Annex D1

Calibration Certificates for Dust Monitoring Equipment

TSP SAMPLER CALIBRATION CACULATION SPREADSHEET

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

CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (^{o}C)	20.0	Temperature (K)	293

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	5.6	5.7	11.3	1.661	56	56.57	Slope= 30.829
13	4.3	4.3	8.6	1.452	51	51.52	Intercept= 6.182
10	3.2	3.2	6.4	1.255	45	45.46	Corr. Coeff.= 0.9976
7	2.0	2.0	4.0	0.997	37	37.37	
5	1.3	1.3	2.6	0.808	30	30.30	

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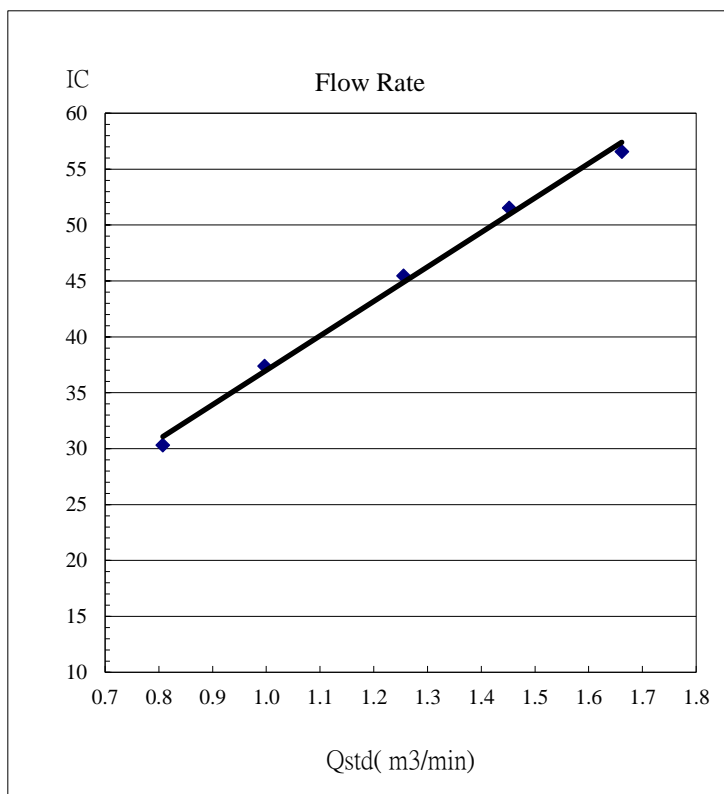
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

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

Name and Model : TISCH HVS Model TE-5170

Date of Calibration: 26-Apr-23

Next Calibration Date: 26-Jun-23

Operator: P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1016		Corrected Pressure (mm Hg)	762.1
Temperature (°C)	20.0		Temperature (K)	293

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	6.5	6.5	13.0	1.781	55	55.56	Slope= 26.274
13	5.0	5.0	10.0	1.564	50	50.51	Intercept= 9.159
10	3.5	3.5	7.0	1.312	43	43.44	Corr. Coeff.= 0.9970
7	2.3	2.3	4.6	1.067	38	38.38	
5	1.4	1.4	2.8	0.837	30	30.30	

