

RECALIBRATION

DUE DATE:

November 2, 2021

Certificate of Calibration

			Calibration	Certificati	on Informat	tion	•••••••••••••••••••••••••••••••••••••••	
Cal. Date:	November	2, 2020	Roots	meter S/N:	438320	Ta:	294	°К
Operator:	Jim Tisch					Pa:	756.7	mm Hg
Calibration	Model #:	TE-5025A	Calil	orator S/N:	3543			-
	<b></b>		Mal Plant				···	1
	Run	Vol. Init (m3)	Vol. Final	ΔVol. (m2)	ΔTime (min)			
	<u></u> 1	1	<b>(m3)</b> 2	(m3) 1	(min) 1.4310	(mm Hg) 3.2	(in H2O) 2.00	
	2	3	4	1	1.0110	6.4	4.00	
	3	5	6	1	0.9000	8.0	5.00	
	4	7	8	1	0.8560	8.9	5.50	
	5	9	10	1	0.7100	12.9	8.00	
				Data Tabula	tion			
	Vstd	Qstd	$\sqrt{\Delta H \left(\frac{Pa}{Pstd}\right)}$	)( <u>Tstd</u> ) Ta)		0.5	$\sqrt{\Delta H(Ta/Pa)}$	
	(m3)	(x-axis)	y (Yeta (y-ax)		Va	Qa (x-axis)	• • •	
	1.0049	0.7022	1.420		0.9958	0.6959	(y-axis) 0.8815	
	1.0006	0.9897	2,009		0.9915	0.9808	1.2467	
	0.9985	1.1094	2,246	53	0.9894	1.0994	1.3938	
	0.9973	1.1651	2.3559		0.9882	1.1545	1.4619	
	0.9920	1.3971	2.841	.4	0.9830	1.3844	1.7631	
		m=	2.03936		_	m=	1.27701	
	QSTD	b=	-0.012		QA	b≃	-0.00805	
		r=	0.999	95		r=	0.99995	
				Calculations				
			/Pstd)(Tstd/Ta	}	Va= ΔVol((Pa-ΔP)/Pa)			
	Qstd=	Vstd/∆Time		<b>Qa=</b> Va/ΔTime				
		·····	For subsequ	ent flow rate calculations:				
	Qstd=	<b>Qstd=</b> $1/m \left( \sqrt{\Delta H \left( \frac{Pa}{Pstd} \right) \left( \frac{Tstd}{Ta} \right)} \right)$			Qa=	1/m ((√∆H	(Та/Ра))-ь)	
		Conditions						
Tstd:	298.15 °К			[		RECA	IBRATION	
Pstd:	760 mm Hg				LIS EPA reco	mmends ar	nual recalibratio	n ner 1000
H: calibrate		er reading (ir	H20)		US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51,			
		eter reading (i					Reference Meth	
		perature (°K)					ended Particulate	
Pa: actual ba		essure (mm l	⊣g)				re, 9.2.17, page 3	
o: intercept				L				
n: slope								

Tisch Environmental, Inc.

145 South Miami Avenue Village of Cleves, OH 45002 <u>www.tisch-env.com</u> TOLL FREE: (877)263-7610 FAX: (513)467-9009



			Site I	nformation			
Location: AM3A Sampler: TE-5170				Zones 2A at West Site ID: Kowloon Cultural Serial No: 4340		Date: 11-Nov-20 Tech: CS Tang	
			Site (	Conditions			
	Barometric Pr	essure (in Hg): 3		contaitaons	Corrected Pres	sure (mm Hg): 766	
	Tempe	erature (deg F): 7	3		Tempe	rature (deg K): 296	
	Average	Press. (in Hg): 3	0.14		Corrected Ave	<b>rage (mm Hg):</b> 766	
	Average	Temp. (deg F): 7	3		Average	<b>Femp. (deg K):</b> 296	
			Calibra	ation Orifice			
	Make: '				Qstd Slope: 2		
		TE-5025A			Qstd Intercept: -		
	Serial#:	3543			Date Certified: 2	-Nov-20	
			Calibratio	on Informatio	on		
Plate or	H2O	Qstd	Ι	IC			
Test #	(in)	(m3/min)	(chart)	(corrected)		Linear Regression	
1	12.20	1.732	53.0	53.39		Slope: 29.9241	
2	10.50	1.607	48.0	48.36		Intercept: 1.1241	
3	7.30	1.341	41.0	41.30		Corr. Coeff: 0.9982	
4	4.40	1.043	33.0	33.24			
		1.043 0.756	33.0 23.0	33.24 23.17	# of	f Observations: 5	
4 5	4.40 2.30	0.756	23.0		# of	f Observations: 5	
4 5 d = 1/m[Sqrt(I	4.40 2.30 H2O(Pa/Pstd)(Ts	0.756	23.0	23.17	m = sampler slop	be	
4 5 d = 1/m[Sqrt(I	4.40 2.30 H2O(Pa/Pstd)(Ts	0.756	23.0	23.17	m = sampler slop b = sampler inter	e cept	
4 5 d = 1/m[Sqrt(I = I[Sqrt(Pa/Pst	4.40 2.30 H2O(Pa/Pstd)(Ts td)(Tstd/Ta)]	0.756	23.0	23.17	m = sampler slop b = sampler inter I = chart respons	ne rcept e	
4 5 d = 1/m[Sqrt(I = I[Sqrt(Pa/Pst d = standard fl	4.40 2.30 H2O(Pa/Pstd)(Ts td)(Tstd/Ta)] low rate	0.756	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag	be icept e ge temperature	
4 5 d = 1/m[Sqrt(H = I[Sqrt(Pa/Pst d = standard fl = corrected cha	4.40 2.30 H2O(Pa/Pstd)(Ts td)(Tstd/Ta)] low rate art response	0.756	23.0	23.17	m = sampler slop b = sampler inter I = chart respons	be icept e ge temperature	
4 5 d = 1/m[Sqrt(I = I[Sqrt(Pa/Pst d = standard f] = corrected cha actual chart re	4.40 2.30 H2O(Pa/Pstd)(Ts td)(Tstd/Ta)] low rate art response esponse	0.756	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag	e cept e ge temperature ge pressure	
4 5 d = 1/m[Sqrt(I = I[Sqrt(Pa/Pst d = standard fl = corrected chat actual chart re = calibrator Qs	4.40 2.30 H2O(Pa/Pstd)(Ts td)(Tstd/Ta)] low rate art response esponse std slope	0.756	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag Av	e cept e ge temperature ge pressure erage I (chart): 40	
4 5 d = 1/m[Sqrt(I = I[Sqrt(Pa/Pst d = standard fl = corrected cha actual chart re = calibrator Qs = calibrator Qs	4.40 2.30 H2O(Pa/Pstd)(Tstd)(Tstd/Ta)] low rate art response esponse std slope td intercept	0.756 std/Ta))-b]	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag Av	e cept e ge temperature ge pressure erage I (chart): 40 e Flow Calculation m3/min	
4 5 d = 1/m[Sqrt(I : [[Sqrt(Pa/Pst d = standard fl : corrected cha actual chart re : calibrator Qs : calibrator Qs : actual tempe	4.40 2.30 H2O(Pa/Pstd)(Tstd)(Tstd/Ta)] low rate art response std slope std slope std slope std slope	0.756 std/Ta))-b] libration (deg K)	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag Av Average	e ge temperature ge pressure erage I (chart): 40 e Flow Calculation m3/min 1.295591082	
4 5 d = 1/m[Sqrt(H = I[Sqrt(Pa/Pst d = standard fl = corrected cha actual chart re = calibrator Qs = actual tempe = actual pressu	4.40 2.30 H2O(Pa/Pstd)(Tst td)(Tstd/Ta)] low rate art response ssponse std slope std slope td intercept erature during calibra	0.756 std/Ta))-b] libration (deg K)	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag Average Average	e ge temperature ge pressure erage I (chart): 40 e Flow Calculation m3/min 1.295591082 e Flow Calculation in CFM	
4 5 I = 1/m[Sqrt(I I [Sqrt(Pa/Pst I = standard fl corrected cha actual chart re calibrator Qs calibrator Qs actual tempe actual pressu = 298 deg K	4.40 2.30 H2O(Pa/Pstd)(Tstd)(Tstd)(Tstd/Ta)] low rate art response esponse std slope std slope std slope art during calibra	0.756 std/Ta))-b] libration (deg K)	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag Average Average	e cept e ge temperature ge pressure erage I (chart): 40 e Flow Calculation m3/min 1.295591082 e Flow Calculation in CFM 45.74732111	
4 5 d = 1/m[Sqrt(I = I[Sqrt(Pa/Pst d = standard fl = corrected cha actual chart re = calibrator Qs = actual tempe = actual pressu d = 298 deg K = 760 mm H	4.40 2.30 H2O(Pa/Pstd)(Tstd)(Tstd)(Tstd/Ta)] low rate art response sponse std slope td intercept erature during calibra ig	0.756 std/Ta))-b] libration (deg K) ation (mm Hg)	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag Average Average Samp	e cept e ge temperature ge pressure erage I (chart): 40 e Flow Calculation m3/min 1.295591082 e Flow Calculation in CFM 45.74732111 ble Time (Hrs): 1.0	
4 5 d = 1/m[Sqrt(I = I[Sqrt(Pa/Pst d = standard fI = corrected cha actual chart re = calibrator Qs = actual tempe = actual pressu d = 298 deg K d = 760 mm H subsequent ca	4.40 2.30 H2O(Pa/Pstd)(Tstd)(Tstd/Ta)] low rate art response std slope std slope std slope std intercept erature during calibra lg alculation of sam	0.756 std/Ta))-b] libration (deg K) ation (mm Hg) pler flow:	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag Average Average Samp	e ge temperature ge pressure erage I (chart): 40 e Flow Calculation m3/min 1.295591082 e Flow Calculation in CFM 45.74732111 ole Time (Hrs): 1.0 o'otal Flow in m3/min	
4 5 d = 1/m[Sqrt(I = I[Sqrt(Pa/Pst d = standard fI = corrected cha actual chart re = calibrator Qs = actual tempe = actual pressu d = 298 deg K d = 760 mm H subsequent ca	4.40 2.30 H2O(Pa/Pstd)(Tstd)(Tstd)(Tstd/Ta)] low rate art response sponse std slope td intercept erature during calibra ig	0.756 std/Ta))-b] libration (deg K) ation (mm Hg) pler flow:	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag Pav = daily averag Average Average Samp T	e ge temperature ge pressure erage I (chart): 40 e Flow Calculation m3/min 1.295591082 e Flow Calculation in CFM 45.74732111 ole Time (Hrs): 1.0 otal Flow in m3/min 77.73546492	
4 5 d = 1/m[Sqrt(I = I[Sqrt(Pa/Pst d = standard fl = corrected cha actual chart re = calibrator Qs = actual tempe = actual pressu d = 298 deg K d = 760 mm H subsequent ca	4.40 2.30 H2O(Pa/Pstd)(Tstd)(Tstd/Ta)] low rate art response std slope std slope std slope std intercept erature during calibra lg alculation of sam	0.756 std/Ta))-b] libration (deg K) ation (mm Hg) pler flow:	23.0	23.17	m = sampler slop b = sampler inter I = chart respons Tav = daily averag Pav = daily averag Pav = daily averag Average Average Samp T	e ge temperature ge pressure erage I (chart): 40 e Flow Calculation m3/min 1.295591082 e Flow Calculation in CFM 45.74732111 ole Time (Hrs): 1.0 o'otal Flow in m3/min	

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			Zones 2A a Kowloon Cu		Date: 11-Nov-20	
Sampler: <sup>1</sup>	<b>FE-5170</b>		Serial No:	3998		Tech: CS Tang
			Site (	Conditions		
	Barometric Pr	essure (in Hg): 3		contaitaons	Corrected Pre	ssure (mm Hg): 766
Temperature (deg F): 73						erature (deg K): 296
	Average	Press. (in Hg): 3	0.14		Corrected Ave	<b>erage (mm Hg):</b> 766
	Average	Temp. (deg F): 7	3		Average	<b>Temp. (deg K):</b> 296
			Calibra	ation Orifice		
	Make:				Qstd Slope:	
		TE-5025A			Qstd Intercept:	
	Serial#:	3543			Date Certified:	2-Nov-20
			Calibratio	on Informatio	on	
Plate or	H2O	Qstd	I	IC		
Test #	(in)	(m3/min)	(chart)	(corrected)		Linear Regression
1	12.50	1.753	53.0	53.39		Slope: 29.0451
2	10.20 7.60	1.584 1.368	48.0	48.36		Intercept: 2.3506 Corr. Coeff: 0.9976
3 4	4.20	1.368	41.0 33.0	41.30 33.24		
5	2.20	0.739	23.0	23.17	# c	of Observations: 5
5						
			С	alculations		
	H2O(Pa/Pstd)(Ts	std/Ta))-b]	C	alculations	m = sampler slo	pe
td = 1/m[Sqrt(F	H2O(Pa/Pstd)(Ts td)(Tstd/Ta)]	std/Ta))-b]	C	alculations	m = sampler slo b = sampler inte	
td = 1/m[Sqrt(F		std/Ta))-b]	C	alculations	m = sampler slo b = sampler inte I = chart respons	rcept
	td)(Tstd/Ta)]	std/Ta))-b]	C	alculations	b = sampler inte	rcept Se
td = 1/m[Sqrt(F = I[Sqrt(Pa/Pst	td)(Tstd/Ta)] low rate	std/Ta))-b]	C	alculations	b = sampler inte I = chart response	rcept se ge temperature
d = 1/m[Sqrt(F = I[Sqrt(Pa/Pst d = standard f1 = corrected cha	td)(Tstd/Ta)] low rate art response	std/Ta))-b]	С	alculations	<ul><li>b = sampler inte</li><li>I = chart response</li><li>Tav = daily avera</li></ul>	rcept se ge temperature
td = 1/m[Sqrt(F = I[Sqrt(Pa/Pst td = standard f1	td)(Tstd/Ta)] low rate art response sponse	std/Ta))-b]	С	alculations	b = sampler inte I = chart respons Tav = daily avera Pav = daily avera	rcept se ge temperature
td = 1/m[Sqrt(F = I[Sqrt(Pa/Pst td = standard f1 = corrected cha actual chart re:	td)(Tstd/Ta)] low rate art response sponse std slope	std/Ta))-b]	С	alculations	b = sampler inte I = chart respons Tav = daily avera Pav = daily avera	rcept se ge temperature ge pressure
td = 1/m[Sqrt(F = I[Sqrt(Pa/Pst td = standard f1 = corrected cha actual chart re: = calibrator Qst = calibrator Qst = actual tempe	td)(Tstd/Ta)] low rate art response sponse std slope td intercept erature during cal	libration (deg K)	C	alculations	b = sampler inte I = chart response Tav = daily avera Pav = daily avera Averag	rcept se ge temperature ge pressure verage I (chart): 40 ge Flow Calculation m3/min 1.292573154
td = 1/m[Sqrt(F = I[Sqrt(Pa/Pst td = standard fl = corrected cha actual chart re: = calibrator Qst = calibrator Qst = actual tempe = actual pressu	td)(Tstd/Ta)] low rate art response sponse std slope td intercept erature during calibra	libration (deg K)	C	alculations	b = sampler inte I = chart response Tav = daily avera Pav = daily avera Averag	rcept se ge temperature ge pressure verage I (chart): 40 ge Flow Calculation m3/min 1.292573154 ge Flow Calculation in CFM
d = 1/m[Sqrt(F = I[Sqrt(Pa/Pst d = standard fl = corrected cha actual chart re: = calibrator Qst = aclibrator Qst = actual tempe = actual pressu d = 298 deg K	td)(Tstd/Ta)] low rate art response sponse std slope td intercept erature during cal are during calibra	libration (deg K)	С	alculations	b = sampler inte I = chart respons Tav = daily avera Pav = daily avera Averag Averag	rcept se ge temperature ge pressure verage I (chart): 40 ge Flow Calculation m3/min 1.292573154 ge Flow Calculation in CFM 45.64075807
td = 1/m[Sqrt(F = I[Sqrt(Pa/Pst td = standard f1 = corrected cha actual chart re: = calibrator Qst = actual tempe = actual pressu d = 298 deg K d = 760 mm Hg	td)(Tstd/Ta)] low rate art response sponse std slope td intercept trature during cal ure during calibra g	libration (deg K) ation (mm Hg)	C	alculations	b = sampler inte I = chart respons Tav = daily avera Pav = daily avera Averag Averag Sam	rcept se ge temperature ge pressure verage I (chart): 40 ge Flow Calculation m3/min 1.292573154 ge Flow Calculation in CFM 45.64075807 ple Time (Hrs): 1.0
d = 1/m[Sqrt(F = I[Sqrt(Pa/Pst d = standard fl = corrected cha actual chart re: = calibrator Qst = actual tempe = actual pressu d = 298 deg K d = 760 mm Hg	td)(Tstd/Ta)] low rate art response sponse std slope td intercept erature during cal ure during calibra g lculation of sam	libration (deg K) ation (mm Hg) pler flow:	C	alculations	b = sampler inte I = chart respons Tav = daily avera Pav = daily avera Averag Averag Sam	rcept se ge temperature ge pressure verage I (chart): 4 0 ge Flow Calculation m3/min 1.292573154 ge Flow Calculation in CFM 45.64075807 ple Time (Hrs): 1.0 Fotal Flow in m3/min
td = 1/m[Sqrt(F = I[Sqrt(Pa/Pst td = standard fl = corrected cha actual chart re: = calibrator Qst = actual tempe = actual pressu d = 298 deg K d = 760 mm Hg	td)(Tstd/Ta)] low rate art response sponse std slope td intercept trature during cal ure during calibra g	libration (deg K) ation (mm Hg) pler flow:	C	alculations	b = sampler inte I = chart respons Tav = daily avera Pav = daily avera Averag Averag Sam	rcept se ge temperature ge pressure verage I (chart): 40 ge Flow Calculation m3/min 1.292573154 ge Flow Calculation in CFM 45.64075807 ple Time (Hrs): 1.0

