



Certificate of Calibration

Calibration Certification Information

Cal. Date: February 11, 2021

Rootsmeter S/N: 438320

Ta: 294

°K

Operator: Jim Tisch

Pa: 755.40

mm Hg

Calibration Model #: TE-5028A

Calibrator S/N: **3878**

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3320	4.2	1.50
2	3	4	1	1.0310	6.9	2.50
3	5	6	1	0.9400	8.2	3.00
4	7	8	1	0.8740	9.6	3.50
5	9	10	1	0.6650	16.5	6.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(Ta/Pa \right)}$ (y-axis)
1.0019	0.7521	1.2293	0.9944	0.7466	0.7641
0.9983	0.9682	1.5870	0.9909	0.9611	0.9864
0.9965	1.0601	1.7385	0.9891	1.0523	1.0806
0.9947	1.1381	1.8778	0.9873	1.1296	1.1671
0.9855	1.4819	2.4586	0.9782	1.4709	1.5281
QSTD	m=	1.68740	QA	m=	1.05662
	b=	-0.04430		b=	-0.02754
	r=	0.99996		r=	0.99996

Calculations

Vstd =	$\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va =	$\Delta Vol((Pa-\Delta P)/Pa)$
Qstd =	$Vstd/\Delta Time$	Qa =	$Va/\Delta Time$
For subsequent flow rate calculations:			
Qstd =	$1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$	Qa =	$1/m \left(\left(\sqrt{\Delta H \left(Ta/Pa \right)} \right) - b \right)$

Standard Conditions

Tstd: 298.15 °K

Pstd: 760 mm Hg

Key

ΔH: calibrator manometer reading (in H2O)

ΔP: rootsmeter manometer reading (mm Hg)

Ta: actual absolute temperature (°K)

Pa: actual barometric pressure (mm Hg)

b: intercept

m: slope

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulation's Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30.