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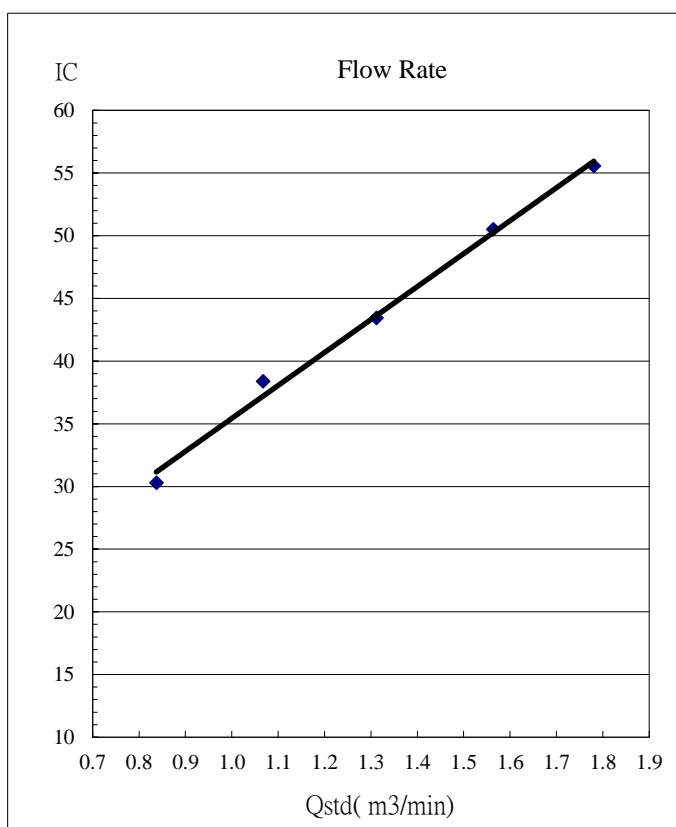
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate

IC vs Qstd(m3/min)

TSP SAMPLER CALIBRATION CACULATION SPREADSHEET

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

CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (°C)	20.0	Temperature (K)	293

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	5.6	5.6	11.2	1.654	63	63.64	Slope= 27.841
13	4.3	4.2	8.5	1.444	58	58.59	Intercept= 17.667
10	3.2	3.3	6.5	1.265	52	52.53	Corr. Coeff.= 0.9971
7	2.2	2.1	4.3	1.033	45	45.46	
5	1.3	1.2	2.5	0.792	40	40.40	

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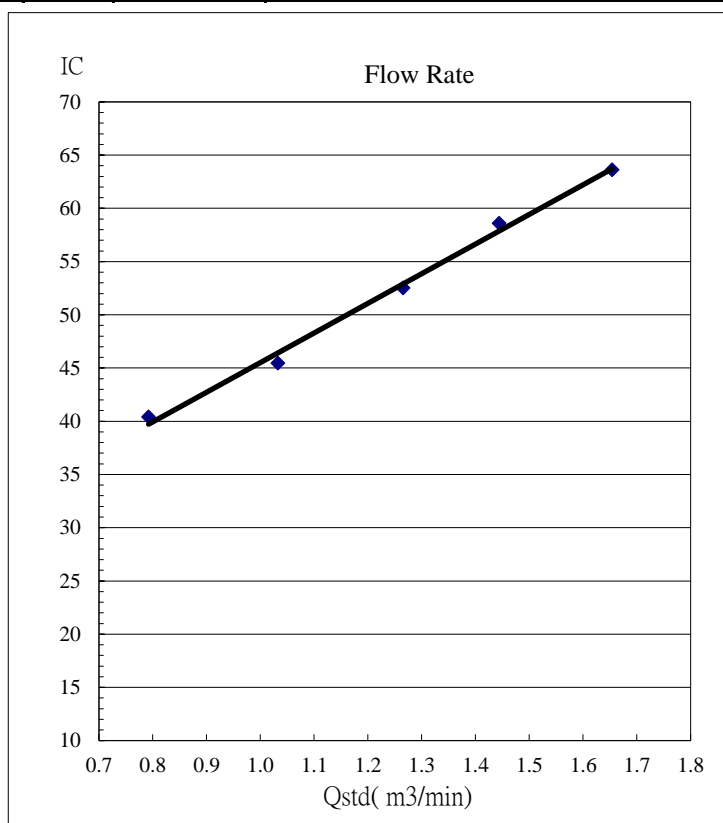
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

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: 26-Apr-23
Name and Model : TISCH HVS Model TE-5170	Next Calibration Date: 26-Jun-23
	Operator: P.F.Yeung

CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (°C)	20.0	Temperature (K)	293

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	6.4	6.5	12.9	1.774	58	58.59	Slope= 30.581
13	5.1	5.1	10.2	1.579	52	52.53	Intercept= 4.669
10	3.4	3.4	6.8	1.293	45	45.46	Corr. Coeff.= 0.9973
7	2.4	2.4	4.8	1.090	38	38.38	
5	1.5	1.5	3.0	0.866	30	30.30	