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Temperature (deg F): 73 Average Press. (in Hg): 30.14Average Temp. (deg F): 73Correct Average Temp. (deg F): 73Calibration OrificeMake: Tisch Model: TE-5025A Serial#: 3543Qstd S Model: TE-5025A Qstd Inter Serial#: 3543Calibration InformationPlate or H2O 1H2O 1.725QstdI ICC Test # (in) (m3/min) (chart) (corrected)Calibration InformationPlate or H2O 1H2O 1.725QstdI IC Test # (in) (m3/min) (chart) (corrected)Calibration Information112.101.72553.053.39210.101.57648.048.3637.301.34141.041.3044.101.00733.033.2452.200.73923.023.17Calculations= l/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]m = samp I = chartI[Sqrt(Pa/Pstd)(Tstd/Ta)]m = samp I = chart= standard flow rate corrected chart responsem = samp I = chartcalibrator Qstd slope calibrator Qstd slopem = salibration (deg K) actual temperature during calibration (deg K) actual pressure during calibration (mm Hg)	Date: 11-Nov-20 Tech: CS Tang
Site ConditionsBarometric Pressure (in Hg): $30.14$ Temperature (deg F): $73$ Calibration OrificeAverage Temp. (deg F): $73$ ACalibration OrificeMake: Tisch Model: TE-5025A Serial#: $3543$ Qstd S Model: TE-5025A 	Tech: CS Tang
Barometric Pressure (in Hg): $30.14$ Temperature (deg F): $73$ Average Press. (in Hg): $30.14$ Average Temp. (deg F): $73$ Averag	
Temperature (deg F): 73 Average Press. (in Hg): $30.14$ Average Temp. (deg F): 73Correct Average Temp. (deg F): 73Calibration OrificeMake: Tisch Model: TE-5025A Serial#: $3543$ Qstd I Date CertCalibration InformationPlate or H2O 1Qstd I IICCalibration InformationPlate or H2O Qstd IQstd I IICCalibration InformationPlate or H2O 1Qstd I IICCalibration InformationPlate or H2O Qstd IQstd I IICCalibration InformationPlate or 1H2O 1Qstd IIC ICTest #(in) (m3/min) (chart)(corrected)1112.101.725 $53.0$ $53.39$ 210.101.57648.048.3637.301.34141.041.3044.101.00733.033.2452.2000.73923.023.17Calculations= I/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta)]m = samp I = chart= standard flow rate corrected chart responsem = samp I = chartcalibrator Qstd slope calibrator Qstd slope calibrator Qstd slope calibration (deg K) actual pressure during calibration (deg K) <br< td=""><td></td></br<>	
Average Press. (in Hg): $30.14$ Average Temp. (deg F): $73$ Correct Average Temp. (deg F): $73$ Calibration OrificeCalibration OrificeMake: Tisch Model: TE-5025A Serial#: $3543$ Qstd Inter Date CertCalibration InformationPlate or H2O IH2O IQstd IICCalibration InformationPlate or IH2O IQstd IICCalibration InformationPlate or IH2O IQstd IICCalibration InformationPlate or IH2O IQstd IICCalibration InformationPlate or IH2O IQstd IICCalibration InformationPlate or IH2O IQstd IICI12.101.725 $53.0$ $53.39$ 210.101.576 I48.0 I48.3637.301.341 I41.0 I41.3044.101.007 I33.0 I33.24S2.200.739 I23.0 I23.17CalculationsI = chart I = chartTave dail corrected chart response calibrator Qstd slope calibrator Qstd slope calibrator Qstd slope calibration (deg K) actual pressure during calibration (deg K) actual pressure during calibration (mm Hg)I	ed Pressure (mm Hg): 766
Average Temp. (deg F): $^{73}$ Calibration OrificeCalibration OrificeMake: Tisch Model: TE-5025A Serial#: 3543Qstd Inter Ogstd Inter Date CertCalibration InformationPlate orH2O (m) (m3/min) (m3/min) (chart)IcPate orH2O (m3/min) (chart)IcTest # (in)(in) (m3/min) (m3/min) (chart)Corrected)112.10 1.7251.725 53.0 53.0 53.3953.39 2 2.10.10 1.576 48.0 48.36 48.36 3 3 7.30 1.341 41.0 41.0 41.30 4 4.10 1.007 33.0 33.24 4 5 5 2.20 0.739 23.0 23.17m = samp 1 = chart Tav = dail Pav = dail tual chart response calibrator Qstd slope calibrator Qstd slope calibration (deg K) actual pressure during calibration (deg K) actual pressure during calibration (mm Hg)m	Temperature (deg K): 296
Calibration OrificeMake: Ti sch Model: TE-5025A Serial#: 3543Qstd S Qstd Inter Serial#: 3543Calibration Informationlate orH2O (m3/min)QstdI (chart)ICTest # (in) (m3/min)(chart) (corrected)(corrected)112.101.72553.053.39210.101.57648.048.3637.301.34141.041.3044.101.00733.033.2452.200.73923.023.17Calculations= 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]m = samp I = chart= standard flow rate corrected chart response calibrator Qstd intercept actual temperature during calibration (deg K) actual pressure during calibration (deg K) actual pressure during calibration (mm Hg)Test H (calibration (mm Hg)	ed Average (mm Hg): 766
Make: Ti schQstd SModel: TE-5025AQstd InterSerial#: 3543Date CertCalibration InformationPlate orH2OQstdIICTest #(in)(m3/min)(chart)(corrected)112.101.72553.053.39210.101.57648.048.3637.301.34141.041.3044.101.00733.033.2452.200.73923.023.17Calculations= 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]m = sampI[Sqrt(Pa/Pstd)(Tstd/Ta)]b = sampI = chart= standard flow rateTav = dailrav = dailcorrected chart responsePav = dailPav = dailctual chart responsePav = dailpav = dailcalibrator Qstd slopecalibration (deg K)actual temperature during calibration (mm Hg)	verage Temp. (deg K): 296
Model:TE-5025A Serial#:Qstd Inter Date CertCalibration InformationPlate orH2O (m3/min)QstdIICTest #(in)(m3/min)(chart)(corrected)112.101.725 $53.0$ $53.39$ 210.101.57648.0 $48.36$ 37.301.341 $41.0$ $41.30$ 4 $4.10$ $1.007$ $33.0$ $33.24$ 5 $2.20$ $0.739$ $23.0$ $23.17$ CalculationsI = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]m = samp I = chartI = standard flow rateTav = dail Pav = dail 	
Date Cert           Calibration Information           Calibration Information           Plate or         H2O         Qstd         I         IC           Test #         (in)         (m3/min)         (chart)         (corrected)           1         12.10         1.725         53.0         53.39           2         10.10         1.576         48.0         48.36           3         7.30         1.341         41.0         41.30           4         4.10         1.007         33.0         33.24           5         2.20         0.739         23.0         23.17           Calculations           I = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]         m = samp           I = chart         Tav = dail         Tav = dail           I = standard flow rate         Tav = dail         Pav = dail           ictual chart response         Pav = dail         Pav = dail           ictual chart response         Eatibrator Qstd slope         Calibrator Qstd slope           calibrator Qstd intercept         actual temperature during calibration (deg K)         actual pressure during calibration (mm Hg)	lope: 2.03936
Calibration InformationPlate orH2OQstdIICTest #(in)(m3/min)(chart)(corrected)112.10 $1.725$ $53.0$ $53.39$ 210.10 $1.576$ $48.0$ $48.36$ 3 $7.30$ $1.341$ $41.0$ $41.30$ 4 $4.10$ $1.007$ $33.0$ $33.24$ 5 $2.20$ $0.739$ $23.0$ $23.17$ CalculationsI = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]m = sampI = standard flow rateTav = dailcorrected chart responsePav = dailcorrected chart responsePav = dailcalibrator Qstd slopeealibration (deg K)calibrator Qstd interceptcatual temperature during calibration (deg K)catual pressure during calibration (mm Hg)for the samp	<b>cept:</b> -0.01298
Plate or       H2O       Qstd       I       IC         Test #       (in)       (m3/min)       (chart)       (corrected)         1       12.10       1.725       53.0       53.39         2       10.10       1.576       48.0       48.36         3       7.30       1.341       41.0       41.30         4       4.10       1.007       33.0       33.24         5       2.20       0.739       23.0       23.17         Calculations         = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]       m = samp         I[Sqrt(Pa/Pstd)(Tstd/Ta)]       b = samp       I = chart         Tav = dail       corrected chart response       Pav = dail         corrected chart response       Pav = dail       Pav = dail         ctual chart response       calibrator Qstd slope       Pav = dail         calibrator Qstd slope       calibration (deg K)       actual pressure during calibration (mm Hg)       Image: Calibration (mm Hg)	fied: 2-11-2020
Test #         (in)         (m3/min)         (chart)         (corrected)           1         12.10         1.725         53.0         53.39           2         10.10         1.576         48.0         48.36           3         7.30         1.341         41.0         41.30           4         4.10         1.007         33.0         33.24           5         2.20         0.739         23.0         23.17 <b>Calculations</b> =         1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]         m = samp         I = chart           I[Sqrt(Pa/Pstd)(Tstd/Ta)]         b = samp         I = chart           = standard flow rate         Tav = dail         corrected chart response         Pav = dail           calibrator Qstd slope         calibrator Qstd slope         ealibrator Qstd slope         ealibration (deg K)         actual temperature during calibration (mm Hg)         fill = chart	
1       12.10       1.725       53.0       53.39         2       10.10       1.576       48.0       48.36         3       7.30       1.341       41.0       41.30         4       4.10       1.007       33.0       33.24         5       2.20       0.739       23.0       23.17         Calculations         I = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]       m = samp         I = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]       m = samp       I = chart         I = standard flow rate       Tav = dail       rav = dail         : corrected chart response       Pav = dail       Pav = dail         : cotract Qstd slope       calibrator Qstd slope       Pav = dail         : actual temperature during calibration (deg K)       : actual pressure during calibration (mm Hg)       I = standard flow meth	
2       10.10       1.576       48.0       48.36         3       7.30       1.341       41.0       41.30         4       4.10       1.007       33.0       33.24         5       2.20       0.739       23.0       23.17         Calculations         = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]       m = samp         I[Sqrt(Pa/Pstd)(Tstd/Ta)]       b = samp       I = chart         = standard flow rate       Tav = dail       Pav = dail         corrected chart response       Pav = dail       Pav = dail         ctual chart response       calibrator Qstd slope       Pav = dail         calibrator Qstd slope       calibration (deg K)       actual pressure during calibration (mm Hg)	Linear Regression
3       7.30       1.341       41.0       41.30         4       4.10       1.007       33.0       33.24         5       2.20       0.739       23.0       23.17         Calculations         = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]       m = samp         I[Sqrt(Pa/Pstd)(Tstd/Ta)]       b = samp       I = chart         = standard flow rate       Tav = dail         corrected chart response       Pav = dail;         tual chart response       Pav = dail;         calibrator Qstd slope       aatibration (deg K)         actual temperature during calibration (deg K)       actual pressure during calibration (mm Hg)	<b>Slope:</b> 29.6386
4       4.10       1.007       33.0       33.24         5       2.20       0.739       23.0       23.17         Calculations         = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]       m = samp         I[Sqrt(Pa/Pstd)(Tstd/Ta)]       b = samp       I = chart         = standard flow rate       Tav = dail       corrected chart response         calibrator Qstd slope       Pav = dail       Pav = dail         calibrator Qstd slope       calibration (deg K)       actual pressure during calibration (mm Hg)	Intercept: 2.0292
5       2.20       0.739       23.0       23.17         Calculations         = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]       m = samp         I[Sqrt(Pa/Pstd)(Tstd/Ta)]       b = samp       I = chart         = standard flow rate       Tav = dail         corrected chart response       Pav = dail         ctual chart response       Pav = dail         calibrator Qstd slope       calibration (deg K)         actual pressure during calibration (mm Hg)       m = samp	<b>Corr. Coeff:</b> 0.9975
Calculations         Calculations         # = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta)])-b]       m = samp         I[Sqrt(Pa/Pstd)(Tstd/Ta)]       b = samp       I = chart         I = standard flow rate       Tav = dail       corrected chart response         corrected chart response       Pav = dail         ctual chart response       Pav = dail         calibrator Qstd slope       Calculation (deg K)         actual pressure during calibration (mm Hg)       Example 1	
= 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]       m = samp         I[Sqrt(Pa/Pstd)(Tstd/Ta)]       b = samp         I = chart       I = chart         = standard flow rate       Tav = dail         corrected chart response       Pav = dail         ctual chart response       Pav = dail         calibrator Qstd slope       Itemperature during calibration (deg K)         actual pressure during calibration (mm Hg)       Itemperature during calibration (mm Hg)	# of Observations: 5
I[Sqrt(Pa/Pstd)(Tstd/Ta)] b = samp I = chart = standard flow rate Tav = dail corrected chart response Pav = dail; ctual chart response calibrator Qstd slope calibrator Qstd intercept actual temperature during calibration (deg K) actual pressure during calibration (mm Hg)	
I = chart Tav = dail corrected chart response calibrator Qstd slope calibrator Qstd intercept actual temperature during calibration (deg K) actual pressure during calibration (mm Hg)	
= standard flow rate       Tav = dail         corrected chart response       Pav = dail         ctual chart response       calibrator Qstd slope         calibrator Qstd intercept       actual temperature during calibration (deg K)         actual pressure during calibration (mm Hg)       Image: Calibration (mm Hg)	
corrected chart response Pav = daily ctual chart response calibrator Qstd slope calibrator Qstd intercept actual temperature during calibration (deg K) actual pressure during calibration (mm Hg)	
ctual chart response calibrator Qstd slope calibrator Qstd intercept actual temperature during calibration (deg K) actual pressure during calibration (mm Hg)	y average temperature
calibrator Qstd slope calibrator Qstd intercept actual temperature during calibration (deg K) actual pressure during calibration (mm Hg)	v average pressure
calibrator Qstd intercept actual temperature during calibration (deg K) actual pressure during calibration (mm Hg)	Average I (chart): 40
= actual temperature during calibration (deg K) = actual pressure during calibration (mm Hg)	Average Flow Calculation m3/min
actual pressure during calibration (mm Hg)	1.277533737
	Average Flow Calculation in CFM
= 298 deg K	45.10971624
= 760 mm Hg	Sample Time (Hrs): 1.0
ubsequent calculation of sampler flow:	Total Flow in m3/min
(I)[Sqrt(298/Tav)(Pav/760)]-b)	76.6520242
	Total Flow in CFM
	2706.582975

