

Annex D1

Calibration Certificates for Dust Monitoring Equipment

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location ID : AM1	Date of Calibration: 21-Jan-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 21-Mar-22
	Operator: Martin

CONDITIONS

Sea Level Pressure (hPa)	1017.6	Corrected Pressure (mm Hg)	763.2
Temperature (°C)	17.9	Temperature (K)	291

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	5.80	5.80	11.6	1.733	60	61.59	Slope = 35.3011 Intercept = 1.4692 Corr. coeff. = 0.9935
13	4.50	4.50	9.0	1.527	54	55.43	
10	3.40	3.40	6.8	1.328	48	49.27	
7	2.20	2.20	4.4	1.069	40	41.06	
5	1.30	1.30	2.6	0.823	28	28.74	

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 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:

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

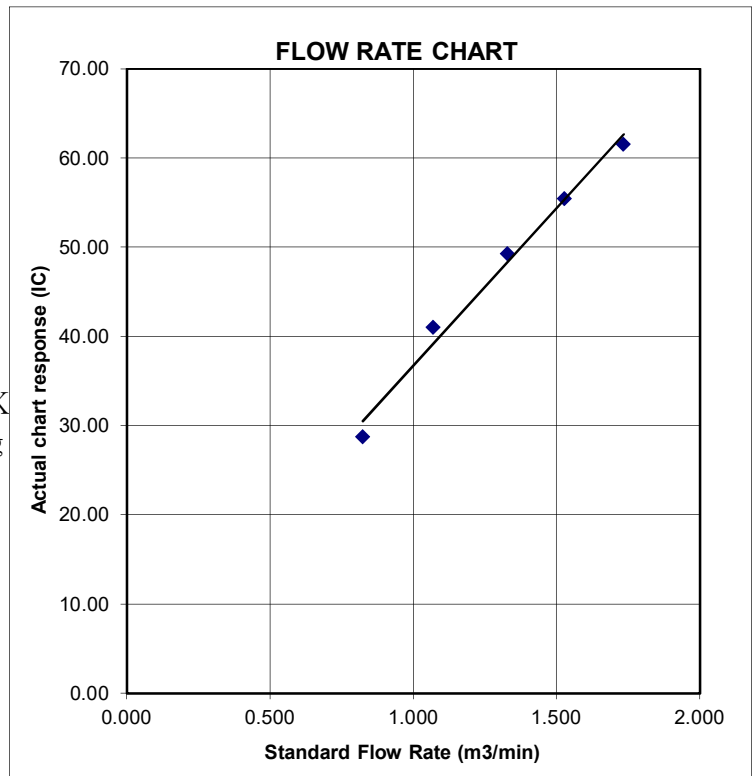
m = sampler slope

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: 21-Jan-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 21-Mar-22
	Operator: Martin

CONDITIONS

Sea Level Pressure (hPa) 1017.6	Corrected Pressure (mm Hg) 763.2
Temperature (°C) 17.9	Temperature (K) 291

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	1.792	52	53.38	Slope = 31.7057 Intercept = -4.2210 Corr. coeff. = 0.9909		
13	5.10	5.10	10.2	1.625	44	45.17			
10	3.70	3.70	7.4	1.385	40	41.06			
7	2.50	2.50	5.0	1.139	32	32.85			
5	1.70	1.70	3.4	0.940	24	24.64			

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:

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

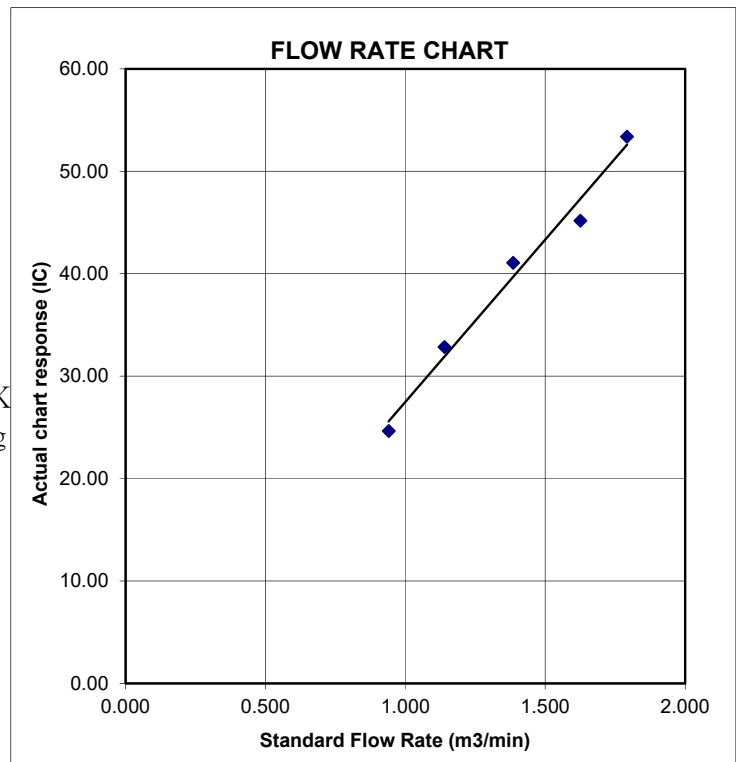
m = sampler slope

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: 21-Jan-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 21-Mar-22
	Operator: Martin

CONDITIONS

Sea Level Pressure (hPa) 1017.6	Corrected Pressure (mm Hg) 763.2
Temperature (°C) 17.9	Temperature (K) 291

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	6.00	6.00	12.0	1.763	56	57.49	Slope = 35.1532 Intercept = -4.1234 Corr. coeff. = 0.9968		
13	4.70	4.70	9.4	1.561	49	50.30			
10	3.70	3.70	7.4	1.385	44	45.17			
7	2.20	2.20	4.4	1.069	34	34.90			
5	1.40	1.40	2.8	0.854	24	24.64			

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:

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

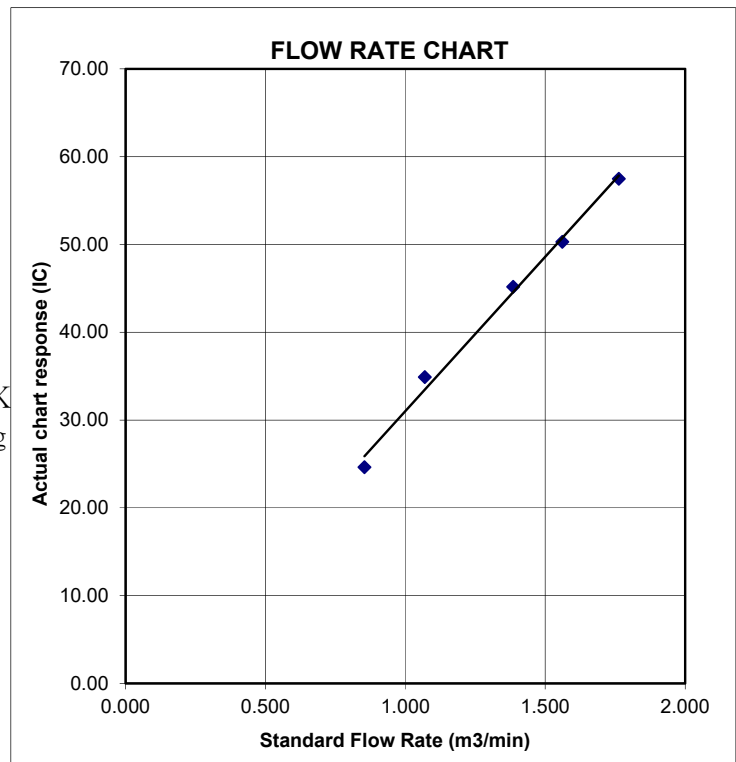
m = sampler slope

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: 21-Jan-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 21-Mar-22
	Operator: Martin

CONDITIONS

Sea Level Pressure (hPa) 1017.6	Corrected Pressure (mm Hg) 763.2
Temperature (°C) 17.9	Temperature (K) 291

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	5.80	5.80	11.6	1.733	54	55.43	28.9709	4.6281	0.9988
13	4.70	4.70	9.4	1.561	48	49.27			
10	3.60	3.60	7.2	1.366	43	44.14			
7	2.30	2.30	4.6	1.093	35	35.93			
5	1.40	1.40	2.8	0.854	29	29.77			

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:

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

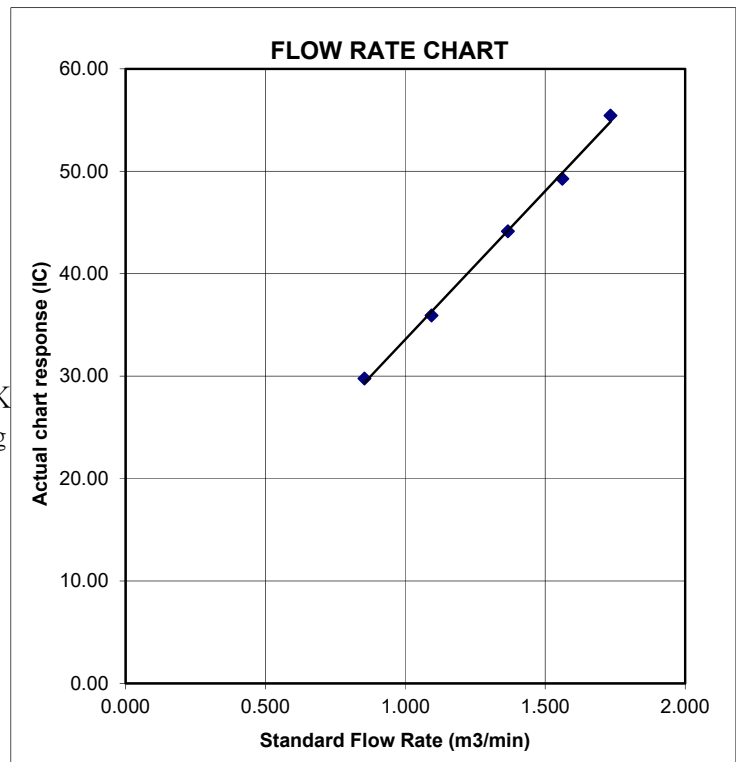
m = sampler slope

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: 24-Mar-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 24-May-22
	Operator: Wesley Yiu

CONDITIONS

Sea Level Pressure (hPa)	1014.3	Corrected Pressure (mm Hg)	760.725
Temperature (°C)	17.6	Temperature (K)	291

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	5.80	5.80	11.6	1.731	58	59.51	Slope = 39.3025 Intercept = -6.8558 Corr. coeff. = 0.9948
13	4.60	4.60	9.2	1.542	54	55.40	
10	3.60	3.60	7.2	1.365	46	47.19	
7	2.20	2.20	4.4	1.068	35	35.91	
5	1.50	1.50	3.0	0.883	26	26.67	

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 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:

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

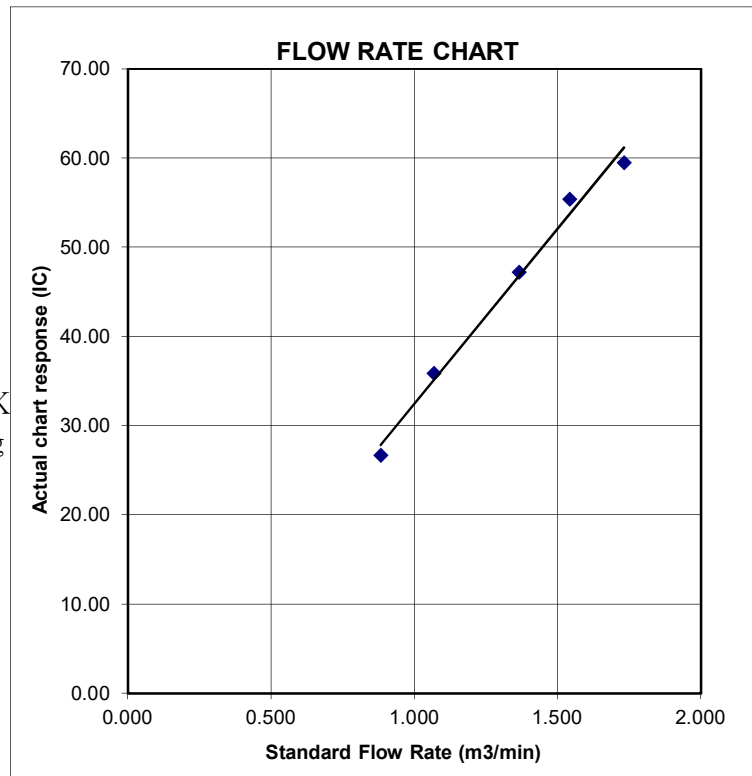
m = sampler slope

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: 24-Mar-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 24-May-22
	Operator: Wesley Yiu

CONDITIONS

Sea Level Pressure (hPa) 1014.3	Corrected Pressure (mm Hg) 760.725
Temperature (°C) 17.6	Temperature (K) 291

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	6.50	6.50	13.0	1.832	52	53.35	Slope = 31.1509 Intercept = -3.0018 Corr. coeff. = 0.9961		
13	5.20	5.20	10.4	1.639	48	49.25			
10	4.00	4.00	8.0	1.438	40	41.04			
7	2.40	2.40	4.8	1.115	32	32.83			
5	1.60	1.60	3.2	0.911	24	24.62			

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:

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

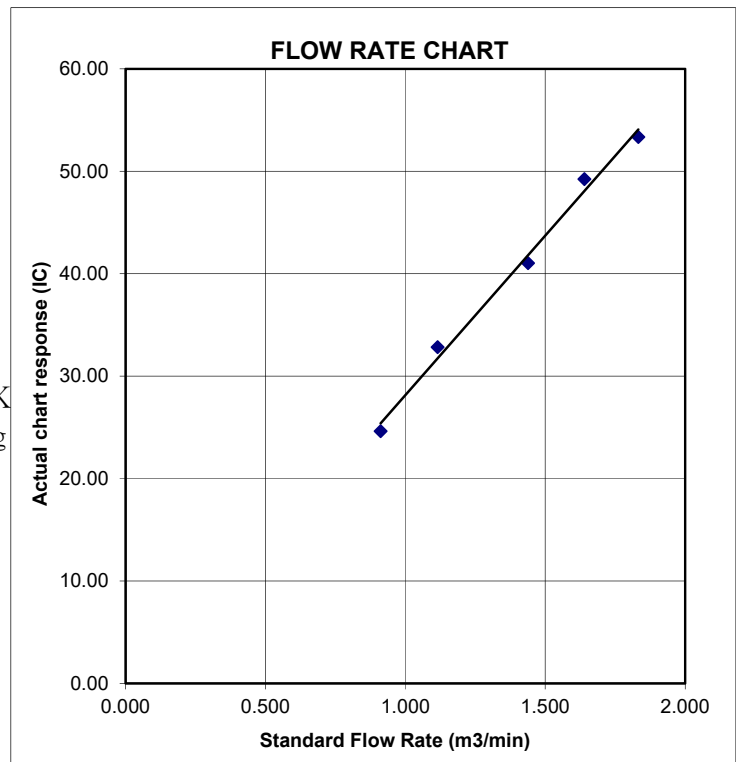
m = sampler slope

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: 24-Mar-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 24-May-22
	Operator: Wesley Yiu

CONDITIONS

Sea Level Pressure (hPa) 1014.3	Corrected Pressure (mm Hg) 760.725
Temperature (°C) 17.6	Temperature (K) 291

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	6.10	6.10	12.2	1.775	58	59.51	Slope = 35.9836 Intercept = -4.0881 Corr. coeff. = 0.9992		
13	4.80	4.80	9.6	1.575	52	53.35			
10	3.70	3.70	7.4	1.384	44	45.14			
7	2.50	2.50	5.0	1.138	36	36.93			
5	1.50	1.50	3.0	0.883	27	27.70			

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

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

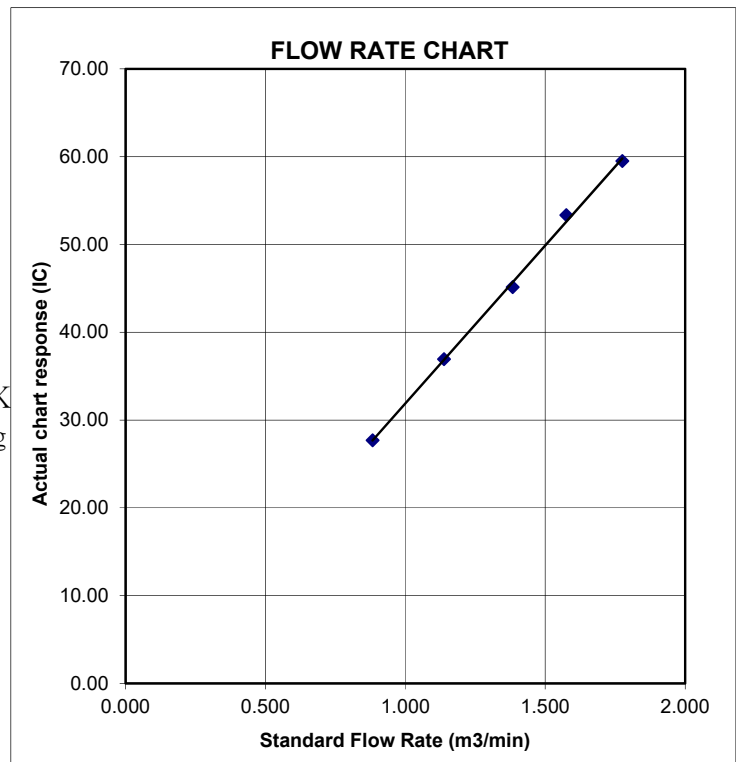
m = sampler slope

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-Mar-22
Name and Model: TISCH HVS Model TE-5170	Next Calibration Date: 24-May-22
	Operator: Wesley Yiu

CONDITIONS

Sea Level Pressure (hPa) 1014.3	Corrected Pressure (mm Hg) 760.725
Temperature (°C) 17.6	Temperature (K) 291

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	6.10	6.10	12.2	1.775	56	57.45	Slope = 31.6006 Intercept = 1.2031 Corr. coeff. = 0.9990		
13	4.90	4.90	9.8	1.592	50	51.30			
10	3.80	3.80	7.6	1.402	44	45.14			
7	2.50	2.50	5.0	1.138	37	37.96			
5	1.50	1.50	3.0	0.883	28	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 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