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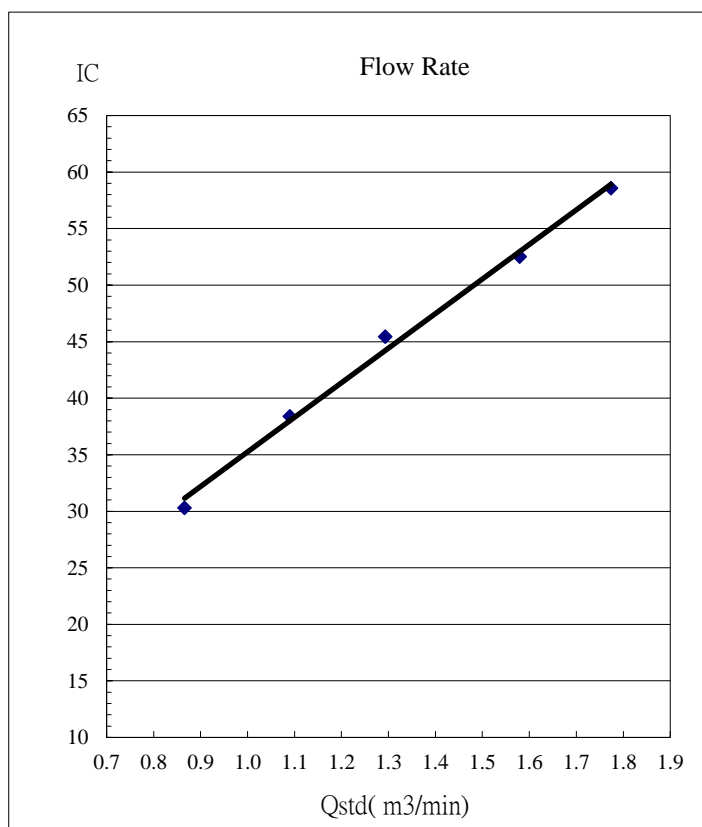
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

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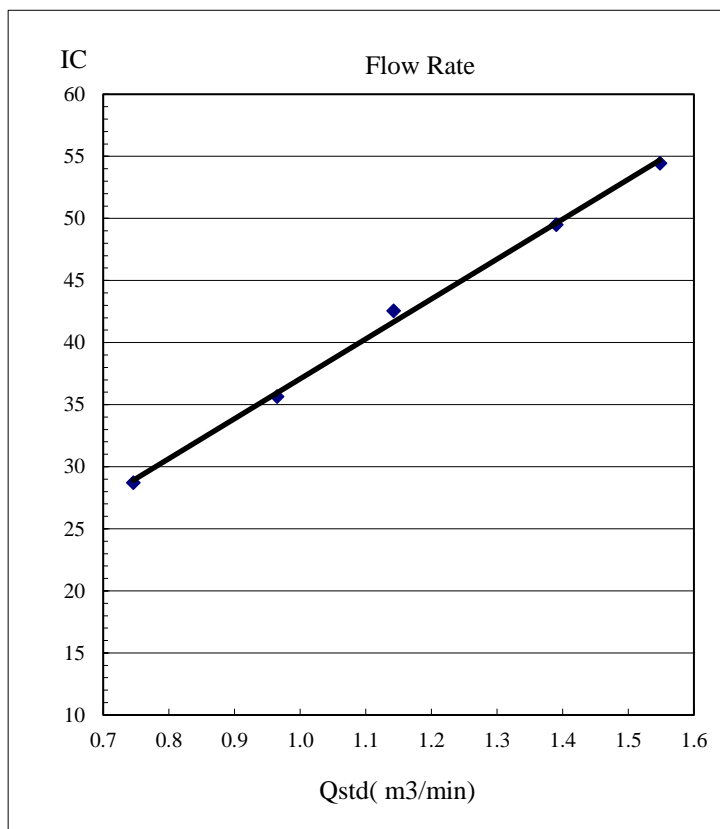
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

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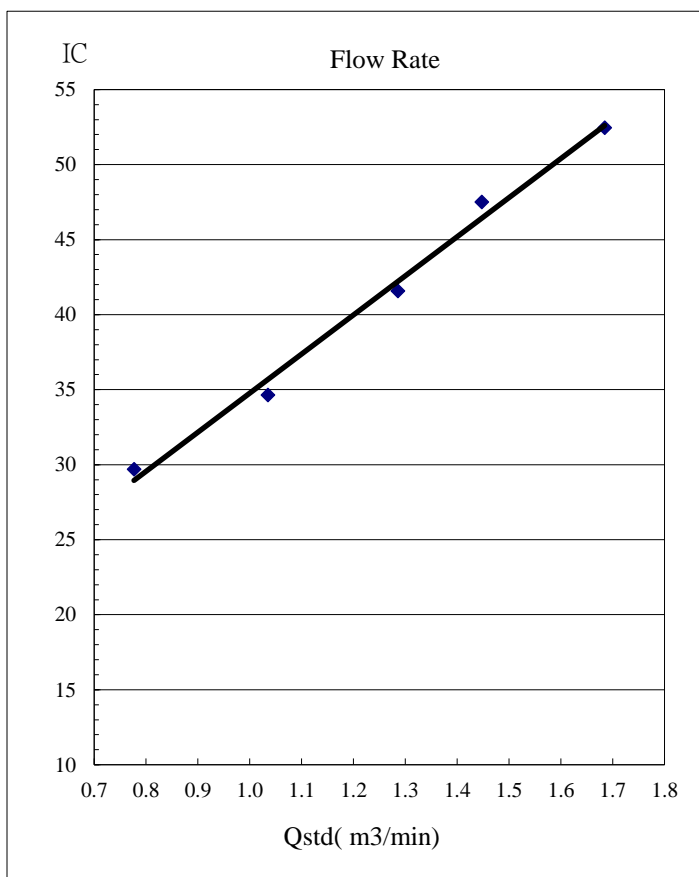
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

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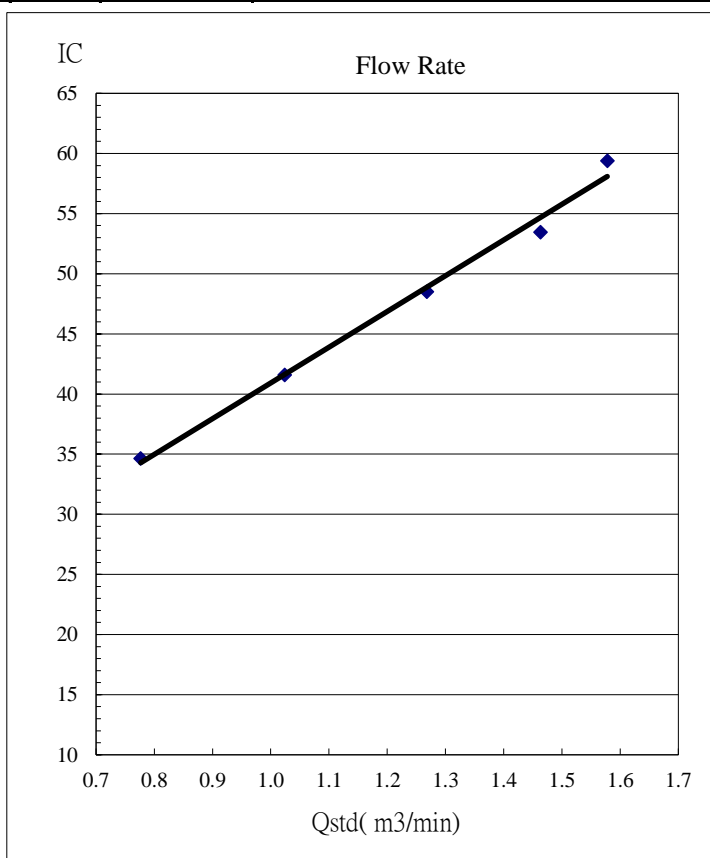
$1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Flow Rate

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 (°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