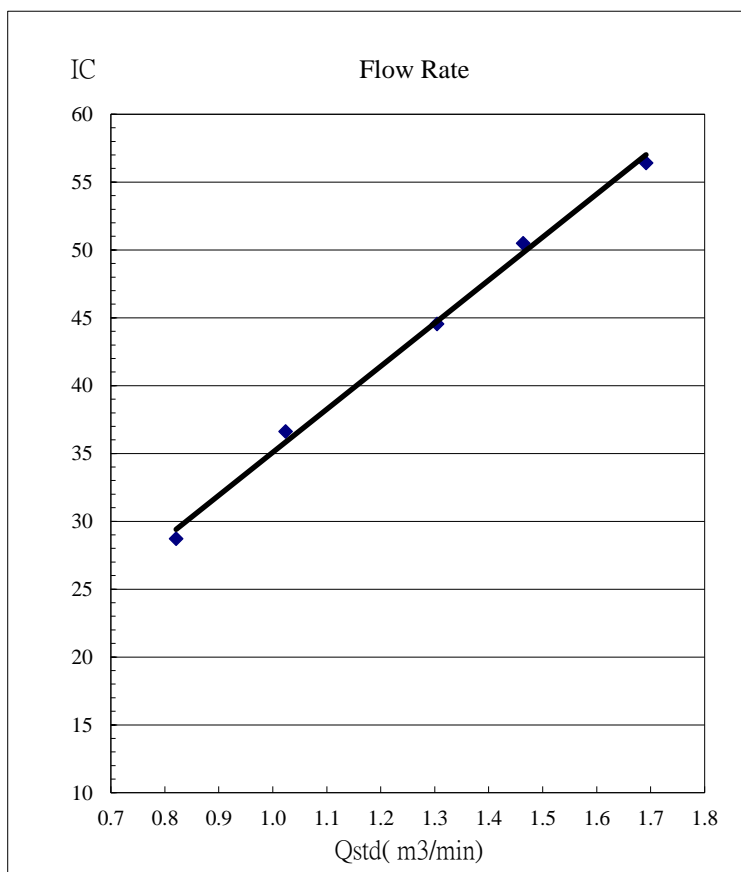
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate

TSP SAMPLER CALIBRATION CACULATION 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 (^{o}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)	H20(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
13	4.5	4.5	9.0	1.457	49	48.54	Intercept= 6.549
10	3.1	3.1	6.2	1.212	43	42.59	Corr. Coeff.= 0.9985
7	2.0	2.0	4.0	0.978	36	35.66	
5	1.3	1.2	2.5	0.777	29	28.73	

Calulations:

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

$IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]$

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)

For subsequent calculation of sampler flow:
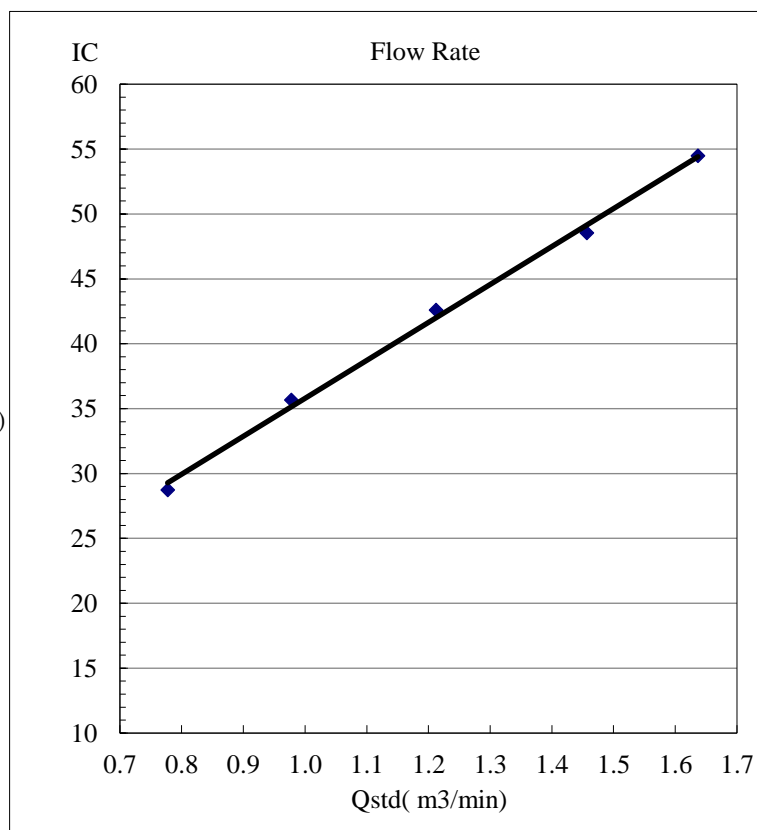
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate

TSP SAMPLER CALIBRATION CACULATION 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 (^{o}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)	H20(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
13	4.9	4.8	9.7	1.511	48	47.55	Intercept= 5.641
10	3.1	3.2	6.3	1.222	41	40.61	Corr. Coeff.= 0.9951
7	2.3	2.2	4.5	1.036	36	35.66	
5	1.4	1.5	2.9	0.836	28	27.74	