Tisch Environmental 145 South Miami Ave, Cleves OH 45002 ● 877.263.7610 ● sales@tisch-env.com ● www.tisch-env.com



# **CERTIFICATE OF ACCREDITATION**

This is to attest that

# AQUALILTY TESTCONSULT LIMITED

11A&B, KAI FONG GARDEN, PING CHE ROAD FANLING, HONG KONG

**Calibration Laboratory CL-207** 

has met the requirements of AC204, *IAS Accreditation Criteria for Calibration Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories*. This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date October 19, 2020

Expiration Date December 1, 2021



President

Visit www.iasonline.org for current accreditation information.

International Accreditation Service, Inc.

3060 Saturn Street, Suite 100, Brea, California 92821, U.S.A. | www.iasonline.org

# AQUALILTY TESTCONSULT LIMITED

www.aqtlgroup.com

# Contact Name Lee Mei Yee Julia

Contact Phone + 852-6309-2280

Accredited to ISO/IEC 17025:2017

Effective Date October 19, 2020

MEASURED QUANTITY or DEVICE	RANGE	UNCERTAINTY <sup>1,2</sup> (±)	· /
TYPE CALIBRATED		(-)	EQUIPMENT USED
	Dimensio	nal	
Caliper -Vernier, Dial & Electronic <sup>3</sup>	0 mm to 300 mm	30 µm	Checker by comparison method (BS 887:1982)
Steel Ruler <sup>3</sup>	1 mm to 1000 mm	280 µm	Reference Steel Rule by comparison method (BS 4372:1968)
Dial Indicator / Gauge (Plunger) <sup>3</sup>	0 mm to 50 mm	8 µm	Reference micrometer head by comparison method (BS 907:2008)
Feeler Gauge <sup>3</sup>	0.01 mm to 1 mm	8 µm	Reference Dial Gauge by comparison method (BS BS957-2008)
Measuring tape <sup>3</sup>	0 m to 1.5 m	1200 µm	Reference steel ruler by comparison method (BS 4035:1966)
Engineering Square <sup>3</sup>	Length 0 mm to 160 mm	20 µm	Reference engineering square and Feeler Gauge (BS 939:2007)
Slump cone <sup>3</sup>	Diameter = 0 mm to 200 mm Thickness = 1.5 mm Height = 0 mm to 300 mm	560 μm 100 μm 560 μm	Reference Caliper & Reference Steel ruler by direct measurement (Verification in accordance with in-house method for the dimensional requirements as specified CS1:1990 Vol.1 A4; CS1: 2010 Vol. 1, A5)
Tamping rod <sup>3</sup>	Diameter = 0 mm to 16 mm Length = 600 mm	600 μm 950 μm	Reference steel ruler & Reference Caliper by direct measurement (Verification in accordance with in-house method for the dimensional

# CALIBRATION AND MEASUREMENT CAPABILITY (CMC)\*

\* If information in this CMC is presented in non-SI units, the conversion factors stated in NIST Special Publication 811 "Guide for the Use of the International System of Units (SI)" apply.





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MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY <sup>1,2</sup> (±)	CALIBRATION PROCEDURE AND/OR STANDARD EQUIPMENT USED
			requirements as specified CS1:1990 Vol.1 A5;CS1: 2010 Vol. 1, A6)
Cube mould <sup>3</sup>	(Max dimensions 150 mm per side) Dimension Flatness Perpendicularity Parallelism	50 μm 10 μm 10 μm 50 μm	Reference Caliper, straight edge & feeler gauge by direct measurement. (Verification in accordance with in-house method for the dimensional requirements as specified in BS1881: Part 108:1983; CS1:1990 Vol1, A21; CS1:2010 Vol 1, A25; BS EN 12390-2:2000)
Compacting Bar <sup>3</sup>	Ramming Face = 25 mm Length = 380 mm Weight = 1.8 kg	100 μm 560 μm 1 g	Reference Caliper & Steel ruler by direct measurement. (Verification in accordance with in-house method for the dimensional & mass requirements as specified in BS1881: Part 105:1984 Cl 3.3; CS1:1990 Vol 2, E3 CS1:2010 Vol 1, A15.3; BS EN 12350 -5:2000 Cl 4.3.)
Covermeter	20 mm to 103 mm	2.9 mm	Reference concrete block (Verification in accordance with in-house method for the dimensional requirements as specified in BS 1881:Part 204:1988 CI.6.4- Method C)
Flow table <sup>3</sup>	15 kg to 17 kg 1 mm to 71 mm	12 g 600 μm	Weighing Balance, Reference caliper & Reference steel ruler by direct measurement
Test Sieve <sup>3</sup>	4 mm to 50 mm	50 µm	Reference Caliper bydirect measurement
	Mechanic	cal	
Force Measuring Machine <sup>3</sup> (Compression Mode)	1 kN to 3000 kN	0.4 %	Ref. Load cell by direct measurement BS 1610: Part 1:1985; BS 1610: Part 1:1992; BS EN ISO 12390-4:2000 Annex B; BS EN ISO 7500-1:2004
Laser Dust Meter <sup>3</sup>	Dust particles 0.001 mg/m <sup>3</sup> to 10.00 mg/m <sup>3</sup>	0.9 mg/m <sup>3</sup>	By comparison method by using reference laser dust meter





