

Annex D1

Calibration Certificates for Dust Monitoring Equipment

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM1	Date of Calibration: 19-May-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 19-Jul-22
	Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1011.9	Corrected Pressure (mm Hg)	758.925
Temperature (°C)	25.8	Temperature (K)	299

CALIBRATION ORIFICE

Make-> TISCH	Qstd Slope -> 1.99838
Model-> 5025A	Qstd Intercept -> -0.00903
Serial # -> 1612	

CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.70	5.70	11.4	1.691	60	59.80	Slope = 33.7639 Intercept = 2.9958 Corr. coeff. = 0.9995
13	4.50	4.50	9.0	1.503	54	53.82	
10	3.50	3.50	7.0	1.326	48	47.84	
7	2.30	2.30	4.6	1.076	40	39.86	
5	1.30	1.30	2.6	0.810	30	29.90	

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 responses

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pstd = actual pressure during calibration (mm Hg)

For subsequent calculation of sampler flow:

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

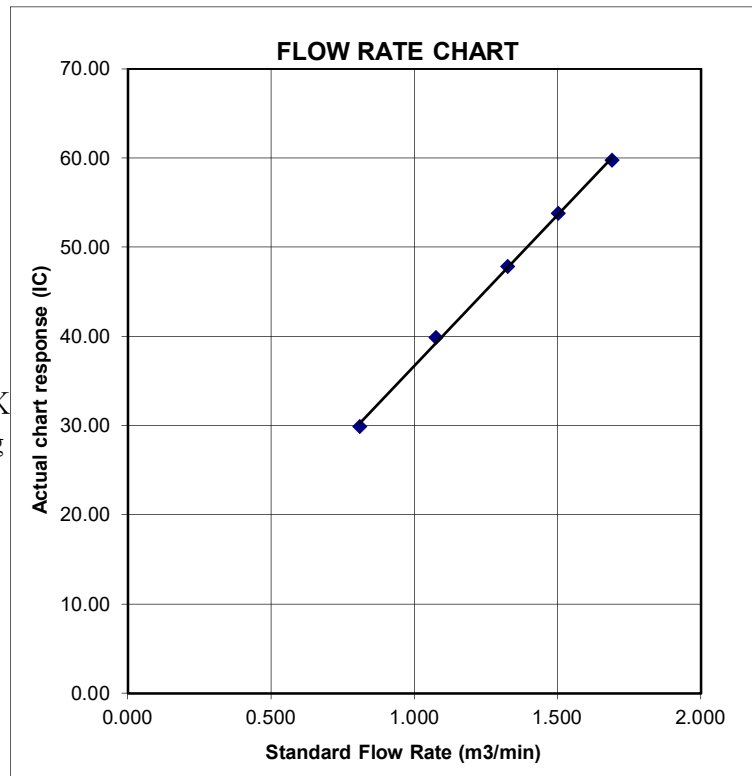
m = sampler slope

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: 19-May-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 19-Jul-22
	Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa) 1011.9	Corrected Pressure (mm Hg) 758.925
Temperature (°C) 25.8	Temperature (K) 299

CALIBRATION ORIFICE

Make-> TISCH	Qstd Slope -> 1.99838
Model-> 5025A	Qstd Intercept -> -0.00903
Serial # -> 1612	

CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	6.40	6.40	12.8	1.791	52	51.82	Slope = 31.8110 Intercept = -5.2670 Corr. coeff. = 0.9987
13	5.10	5.10	10.2	1.599	45	44.85	
10	3.90	3.90	7.8	1.399	40	39.86	
7	2.50	2.50	5.0	1.121	31	30.90	
5	1.50	1.50	3.0	0.869	22	21.93	