Calulations:

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

$IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]$

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)

For subsequent calculation of sampler flow:
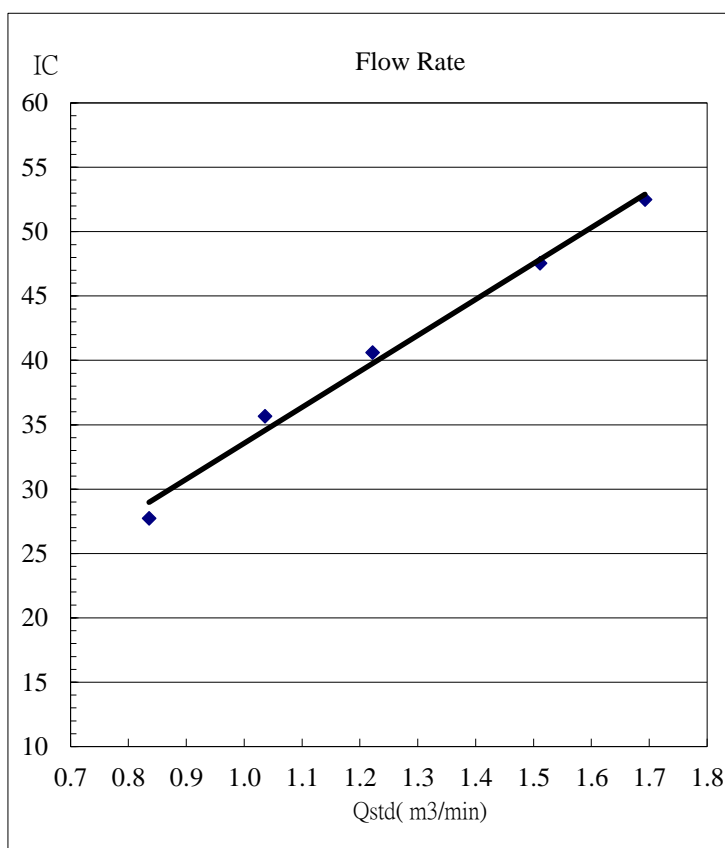
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate

TSP SAMPLER CALIBRATION CACULATION 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 (^{o}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)	H20(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
13	4.7	4.6	9.3	1.480	55	54.48	Intercept= 12.085
10	3.5	3.4	6.9	1.278	50	49.53	Corr. Coeff.= 0.9979
7	2.1	2.0	4.1	0.990	42	41.60	
5	1.4	1.3	2.7	0.807	35	34.67	

Calulations:

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

$IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]$

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)

For subsequent calculation of sampler flow:
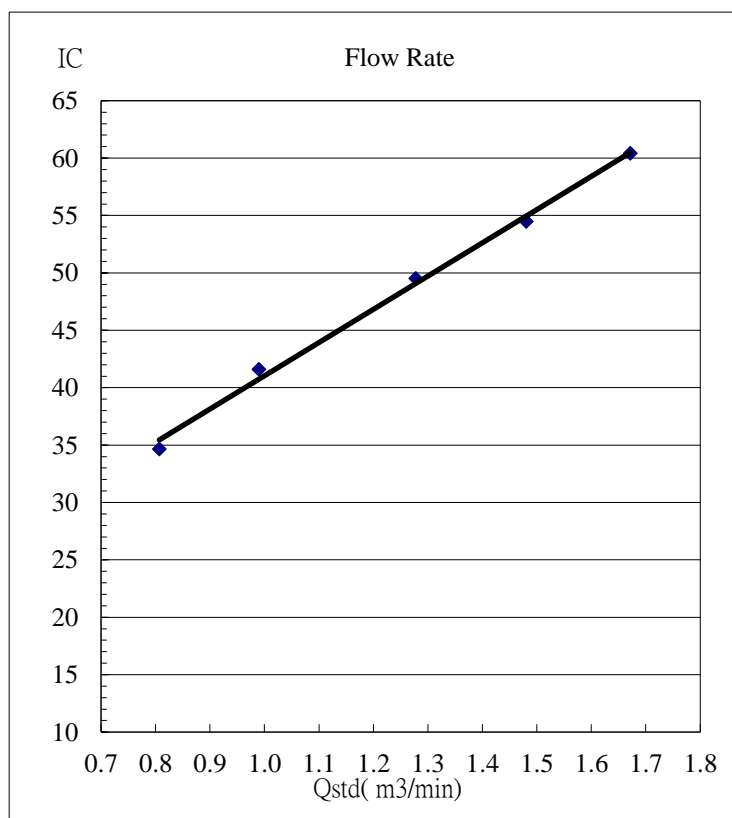
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate

TSP SAMPLER CALIBRATION CACULATION 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 (^{o}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)	H20(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
13	4.5	4.5	9.0	1.457	52	51.51	Intercept= 3.629
10	3.6	3.6	7.2	1.305	45	44.57	Corr. Coeff.= 0.9933
7	2.2	2.2	4.4	1.025	38	37.64	
5	1.3	1.3	2.6	0.792	28	27.74	

Calulations:

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)

For subsequent calculation of sampler flow:

1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate