

Certificate of Calibration

Calibration Certification Information			
Cal. Date: November 8, 2019	Rootsmeter S/N: 438320	Ta: 296	°K
Operator: Jim Tisch		Pa: 760.7	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 3543		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4110	3.2	2.00
2	3	4	1	1.0100	6.4	4.00
3	5	6	1	0.8990	7.9	5.00
4	7	8	1	0.8560	8.7	5.50
5	9	10	1	0.7100	12.7	8.00

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)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
1.0035	0.7112	1.4197	0.9958	0.7057	0.8822
0.9992	0.9894	2.0077	0.9916	0.9818	1.2476
0.9973	1.1093	2.2447	0.9896	1.1008	1.3948
0.9962	1.1638	2.3542	0.9886	1.1549	1.4629
0.9909	1.3956	2.8393	0.9833	1.3849	1.7643
QSTD	m=	2.06886	QA	m=	1.29548
	b=	-0.04852		b=	-0.03015
	r=	0.99994		r=	0.99994

Calculations			
Vstd=	$\Delta Vol \left(\frac{Pa - \Delta P}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)$	Va=	$\Delta Vol \left(\frac{Pa - \Delta P}{Pa} \right)$
Qstd=	Vstd/ΔTime	Qa=	Va/ΔTime
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= $1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$	

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 Regulations 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

Certificate of Calibration

Calibration Certification Information			
Cal. Date: November 2, 2020	Rootsmeter S/N: 438320	Ta: 294	°K
Operator: Jim Tisch		Pa: 756.7	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 3543		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4310	3.2	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 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)	$\sqrt{\Delta H (Ta/Pa)}$ (y-axis)
1.0049	0.7022	1.4207	0.9958	0.6959	0.8815
1.0006	0.9897	2.0091	0.9915	0.9808	1.2467
0.9985	1.1094	2.2463	0.9894	1.0994	1.3938
0.9973	1.1651	2.3559	0.9882	1.1545	1.4619
0.9920	1.3971	2.8414	0.9830	1.3844	1.7631
QSTD	m=	2.03936	QA	m=	1.27701
	b=	-0.01298		b=	-0.00805
	r=	0.99995		r=	0.99995

Calculations	
Vstd= ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	Va= ΔVol((Pa-ΔP)/Pa)
Qstd= Vstd/ΔTime	Qa= Va/ΔTime
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= $1/m \left(\left(\sqrt{\Delta H (Ta/Pa)} \right) - b \right)$

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 Regulations 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



TE-5170 Calibration Worksheet

Site Information

Location: AM3A	Zones 2A at West	Date: 16-Sep-20
Sampler: TE-5170	Site ID: Kowloon Cultural	Tech: CS Tang
	Serial No: 4340	

Site Conditions

Barometric Pressure (in Hg): 29.86	Corrected Pressure (mm Hg): 758
Temperature (deg F): 82	Temperature (deg K): 301
Average Press. (in Hg): 29.86	Corrected Average (mm Hg): 758
Average Temp. (deg F): 82	Average Temp. (deg K): 301

Calibration Orifice

Make: Tisch	Qstd Slope: 1.29548
Model: TE-5025A	Qstd Intercept: -0.03015
Serial#: 3543	Date Certified: 8-Nov-19

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	Linear Regression
1	12.30	2.714	53.0	52.68	Slope: 18.9107 Intercept: 1.2274 Corr. Coeff: 0.9953 # of Observations: 5
2	10.40	2.498	48.0	47.71	
3	7.20	2.082	41.0	40.75	
4	4.10	1.577	33.0	32.80	
5	2.40	1.212	23.0	22.86	

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 response
 I = actual chart response
 m = calibrator Qstd slope
 b = calibrator Qstd intercept
 Ta = actual temperature during calibration (deg K)
 Pa = actual pressure during calibration (mm Hg)
 Tstd = 298 deg K
 Pstd = 760 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

Average I (chart): 40
Average Flow Calculation m3/min 2.016546576
Average Flow Calculation in CFM 71.2042596
Sample Time (Hrs): 1.0
Total Flow in m3/min 120.9927946
Total Flow in CFM 4272.255576

NOTE: Ensure calibration orifice has been certified within 12 months of use



TE-5170 Calibration Worksheet

Site Information

Location: AM3A	Zones 2A at West Site ID: Kowloon Cultural	Date: 11-Nov-20
Sampler: TE-5170	Serial No: 4340	Tech: CS Tang

Site Conditions

Barometric Pressure (in Hg): 30.14	Corrected Pressure (mm Hg): 766
Temperature (deg F): 73	Temperature (deg K): 296
Average Press. (in Hg): 30.14	Corrected Average (mm Hg): 766
Average Temp. (deg F): 73	Average Temp. (deg K): 296