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 responses

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K

Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

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

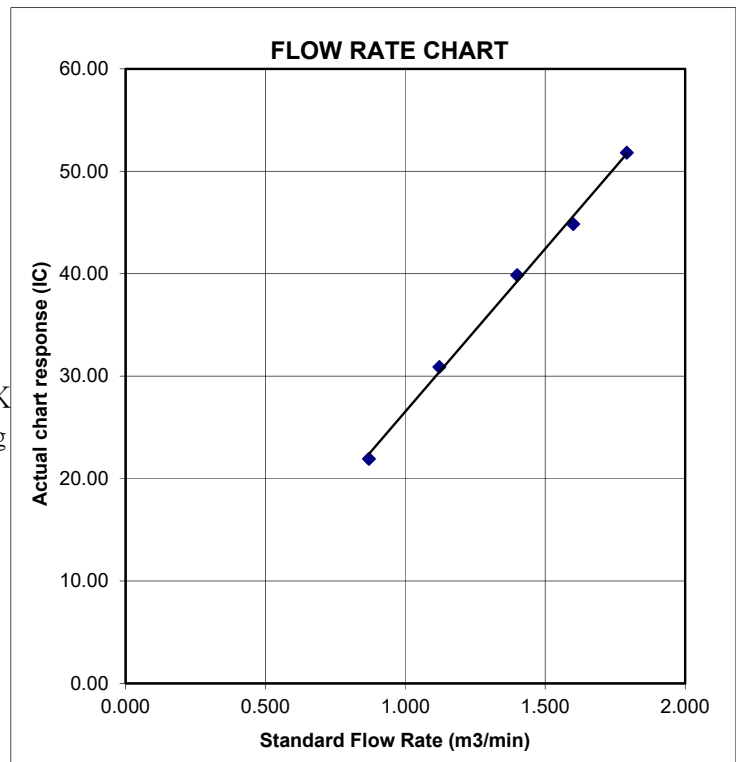
m = sampler slope

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: 19-May-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 19-Jul-22
	Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa) 1011.9	Corrected Pressure (mm Hg) 758.925
Temperature (°C) 25.8	Temperature (K) 299

CALIBRATION ORIFICE

Make-> TISCH	Qstd Slope -> 1.99838
Model-> 5025A	Qstd Intercept -> -0.00903
Serial # -> 1612	

CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.40	5.40	10.8	1.646	56	55.81	Slope = 42.8543 Intercept = -14.5250 Corr. coeff. = 0.9965
13	4.00	4.00	8.0	1.417	48	47.84	
10	3.60	3.60	7.2	1.344	42	41.86	
7	2.40	2.40	4.8	1.099	32	31.89	
5	1.40	1.40	2.8	0.840	22	21.93	

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 responses

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pstd = actual pressure during calibration (mm Hg)

For subsequent calculation of sampler flow:

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

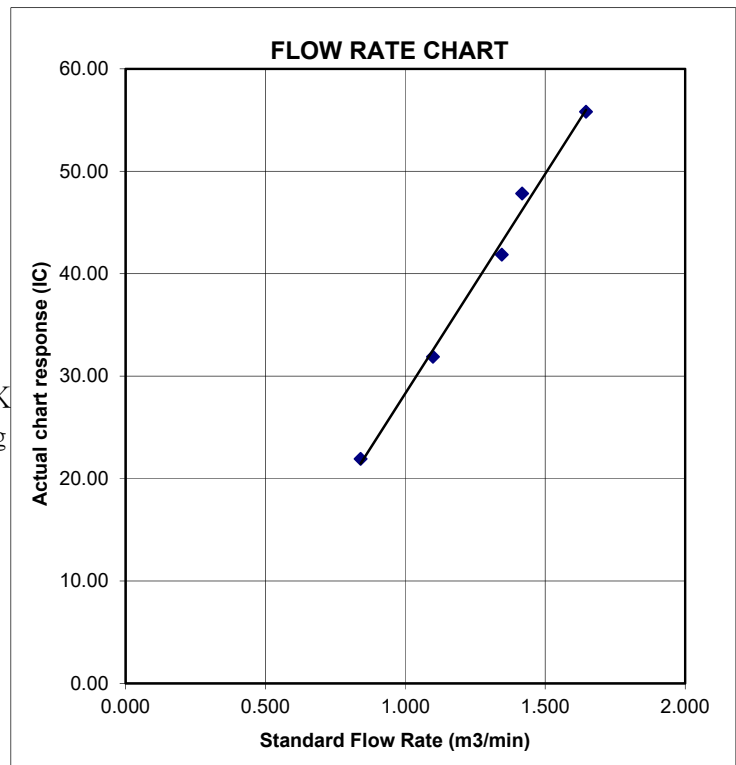
m = sampler slope

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: 19-May-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 19-Jul-22
	Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa) 1011.9	Corrected Pressure (mm Hg) 758.925
Temperature (°C) 25.8	Temperature (K) 299

CALIBRATION ORIFICE

Make-> TISCH	Qstd Slope -> 1.99838
Model-> 5025A	Qstd Intercept -> -0.00903
Serial # -> 1612	

CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION		
							Slope =	Intercept =	Corr. coeff. =
18	6.20	6.20	12.4	1.763	54	53.82	28.3766	3.6780	0.9991
13	4.90	4.90	9.8	1.568	48	47.84			
10	3.80	3.80	7.6	1.381	43	42.85			
7	2.30	2.30	4.6	1.076	35	34.88			
5	1.50	1.50	3.0	0.869	28	27.91			

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 responses

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pstd = actual pressure during calibration (mm Hg)

For subsequent calculation of sampler flow:

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

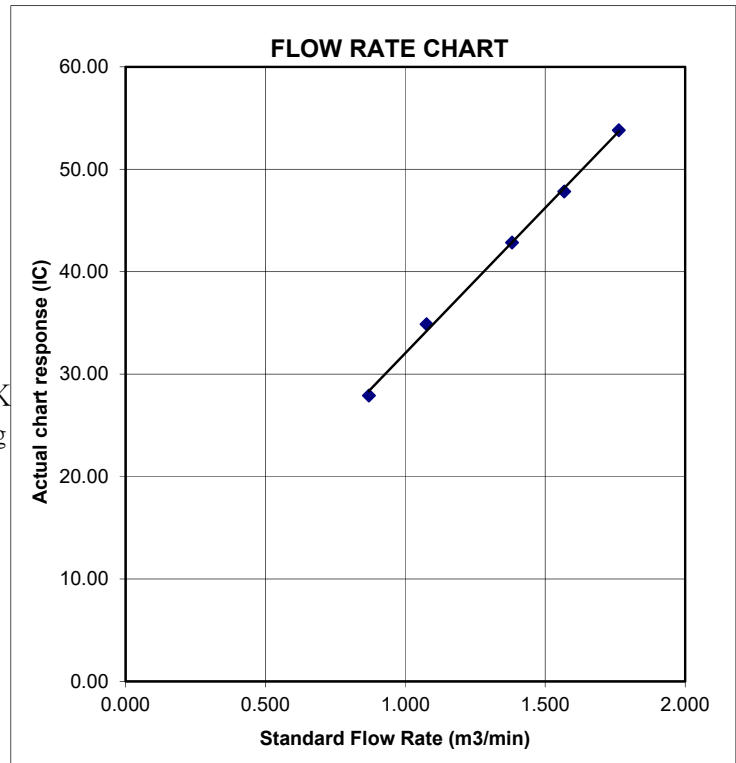
m = sampler slope

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: 18-Jul-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 18-Sep-22
	Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa)	1004.9	Corrected Pressure (mm Hg)	753.675
Temperature (°C)	30.4	Temperature (K)	303

CALIBRATION ORIFICE

Make-> TISCH	Qstd Slope -> 1.99838
Model-> 5025A	Qstd Intercept -> -0.00903
Serial # -> 1612	

CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.70	5.70	11.4	1.672	59	57.71	Slope = 42.3021 Intercept = -12.4750 Corr. coeff. = 0.9978
13	4.40	4.40	8.8	1.470	52	50.86	
10	3.50	3.50	7.0	1.311	43	42.06	
7	2.30	2.30	4.6	1.064	34	33.26	
5	1.50	1.50	3.0	0.860	24	23.47	

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 responses

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pstd = actual pressure during calibration (mm Hg)

For subsequent calculation of sampler flow:

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

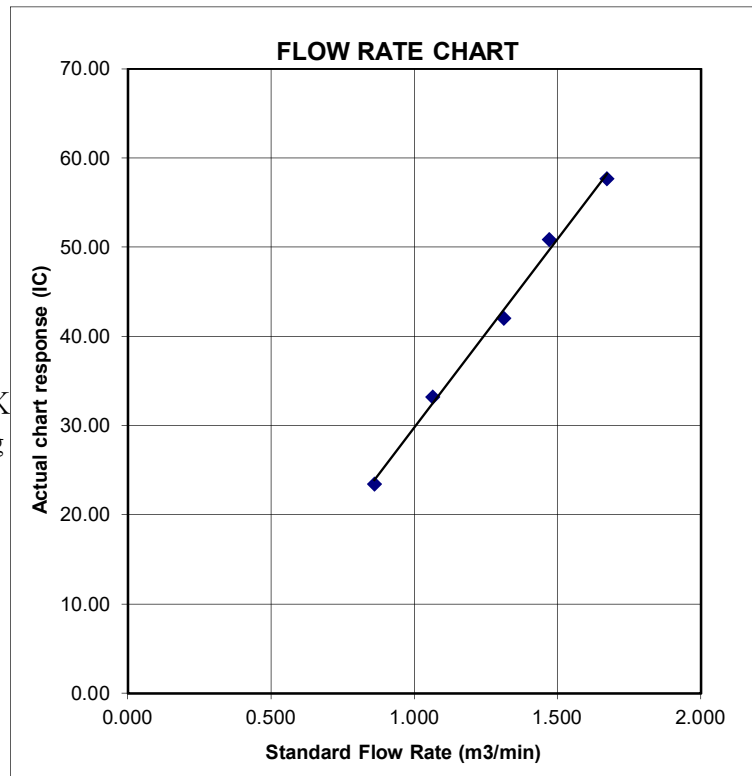
m = sampler slope

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: 18-Jul-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 18-Sep-22
	Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa) 1004.9	Corrected Pressure (mm Hg) 753.675
Temperature (°C) 30.4	Temperature (K) 303

CALIBRATION ORIFICE

Make-> TISCH	Qstd Slope -> 1.99838
Model-> 5025A	Qstd Intercept -> -0.00903
Serial # -> 1612	

CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	6.00	6.00	12.0	1.715	52	50.86	Slope = 30.9016 Intercept = -2.5771 Corr. coeff. = 0.9988
13	4.80	4.80	9.6	1.535	46	44.99	
10	3.70	3.70	7.4	1.348	39	38.15	
7	2.30	2.30	4.6	1.064	31	30.32	
5	1.30	1.30	2.6	0.801	23	22.50	

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 responses

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K

Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

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

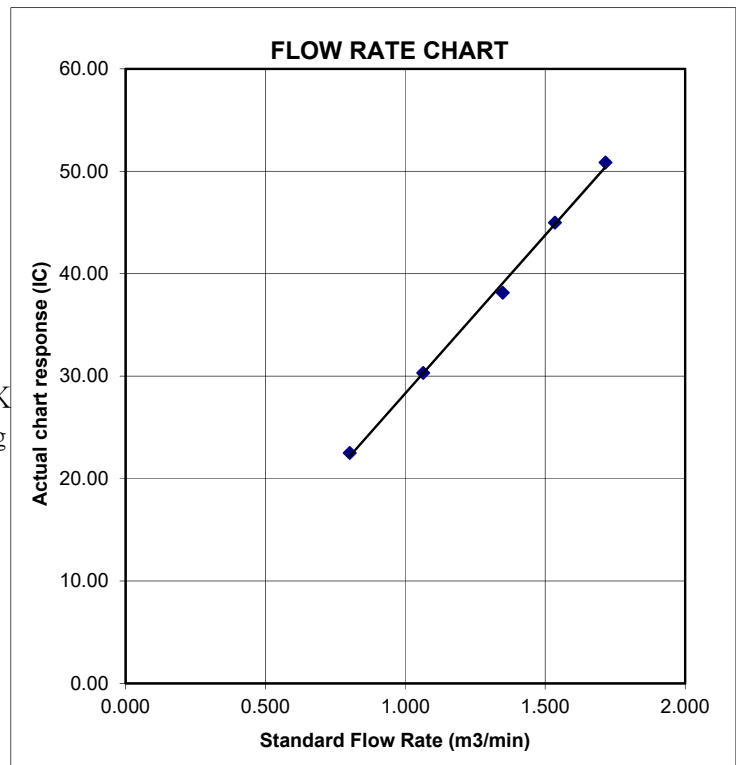
m = sampler slope

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: 18-Jul-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 18-Sep-22
	Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa) 1004.9	Corrected Pressure (mm Hg) 753.675
Temperature (°C) 30.4	Temperature (K) 303

CALIBRATION ORIFICE

Make-> TISCH	Qstd Slope -> 1.99838
Model-> 5025A	Qstd Intercept -> -0.00903
Serial # -> 1612	

CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.70	5.70	11.4	1.672	58	56.73	Slope = 36.7741 Intercept = -4.2418 Corr. coeff. = 0.9978
13	4.50	4.50	9.0	1.486	52	50.86	
10	3.40	3.40	6.8	1.292	44	43.04	
7	2.20	2.20	4.4	1.040	36	35.21	
5	1.40	1.40	2.8	0.831	26	25.43	

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 responses

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K

Pstd = actual pressure during calibration (mm Hg

For subsequent calculation of sampler flow:

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

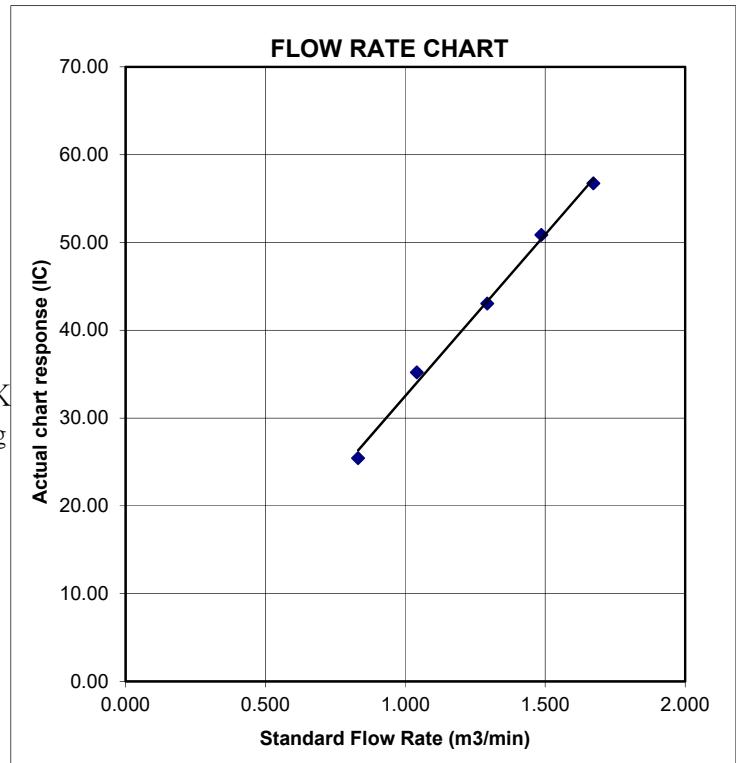
m = sampler slope

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: 18-Jul-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 18-Sep-22
	Operator: Dixon Chan

CONDITIONS

Sea Level Pressure (hPa) 1004.9	Corrected Pressure (mm Hg) 753.675
Temperature (°C) 30.4	Temperature (K) 303

CALIBRATION ORIFICE

Make-> TISCH	Qstd Slope -> 1.99838
Model-> 5025A	Qstd Intercept -> -0.00903
Serial # -> 1612	

CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	5.90	5.90	11.8	1.701	53	51.84	Slope = 30.9549 Intercept = -0.3923 Corr. coeff. = 0.9989
13	4.60	4.60	9.2	1.502	48	46.95	
10	3.70	3.70	7.4	1.348	42	41.08	
7	2.30	2.30	4.6	1.064	33	32.28	
5	1.40	1.40	2.8	0.831	26	25.43	

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 responses

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K

Pstd = 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