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MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY <sup>1,2</sup> (±)	CALIBRATION PROCEDURE AND/OR STANDARD EQUIPMENT USED
Rebound Hammer <sup>3</sup>	80 unit (hardness)	1.6 rebound count	Reference Rebound count by comparison method. BS1881: Part 202:1986; BS EN 12504-2:2001; BS EN 12504-2:2012
Mass (F2 class and coarser)	1 g to 200 g 200 g to 5 kg 5 kg to 10 kg 10 kg to 50 kg	1.3 mg 0.5 g 1 g 7 g	Standard Weight E2/ F1 Class & Weighing Balances by comparison method (OIMLR111)
Weighing Scale & Balance <sup>3</sup>	1 g to 200 g 200 g to 5 kg 5 kg to 50 kg	1 mg 1 g 15 g	Standard weight of E2/F1 Grade by direct measurement
Volumetric Glassware	1 mL to 100 mL 100 mL to 1000 mL	0.004 mL 0.09 mL	Standard weight E2 Class, Weighing Balances & Distilled water by gravimetric method
	Therma	1	
Digital/Liquid in Glass Thermometers & <i>RTD/</i> Thermocouples with or without Indicators	15 °C to 55°C 55°C to 95°C	0.4 °C 0.9 °C	Water Baths, Reference Sensor and Indictor by Comparison Method (OIML R133)
Curing Tank <sup>3</sup>	(Calibration at 20 °C & 27 °C @ 30 min) 20 °C Temperature distribution 27 °C Temperature distribution Efficiency of circulation	0.4 °C 0.8 °C 5 s	Reference Temperature datalogger by Mapping Method & Reference Stop Watch (Verification in accordance with in-house method for the Temp & Time requirements as specified in BS1881-111:1983 CS1:1990 Vol 1 App A24 CS1:2010 Vol 1 App A28 BE EN 12390-2:2000
Oven <sup>3</sup>	40.0 °C to 180.0 °C	1.5 °C	Reference Temperature datalogger by Mapping Method (AS 2853:1986)
Furnace <sup>3</sup>	200 °C to 1300 °C	6 °C	Reference Thermocouple with Indicator By single point Calibration (AS 2853:1986)
Water bath <sup>3</sup>	15 °C to 95 °C	0.2 °C	Reference Temperature datalogger by Mapping Method (AS 2853:1986)
	Time and Free		
Stop Watch/ Timer <sup>3</sup>	10 s to 3600 s	0.2 s	Reference stop watch





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MEASURED QUANTITY or DEVICE TYPE CALIBRATED		(±)	CALIBRATION PROCEDURE AND/OR STANDARD EQUIPMENT USED
Grout Flow Cone <sup>3</sup>	7 s to 9 s		Reference stop watch by direct method (ASTM C939-10 Cl.9)

<sup>1</sup>The uncertainty covered by the Calibration and Measurement Capability (CMC) is expressed as the expanded uncertainty having a coverage probability of approximately 95 %. It is the smallest measurement uncertainty that a laboratory can achieve within its scope of accreditation when performing calibrations of a best existing device. The measurement uncertainty reported on a calibration certificate may be greater than that provided in the CMC due to the behavior of the calibration item and other factors that may contribute to the uncertainty of a specific calibration.

<sup>2</sup>When uncertainty is stated in relative terms (such as percent, a multiplier expressed as a decimal fraction or in scientific notation), it is in relation to instrument reading or instrument output, as appropriate, unless otherwise indicated.

<sup>3</sup>Also available as site calibration. Note that actual measurement uncertainties achievable at a customer's site can normally be expected to be larger than the uncertainties listed on this Scope of Accreditation.





# AQuality 東恒測試顧問有限公司 AQUALITY TESTCONSULT LIMITED

### 香港新界粉嶺坪輋路啟芳園11A&11B號

No. 11A&B, KAI FONG GARDEN, PING CHE ROAD, FANLING, NEW TERRITORIES, HONG KONG TEL : 852-3582-9589 FAX : 852-2674-1177 EMAIL : cal.aqtl@gmail.com WEBSITE: www.aqtlgroup.com

	CERTIFICATE OF CALIBRATION
Report Number	: 201108MCA-126F
Date of Report	: 12-Nov-20
Page Number	: 1 of 2
Customer *	: Apex Testing & Certification Ltd.
Customer Address*	: Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK
Customers Ref. *	: A005
Item Under Calibration (IUC)	*
Equipment No.	: N/A
Manufacturer	: Sibata Scientific Technology Ltd
	: LD-3B
Serial No.	: 235811
Scale Division	: 0.001 mg/m3
Range	: 0.001 to 1 mg/m3
Condition of Item	: Normal
Date Item Received	: 8-Nov-20
Date Calibrated	: 8-Nov-20
Calibration Location	: AQuality Calibration Lab.
Date of Next Calibration	: 7-Nov-21
Calibrated By	: Jessica Liu
Test Environment	

I est Environment					
Ambient Temperature	:	27.5	°C to	23.9	°C
Relative Humidity	:	51	% to	83	%

# **Calibration Results**

Reference True Reading (mg/m3)	Average IUC Reading (mg/m <sup>3</sup> )	Correction (mg/m <sup>3</sup> )	Error of IUC Reading (%)	Expanded Uncertainty (mg/m <sup>3</sup> )	Coverage Factor K
0.158	0.167	-0.008	5.1%	0.020	2.0
5.164	5.647	-0.484	8.5%	0.463	2.0
10.100	11.141	-1.041	9.3%	0.904	2.0

<u>Remarks</u>

- 1. \* Denotes information supplied by customer.
- 2. The results relate only to the items calibrated.
- 3. The results apply to the items as received.
- 4. Correction = Average of (Ref reading IUC reading)
- 5. The technical requirement of laser dust meter. +/- 20% error for the particles concentration.

Approved by:

LEE Mei Yee, Julia Managing Director



東恒測試顧問有限公司

# AQUALITY TESTCONSULT LIMITED

### 香港新界粉嶺坪輋路啟芳園11A&11B號

No. 11A&11B, KAI FONG GARDEN, PING CHE ROAD, FANLING, NEW TERRITORIES, HONG KONG TEL : 852-3582-9589 FAX : 852-2674-1177 EMAIL : cal.aqtl@gmail.com WEBSITE: www.aqtlgroup.com

# **CERTIFICATE OF CALIBRATION**

Report Number	: 201108MCA-126F
Date of Report	: 12-Nov-20
Page Number	: 2 of 2
Customer *	: Apex Testing & Certification Ltd.
Customers Ref. *	: A005

### **Details of Calibration**

- 1. The calibration was performed in accordance with AQuality Testconsult Procedure Number ENV-L-003 (in-house method), by comparison with the laboratory's reference equipment which have traceable international standards of measurement.
- 2. The item under calibration (IUC) was allowed to stabilize in the laboratory for 0.25 hour before commencement of calibration.
- 3. A set of readings were made at each calibration concentration. The values quoted in the results are the average of each set of readings.
- 4. The values given in this calibration certificate only relate to the values measured at the time of calibration. Any uncertainties quoted do not include allowance for the capability of any other laboratory to repeat the measurement. The uncertainty quoted relate only to item at time of calibration. AQuality Testconsult Limited is not liable for any loss or damage resulting from the use of this equipment.
- 5. The identification, calibration certificate numbers for the reference equipment used were as follows :

Equipment Number	Certificate Number	Description
CH-LDM-1	HBW202001563	粉尘测试仪

6. Copies of the Calibration certificates of the reference equipment used in this calibration may be obtained from AQuality Testconsult Limited, if necessary.

- End of Report -



# 東恒測試顧問有限公司 AQUALITY TESTCONSULT LIMITED 香港新界粉嶺坪輋路啟芳園11A&11B號

TEL : 852-3582-9589 FAX : 852-2674-1177 EMAIL : cal.aqtl@gmail.com WEBSITE: www.aqtlgroup.com

No. 11A&11B, KAI FONG GARDEN, PING CHE ROAD, FANLING, N.T., HONG KONG

# **CERTIFICATE OF CALIBRATION**

Apex Testing & Certification Ltd.	Test Report No.	201108MCA-126F
Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Date of Issue	12-Nov-20
	Date of Testing	8-Nov-20
	Page	1 of 1

## **Item for Calibration**

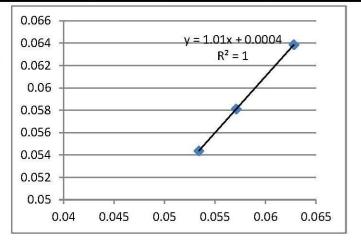
Description	: Laser Dust Monitor
Manufacturer	: Sibata Scientific Technology Ltd
Model No.	: LD-3B
Serial No.	: 235811

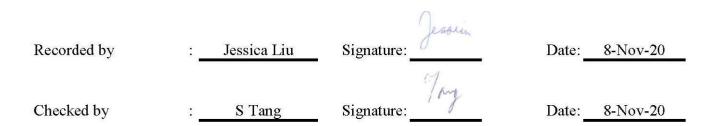
## Standard Equipment

Volume Sampler / Calibration Orifice
n Environmental, Inc.
170 / TE-5025A
/ 3543
v-20 / 2-Nov-20

			Mean	Concentration	Concentration
Date	Time	Mean Temp	3253	Standard	Calibrated
Date	1 mie		Pressure	Equipment	Equipment
		(°C)	(hPa)	(mg/m3)	(mg/m3)
8-Nov-20	20:15	25.7	1017.2	0.0628	0.0639
8-Nov-20	21:20	25.7	1017.2	0.0534	0.0544
8-Nov-20	22:25	25.7	1017.2	0.0571	0.0581

By Linear Regression of	fΥ	or X
Slope (K-factor)	:	1.0100
Correlation Coefficient	•	1.0000
Validity of Calibration	:	7-Nov-21





# AQuality 東恒測試顧問有限公司 AQUALITY TESTCONSULT LIMITED

### 香港新界粉嶺坪輋路啟芳園11A&11B號

No. 11A&B, KAI FONG GARDEN, PING CHE ROAD, FANLING, NEW TERRITORIES, HONG KONG TEL : 852-3582-9589 FAX : 852-2674-1177 EMAIL : cal.aqtl@gmail.com WEBSITE: www.aqtlgroup.com

	CERTIFICATE OF CALIBRATION
Report Number	: 201108MCA-123F
Date of Report	: 12-Nov-20
Page Number	: 1 of 2
Customer *	: Apex Testing & Certification Ltd.
Customer Address*	: Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK
Customers Ref. *	: A005
Item Under Calibration (IUC)	*
Equipment No.	
	: Sibata Scientific Technology Ltd
Model No.	
Serial No.	
Scale Division	
Range	: 0.001  to  1  mg/m3
Condition of Item	
Date Item Received	: 8-Nov-20
Date Calibrated	: 8-Nov-20
Calibration Location	: AQuality Calibration Lab.
Date of Next Calibration	: 7-Nov-21
Calibrated By	: Jessica Liu

Test Environment					
Ambient Temperature		27.5	°C to	23.9	°C
Relative Humidity	:	51	% to	83	%

# **Calibration Results**

Reference True Reading (mg/m3)	Average IUC Reading (mg/m <sup>3</sup> )	Correction (mg/m <sup>3</sup> )	Error of IUC Reading (%)	Expanded Uncertainty (mg/m <sup>3</sup> )	Coverage Factor K
0.158	0.168	-0.010	5.7%	0.026	2.0
5.164	5.562	-0.398	7.1%	0.462	2.0
10.100	10.936	-0.837	7.6%	0.905	2.0

<u>Remarks</u>

- 1. \* Denotes information supplied by customer.
- 2. The results relate only to the items calibrated.
- 3. The results apply to the items as received.
- 4. Correction = Average of (Ref reading IUC reading)
- 5. The technical requirement of laser dust meter. +/- 20% error for the particles concentration.

20

Approved by:

LEE Mei Yee, Julia Managing Director



東恒測試顧問有限公司

# AQUALITY TESTCONSULT LIMITED

### 香港新界粉嶺坪輋路啟芳園11A&11B號

No. 11A&11B, KAI FONG GARDEN, PING CHE ROAD, FANLING, NEW TERRITORIES, HONG KONG TEL : 852-3582-9589 FAX : 852-2674-1177 EMAIL : cal.aqtl@gmail.com WEBSITE: www.aqtlgroup.com

# **CERTIFICATE OF CALIBRATION**

Report Number	: 201108MCA-123F
Date of Report	: 12-Nov-20
Page Number	: 2 of 2
Customer *	: Apex Testing & Certification Ltd.
Customers Ref. *	: A005

### **Details of Calibration**

- 1. The calibration was performed in accordance with AQuality Testconsult Procedure Number ENV-L-003 (in-house method), by comparison with the laboratory's reference equipment which have traceable international standards of measurement.
- 2. The item under calibration (IUC) was allowed to stabilize in the laboratory for 0.25 hour before commencement of calibration.
- 3. A set of readings were made at each calibration concentration. The values quoted in the results are the average of each set of readings.
- 4. The values given in this calibration certificate only relate to the values measured at the time of calibration. Any uncertainties quoted do not include allowance for the capability of any other laboratory to repeat the measurement. The uncertainty quoted relate only to item at time of calibration. AQuality Testconsult Limited is not liable for any loss or damage resulting from the use of this equipment.
- 5. The identification, calibration certificate numbers for the reference equipment used were as follows :

Equipment Number	Certificate Number	Description
CH-LDM-1	HBW202001563	粉尘测试仪

6. Copies of the Calibration certificates of the reference equipment used in this calibration may be obtained from AQuality Testconsult Limited, if necessary.

- End of Report -



# 東恒測試顧問有限公司 AQUALITY TESTCONSULT LIMITED 香港新界粉嶺坪輋路啟芳園11A&11B號

No. 11A&11B, KAI FONG GARDEN, PING CHE ROAD, FANLING, N.T., HONG KONG

# **CERTIFICATE OF CALIBRATION**

Apex Testing & Certification Ltd.	Test Report No.	201108MCA-123F
Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Date of Issue	12-Nov-20
	Date of Testing	8-Nov-20
	Page	1 of 1

### **Item for Calibration**

Description	: Laser Dust Monitor
Manufacturer	: Sibata Scientific Technology Ltd
Model No.	: LD-3B
Serial No.	: 336338

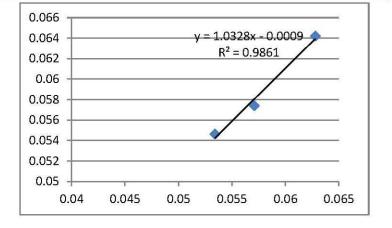
## Standard Equipment

: High Volume Sampler / Calibration Orifice
: Tisch Environmental, Inc.
: TE-5170 / TE-5025A
4344 / 3543
: 8-Nov-20 / 2-Nov-20

Date	Time	Mean Temp	Mean	Concentration	Concentration
			Pressure	Standard	Calibrated
				Equipment	Equipment
		(°C)	(hPa)	(mg/m3)	(mg/m3)
8-Nov-20	20:15	25.7	1017.2	0.0628	0.0642
8-Nov-20	21:20	25.7	1017.2	0.0534	0.0546
8-Nov-20	22:25	25.7	1017.2	0.0571	0.0574

Y or X
1.0328
0.9861
7-Nov-21

:



Jessin Recorded by Signature: Jessica Liu Date: 8-Nov-20 •

Checked by

S Tang

Signature:

Date: 8-Nov-20

#### 東恒測試顧問有限公司 **AQuality AQUALITY TESTCONSULT LIMITED**

### 香港新界粉嶺坪鲞路啟芳園11A&11B號

No. 11A&B, KAI FONG GARDEN, PING CHE ROAD, FANLING, NEW TERRITORIES, HONG KONG TEL: 852-3582-9589 FAX: 852-2674-1177 EMAIL: cal.aqtl@gmail.com WEBSITE: www.aqtlgroup.com

	CERTIFICATE OF CALIBRATION
Report Number	: 201108MCA-125F
Date of Report	: 12-Nov-20
Page Number	: 1 of 2
Customer *	: Apex Testing & Certification Ltd.
Customer Address*	: Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK
Customers Ref. *	: A005

# Item Under Calibration (IUC)\*

Equipment No.	: N/A
Manufacturer	: Sibata Scientific Technology Ltd
Model No.	: LD-3B
Serial No.	: 567188
Scale Division	: 0.001 mg/m3
Range	: 0.001 to 1 mg/m3
Condition of Item	: Normal
n Received	: 8-Nov-20

Date Item Received	: <b>8-</b> N	ov-20			
Date Calibrated	: <b>8-</b> N	ov-20			
Calibration Location	: AQ	uality Cali	bration Lab.		
Date of Next Calibration	: 7-N	ov-21			
Calibrated By	: Jess	ica Liu			
Test Environment					
Ambient Temperature	:	27.5	°C to	23.9	°C
Relative Humidity	:	51	% to	83	%

# **Calibration Results**

Reference True Reading (mg/m3)	Average IUC Reading (mg/m <sup>3</sup> )	Correction (mg/m <sup>3</sup> )	Error of IUC Reading (%)	Expanded Uncertainty (mg/m <sup>3</sup> )	Coverage Factor K
0.158	0.167	-0.008	4.9%	0.023	2.0
5.164	5.693	-0.530	9.3%	0.463	2.0
10.100	11.045	-0.945	8.6%	0.905	2.0

# Remarks

- 1. \* Denotes information supplied by customer.
- 2. The results relate only to the items calibrated.
- 3. The results apply to the items as received.
- 4. Correction = Average of (Ref reading IUC reading)
- 5. The technical requirement of laser dust meter. +/- 20% error for the particles concentration.

20

Approved by:

LEE Mei Yee, Julia Managing Director



東恒測試顧問有限公司

# AQUALITY TESTCONSULT LIMITED

### 香港新界粉嶺坪輩路啟芳園11A&11B號

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# **CERTIFICATE OF CALIBRATION**

Report Number	: 201108MCA-125F
Date of Report	: 12-Nov-20
Page Number	: 2 of 2
Customer *	: Apex Testing & Certification Ltd.
Customers Ref. *	: A005

### **Details of Calibration**

- 1. The calibration was performed in accordance with AQuality Testconsult Procedure Number ENV-L-003 (in-house method), by comparison with the laboratory's reference equipment which have traceable international standards of measurement.
- 2. The item under calibration (IUC) was allowed to stabilize in the laboratory for 0.25 hour before commencement of calibration.
- 3. A set of readings were made at each calibration concentration. The values quoted in the results are the average of each set of readings.
- 4. The values given in this calibration certificate only relate to the values measured at the time of calibration. Any uncertainties quoted do not include allowance for the capability of any other laboratory to repeat the measurement. The uncertainty quoted relate only to item at time of calibration. AQuality Testconsult Limited is not liable for any loss or damage resulting from the use of this equipment.
- 5. The identification, calibration certificate numbers for the reference equipment used were as follows :

Equipment Number	Certificate Number	Description
CH-LDM-1	HBW202001563	粉尘测试仪

6. Copies of the Calibration certificates of the reference equipment used in this calibration may be obtained from AQuality Testconsult Limited, if necessary.

- End of Report -



# **東恒測試顧問有限公司** AQUALITY TESTCONSULT LIMITED 香港新界粉嶺坪輋路啟芳園11A&11B號

No. 11A&11B, KAI FONG GARDEN, PING CHE ROAD, FANLING, N.T., HONG KONG

# **CERTIFICATE OF CALIBRATION**

Apex Testing & Certification Ltd.	Test Report No.	201108MCA-125F
Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Date of Issue	12-Nov-20
	Date of Testing	8-Nov-20
	Page	1 of 1

# **Item for Calibration**

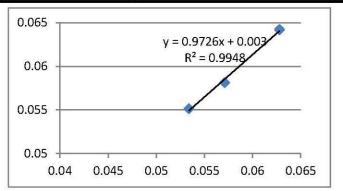
Description	: Laser Dust Monitor
Manufacturer	: Sibata Scientific Technology Ltd
Model No.	: LD-3B
Serial No.	: 567188

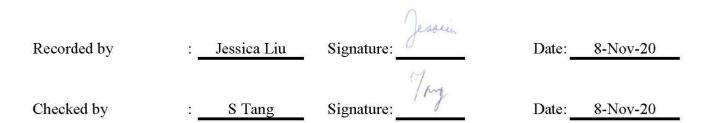
# <u>Standard Equipment</u>

Description :	High Volume Sampler / Calibration Orifice
Manufacturer :	Tisch Environmental, Inc.
Model No.	TE-5170 / TE-5025A
Serial No.	4344 / 3543
Last Calibration :	8-Nov-20 / 2-Nov-20

			Mean	Concentration	Concentration
Date	Time	Mean Temp	Pressure	Standard	Calibrated
Date	Date Time		riessure	Equipment	Equipment
		(°C)	(hPa)	(mg/m3)	(mg/m3)
8-Nov-20	20:15	25.7	1017.2	0.0628	0.0642
8-Nov-20	21:20	25.7	1017.2	0.0534	0.0552
8-Nov-20	22:25	25.7	1017.2	0.0571	0.0581

By Linear Regression of	fΥ	or X
Slope (K-factor)	:_	0.9726
Correlation Coefficient	:	0.9948
Validity of Calibration	:	7-Nov-21







E-mail: smec@cigismec.com



# CERTIFICATE OF CALIBRATION

Website: www.cigismec.com

Certificate No.:	20CA0408 04-02		Page	1	of	2
Item tested						
Description: Manufacturer: Type/Model No.: Serial/Equipment No.: Adaptors used:	Sound Level Meter Hangzhou Aihua Ir AWA5661 304723 -	r (Class 1) , nstruments Co., Ltd , , ,	Microphone - AWA14425 9792 -	2	U.	
Item submitted by						
Customer Name: Address of Customer: Request No.: Date of receipt:	Apex Testing & Ce Unit D6A, 10/F, TM - 08-Apr-2020	ertification Ltd. AL Tower, 3 Hoi Shing	Road, Tsuen Wan, N.	T.		
Date of test:	10-Apr-2020					
Reference equipment	used in the calib	ration				
Description: Multi function sound calibrator Signal generator	Model: B&K 4226 DS 360	Serial No. 2288444 33873	Expiry Date: 23-Aug-2020 10-May-2020		Tracea CIGISM CEPREI	EC
Ambient conditions						
Temperature: Relative humidity: Air pressure:	21 ± 1 °C 55 ± 10 % 1000 ± 5 hPa					
Test specifications						

- 1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

#### **Test results**

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

A Feng Jungi

Date: 14-Apr-2020



Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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Approved Signatory:

Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

Company Chop:

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. HOKLAS 028) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. This certificate shall not be reproduced except in full.



#### 综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黃竹坑道37號利達中心12樓

香 進 質 竹 坑 垣 3 7 號 杓 连 中 心 1 2 读 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533

Page



Coverage

# CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate	No.:

20CA0408 04-02

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Evpanded

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Factor
	•	Pass	0.3	
Self-generated noise	A C	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
1. It was feel or	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Linearity range for Leq	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0,3	
Line arity range for SDI	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Linearity range for SPL	A	Pass	0.3	
Frequency weightings	Ĉ	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
Time weightings	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
Tanle weighting r	Repeated at frequency of 100 Hz	Pass	0.3	
There ever the	1 ms burst duty factor 1/10 <sup>3</sup> at 4kHz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
	Single burst 10 ms at 4 kHz	Pass	0.4	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single buist to this at 4 kinz	Pass	0.3	
Overload indication	Leq	Pass	0.4	

#### 2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz Weighting A at 8000 Hz	Pass Pass	0.3 0.5	

### 3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.



The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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Form No.CARP152-2/Issue 1/Rev.C/01/02/2007

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. HOKLAS 028) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. This certificate shall not be reproduced except in full.



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Tel: (852) 2873 6860 Fax: (852) 2555 7533

# SMECLab

Test Data for Sour	nd Level Met	er				Page 1 of 5
Sound level met	er type:	AWA5661	Serial No.	304723	Date	10-Apr-2020
Microphone	type:	AWA14425	Serial No.	9792	Report	: 20CA0408 04-02

# SELF GENERATED NOISE TEST

The noise test is performed in the most sensitive range of the SLM with the microphone replaced by an equivalent impedance.

Noise level in A weighting	12.1	dB
Noise level in C weighting	12,4	dB
Noise level in Lin	21.1	dB

# LINEARITY TEST

The linearity is tested relative to the reference sound pressure level using a continuous sinusoidal signal of frequency 4 kHz. The measurement is made on the reference range for indications at 5 dB intervals starting from the 94 dB reference sound pressure level. And until within 5 dB of the upper and lower limits of the reference range, the measurements shall be made at 1 dB intervals.(SLM set to LEQ/SPL)

	Actual level		Tolerance	Devia	······································
Reference/Expected level	non-integrated	integrated	·	non-integrated	integrated
dB	dB	dB	+/- dB	dB	dB
94.0	94.0	94.0	0.7	0.0	0.0
99.0	98.9	98.9	0.7	-0.1	-0.1
104.0	103.9	103.9	0.7	-0.1	-0.1
109.0	108.9	108.9	0.7	-0.1	-0.1
114.0	113.9	113.9	0.7	-0.1	-0.1
115.0	114.9	114.9	0.7	-0.1	-0.1
116.0	115.9	115.9	0.7	-0.1	-0.1
117.0	116.9	116.9	0.7	-0.1	-0.1
118.0	117.9	117.9	0.7	-0.1	-0.1
119.0	118.9	118.9	0.7	-0.1	-0.1
120.0	119.9	119.9	0.7	-0.1	-0.1
89.0	89.0	89.0	0.7	0.0	0.0
84.0	84.0	84.0	0.7	0.0	0.0
79.0	79.0	79.0	0.7	0.0	0.0
74.0	74.0	74.0	0.7	0.0	0.0
69.0	69.0	69.0	0.7	0.0	0.0
64.0	64.0	64.0	0.7	0.0	0.0
59.0	59.0	59.0	0.7	0.0	0.0
54.0	54.0	54.0	0.7	0.0	0.0
49.0	48.9	48.9	0.7	-0.1	-0.1
44.0	43.9	43.9	0.7	-0.1	-0.1
39.0	39.0	39.0	0.7	0.0	0.0
34.0	34.0	34.0	0.7	0.0	0.0
29.0	28.9	28.9	0.7	-0.1	-0.1
28.0	28.0	28.0	0.7	0.0	0.0

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Form No. CAWS 152-Issue L/Rev. B 01/02/2007



综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑道37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@clgismec.com Website: www.cigismec.com

Tel: (852) 2873 6860 Fax: (852) 2555 7533

# SMECLab

Page 2 of 5

Test Data for Sound Level Meter

Sound level met Microphone	er type: type:	AWA5661 AWA14425		Serial No. Serial No.	304723 9792	Date Repo	10-Apr-2020
27.0	<u> </u>	27.1	27.1	0.7		0.1	0.1
26.0		26.2	26.2	0.7		0.2	0.2
25.0		25.1	25.1	0.7		0.1	0.1

Measurements for an indication of the reference SPL on all other ranges which include it

Other ranges	Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
25-120	94.0	94.0	0.7	0.0
45-140	94.0	94.0	0.7	0.0

Measurements on all level ranges for indications 2 dB below the upper limit and 2 dB above the lower limit

Ranges	Reference/Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
	27.0	27.0	0.7	0.0
25-120	118.0	117.9	0.7	-0.1
	47.0	46.8	0.7	-0.2
45-140	138.0	137.8	0.7	-0.2

# FREQUENCY WEIGHTING TEST

The frequency response of the weighting netwoks are tested at octave intervals over the frequency ranges 31.5 Hz to 12500 Hz. The signal level at 1000 Hz is set to give an indication of the reference SPL.

Frequency	weighting	A:
1 IEQUEIICY	weighnig	<i>'</i> ``

Frequency weighting A:							
Frequency	Ref. level	Expected level	Actual level	Toleran	ice(dB)	Deviation	
Hz	dB	dB	dB	+		dB	
1000.0	94.0	94.0	94.0	0.0	0.0	0.0	
31.6	94.0	54.6	54.4	1.5	1.5	-0.2	
63.1	94.0	67.8	67.7	1.5	1.5	-0.1	
125.9	94.0	77.9	77.8	1.0	1.0	-0.1	
251.2	94.0	85.4	85.3	1.0	1.0	-0.1	
501.2	94.0	90.8	90.7	1.0	1.0	-0.1	
1995.0	94.0	95.2	95.2	1.0	1.0	0.0	
3981.0	94.0	95.0	95.2	1.0	1.0	0.2	
7943.0	94.0	92.9	93.5	1.5	3.0	0.6	
12590.0	94.0	89.7	89.4	3.0	6.0	-0.3	
Frequency wei		· ·					
Frequency	Ref. level	Expected level	Actual level	Tolerar	nce(dB)	Deviation	
Hz	dB	dB	dB	+		dB	
1000.0	94.0	94.0	94.0	0.0	0.0	0.0	
31.6	94.0	91.0	90.9	1.5	1.5	-0.1	
63.1	94.0	93.2	93.1	1.5	1.5	-0.1	
00.1	\$						

93.8

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125.9

94.0

Form No. CAWS 152/Issue 1/Rev. B 01/02/2007

0.0

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1.0

93.8



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Tel: (852) 2873 6860 Fax: (852) 2555 7533

# SMECLab

Test Data for Sou	nd Level Meter	r					Page 3 of 5
Sound level me Microphone	ter type: type:	AWA5661 AWA14425	Serial No. Serial No.	304 <sup>-</sup> 9792			0-Apr-2020 0CA0408 04-02
251.2	94.0	94.0	94.0	1.0	1.0	0.0	
501.2	94.0	94.0	94.0	1.0	1.0	0.0	
1995.0	94.0	93.8	94.0	1.0 <sup>:</sup>	1.0	0.2	
3981.0	94.0	93.2	93.5	1.0	1.0	0.3	
7943.0	94.0	91.0	91.7	1.5	3.0	0.7	
12590.0	94.0	87.8	87.5	3.0	6.0	-0.3	
Frequency weig	hting Lin:						<u> </u>
Frequency	Ref. leve	Expected level	Actual level	Tolerar	nce(dB)	Deviation	. <u></u>
Hz	dB	dB	dB	+	-	dB	
1000.0	94.0	94.0	94.0	0.0	0.0	0.0	
31.6	94.0	94.0	93.9	1.5	1.5	-0.1	
63.1	94.0	94.0	93.9	1.5	1.5	-0.1	1
125.9	94.0	94.0	93.9	1.0	1.0	-0.1	
251.2	94.0	94.0	93.9	1.0	1.0	-0.1	
501.2	94.0	94.0	93.9	1.0	1.0	-0.1	
1995.0	94.0	94.0	93.9	1.0	1.0	-0.1	
3981.0	94.0	94.0	93.9	1.0	1.0	-0.1	
7943.0	94.0	94.0	93.9	1.5	3.0	-0.1	:
12590.0	94.0	94.0	93.9	3.0	6.0	-0.1	

### TIME WEIGHTING FAST TEST

Time weighting F is tested on the reference range with a single sinusoidal burst of duration 200 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous (Weight A Maximum hold)

when the signal is continuous.	(vveight A, Maxin		,		
Ref. level	Expected level	Actual level	Tolerar	ice(dB)	Deviation
dB	dB	dB	+	-	dB
116.0	115.0	115.0	1.0	1.0	0.0

### TIME WEIGHTING SLOW TEST

Time weighting S is tested on the reference range with a single sinusoidal burst of duration 500 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous (Weight A Maximum hold)

when the signal is continuous.	(weight A, Maxim	unnouy			
Ref. level	Expected level	Actual level	Tolera	nce(dB)	Deviation
dB	dB	dB	+		dB
116.0	111.9	111.9	1.0	1.0	0.0

### PEAK RESPONSE TEST

The onset time of the peak detector is tested on the reference range by comparing the response to a 100 us rectangular test pulse with the response to a 10 ms reference pulse of the same amplitude. The amplitude of the 10 ms reference pulse is such as to produce an indication 1 dB below the upper limit of the primary indicator range.

r usitive pulatities.	(vvcigitting E, oot the generative - )	•	
		T-levence	Deviation
Ref. level	Response to 10 ms Response to 100 us	Tolerance	Deviation
	· · · · · · · · · · · · · · · · · · ·		



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# SMECLab

Test Data for Sound Leve	el Meter			Page 4 c	of 5
Sound level meter type Microphone type:		Serial No. Serial No.	304723 9792	Date 10-Apr-2020 Report: 20CA0408 04-0	02
dB	dB	dB	+/- dB	dB	
119.0	119.0	119.5	2.0	0.5	
Negative polarities: Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation	
dB	dB	dB —	+/- dB	dB	
119.0	119.0	119.5	2.0	0.5	

#### RMS ACCURACY TEST

The RMS detector accuracy is tested on the reference range for a crest factor of 3.

Test frequency:2000 HzAmplitude:2 dB below the upper limit of the primary indicator range.Burst repetition frequency:40 HzTone burst signal:11 cycles of a sine wave of frequency 2000 Hz.					
¥	Ref. Level	Expected level	Tone burst signal	Tolerance	Deviation
Time wighting	dB	dB	indication(dB)	+/- dB	dB
Slow	116.0+6.6	116.0	115.7	0.5	-0.3

#### TIME WEIGHTING IMPULSE TEST

Time weighting I is tested o	on the reference range	(Set the SLM to LAImax)
Test frequency:	2000 Hz	
Amplitude:	The upper limit of the	e primary indicator range.

Single sinusoidal burst of duration 5 ms:

Ref. Level	Single burst indication	n Tolerance	Deviation
dB	Expected (dB) Actua	I (dB) +/- dB	dB
120.0	111.2 11	1.12.0	-0.1

#### Repeated at 100 Hz

Ref. Level	Repeated but	rst indication	Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	117.3	117.1	1.0	-0.2

#### TIME AVERAGING TEST

This test compares the SLM reading for continuous sine signals with readings obtained from a sine tone burst sequence having the same RMS level. The test level is 30 dB below the upper limit of the linearity range and repeated for Type 1 SLM with 40 dB below the upper limit of the linearity.

Frequency of tone burst: Duration of tone burst:	4000 Hz 1 ms					
Repetition Time	Level of	Expected	Actual	Tolerance	Deviation	Remarks
	tone burst	Leq	Leq			
msec	dB	dB	dB	+/- dB	dB	
1000	90.0	90.0	89.9	1.0	-0.1	60s integ.
10000	80.0	80.0	79.8	1.0	-0.2	6min. integ.

## PULSE RANGE AND SOUND EXPOSURE LEVEL TEST

The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range

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# **SMECLab**

Sound level met	er type: A	AWA5661	Serial No.	304723	Date	10-Apr-2020
Microphone		AWA14425	Serial No.	9792	Doport	20CA0408 04-02
				- <u> </u>	Report.	200,40408 04-02
Test frequency:		1000 Hz				
Integration time:		I0 sec				
The integrating s						
Duration	Rms level o	f Expected	Actual	Tolerance	Deviation	<u>)</u>
msec	tone burst (d	B) dB	dB	+/- dB	dB	
10	90.0	60.0	59.8	1.7	-0.2	
The integrating s	ound level me	ter set to SEL:				
Duration	Rms level o	f Expected	Actual	Tolerance	Deviation	<u>1</u>
msec	tone burst (d	B) dB	dB	+/- dB	dB	
10.0	90.0	70.0	70.0	1.7	0.0	
OVERLOAD INI	DICATION TES	GT		<u></u>		
For SLM capable	e of operating i	n a non-integrating n	node.			
Test frequer	ncy:	2000 Hz				
Amplitude:		2 dB below the u	pper limit of the p	rimary indicator r	ange.	
Burst repetition frequency: 40 Hz						
Tone burst s	· · · · · · ·		e wave of freque			
Level		by Further reduced	Difference	Tolerance	Deviation	VA044
	1 dB	3 dB	dB	dB	dB	
at overload (dB)	1 4 5		3.0	1.0	0.0	

For integrating SLM, with the instrument indicating Leq.

For integrating SLM, with the instrument indicating Leq and set to the reference range. The test signal as following: The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range Test frequency: 4000 Hz Integration time: 10 sec Single burst duration: 1 msec Expected level Actual level Tolerance Deviation Rms level Level reduced by dB at overload (dB) 1 d8 dB dB dB 2.2 -0.2 80.8 122.0 121.0 81.0

# ACOUSTIC TEST

The acoustic test of the complete SLM is tested at the frequency 125 Hz and 8000 Hz using a B&K type 4226 Multifunction Acoustic Calibrator. The test is performed in A weighting.

Frequency	Expected level	Actual level	Tolera		Deviation
Hz	dB	Measured (dB)	+	-	dB
1000	94.0	94.0	0.0	0.0	0.0
125	77.9	78.1	1.0	1.0	0.2
8000	92.9	93.4	1.5	3.0	0.5

-----END------



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# **CERTIFICATE OF CALIBRATION**

Certificate No.:	20CA0616 03-02	2	Page:	1	of	2
Item tested						
Description:	Acoustical Calibr	ator (Class 1)				
Manufacturer:	Pulsar	2 - 2 - 19 - 19 - 19 - 19 - 19 - 19 - 19				
Type/Model No.:	100B					
Serial/Equipment No.:	039507					
Adaptors used:	Yes					
Item submitted by						
Customer:	Apex Testing & (	Certification Ltd.				
Address of Customer:	Unit D6A, 10/F, 1	ML Tower, 3 Hoi Shin	ig Road, Tsuen Wan, N	V.Т.		
Request No.:	-		•			
Date of receipt:	16-Jun-2020					
Date of test:	20-Jun-2020					
Reference equipmen	t used in the cali	bration				
Description:	Model:	Serial No.	Expiry Date:		Tracea	ble to:

Description:	Model:	Serial No.	Eurise Dates	The later	
Star Star Star Star Star Star Star Star			Expiry Date:	Traceable to:	
Lab standard microphone	B&K 4180	2412857	11-May-2021	SCL	
Preamplifier	B&K 2673	2743150	03-Jun-2021	CEPREI	
Measuring amplifier	B&K 2610	2346941	03-Jun-2021	CEPREI	
Signal generator	DS 360	33873	19-May-2021	CEPREI	
Digital multi-meter	34401A	US36087050	19-May-2021	CEPREI	3
Audio analyzer	8903B	GB41300350	18-May-2021	CEPREI	
Universal counter	53132A	MY40003662	18-May-2021	CEPREI	

#### Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1005 ± 5 hPa

#### **Test specifications**

 The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2. The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3. The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

#### **Test results**

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on page 2 of this certificate.





Date:

22-Jun-2020 Company Chop:



**Comments:** The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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Form No.CARP156-1/Issue 1/Rev.D/01/03/2007

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. HOKLAS 028) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific calibration activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this certificate are traceable to the International System of Units (SI) or recognised measurement standards. This certificate shall not be reproduced except in full.



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# **CERTIFICATE OF CALIBRATION**

(Continuation Page)

Certificate No.:

20CA0616 03-02

Page: 2 of

01

2

#### 1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

Frequency Shown	Output Sound Pressure Level Setting	Measured Output Sound Pressure Level	Estimated Expanded Uncertainty
Hz	dB	dB	dB
1000	94.00	94.10	0.10

#### 2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz	STF = 0.009 dB
Estimated expanded uncertainty	0.005 dB

#### 3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz	Actual Frequency = 997.6 Hz	
Estimated expanded uncertainty	0.1 Hz	Coverage factor k = 2.2

#### 4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz	TND = 0.9 %
Estimated expanded uncertainty	0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

	1	- End -	Aann
Calibrated by:	$1 \sim 1$	Checked by:	71 0016-6
	/ Fung Chi Yip		Shek Kwong Tat
Date:	/ 20-Jun-2020 \)	Date:	22-Jun-2020

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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Form No.CARP156-2/Issue 1/Rev.C/01/05/2005

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