Calibration Orifice

Make: Tisch	Qstd Slope: 2.03936
Model: TE-5025A	Qstd Intercept: -0.01298
Serial#: 3543	Date Certified: 2-Nov-20

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (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	
5	2.30	0.756	23.0	23.17	# of Observations: 5

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 response
 I = actual chart response
 m = calibrator Qstd slope
 b = calibrator Qstd intercept
 Ta = actual temperature during calibration (deg K)
 Pa = actual pressure during calibration (mm Hg)
 Tstd = 298 deg K
 Pstd = 760 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

Average I (chart): 40
Average Flow Calculation m3/min 1.295591082
Average Flow Calculation in CFM 45.74732111
Sample Time (Hrs): 1.0
Total Flow in m3/min 77.73546492
Total Flow in CFM 2744.839266

NOTE: Ensure calibration orifice has been certified within 12 months of use



TE-5170 Calibration Worksheet

Site Information

Location: AM4A	Zones 2A at West	Date: 16-Sep-20
Sampler: TE-5170	Site ID: Kowloon Cultural	Tech: CS Tang
	Serial No: 3998	

Site Conditions

Barometric Pressure (in Hg): 29.86	Corrected Pressure (mm Hg): 758
Temperature (deg F): 82	Temperature (deg K): 301
Average Press. (in Hg): 29.86	Corrected Average (mm Hg): 758
Average Temp. (deg F): 82	Average Temp. (deg K): 301

Calibration Orifice

Make: Tisch	Qstd Slope: 1.29548
Model: TE-5025A	Qstd Intercept: -0.03015
Serial#: 3543	Date Certified: 8-Nov-19

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	Linear Regression
1	12.40	2.725	53.0	52.68	Slope: 18.7248 Intercept: 1.5865 Corr. Coeff: 0.9986 # of Observations: 5
2	10.10	2.462	48.0	47.71	
3	7.50	2.125	41.0	40.75	
4	4.30	1.614	33.0	32.80	
5	2.20	1.161	23.0	22.86	

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 response
 I = actual chart response
 m = calibrator Qstd slope
 b = calibrator Qstd intercept
 Ta = actual temperature during calibration (deg K)
 Pa = actual pressure during calibration (mm Hg)
 Tstd = 298 deg K
 Pstd = 760 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

Average I (chart): 40
Average Flow Calculation m3/min 2.017398315
Average Flow Calculation in CFM 71.23433451
Sample Time (Hrs): 1.0
Total Flow in m3/min 121.0438989
Total Flow in CFM 4274.060071

NOTE: Ensure calibration orifice has been certified within 12 months of use



TE-5170 Calibration Worksheet

Site Information

Location: AM4A	Zones 2A at West Site ID: Kowloon Cultural	Date: 11-Nov-20
Sampler: TE-5170	Serial No: 3998	Tech: CS Tang

Site Conditions

Barometric Pressure (in Hg): 30.14	Corrected Pressure (mm Hg): 766
Temperature (deg F): 73	Temperature (deg K): 296
Average Press. (in Hg): 30.14	Corrected Average (mm Hg): 766
Average Temp. (deg F): 73	Average Temp. (deg K): 296

Calibration Orifice

Make: Tisch	Qstd Slope: 2.03936
Model: TE-5025A	Qstd Intercept: -0.01298
Serial#: 3543	Date Certified: 2-Nov-20

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	Linear Regression
1	12.50	1.753	53.0	53.39	Slope: 29.0451
2	10.20	1.584	48.0	48.36	Intercept: 2.3506
3	7.60	1.368	41.0	41.30	Corr. Coeff: 0.9976
4	4.20	1.019	33.0	33.24	
5	2.20	0.739	23.0	23.17	# of Observations: 5

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 response
 I = actual chart response
 m = calibrator Qstd slope
 b = calibrator Qstd intercept
 Ta = actual temperature during calibration (deg K)
 Pa = actual pressure during calibration (mm Hg)
 Tstd = 298 deg K
 Pstd = 760 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

Average I (chart): 40
Average Flow Calculation m3/min 1.292573154
Average Flow Calculation in CFM 45.64075807
Sample Time (Hrs): 1.0
Total Flow in m3/min 77.55438925
Total Flow in CFM 2738.445484

NOTE: Ensure calibration orifice has been certified within 12 months of use



TE-5170 Calibration Worksheet

Site Information

Location: AM5A	Zones 2A at West	Date: 16-Sep-20
Sampler: TE-5170	Site ID: Kowloon Cultural	Tech: CS Tang
	Serial No: 4344	

Site Conditions

Barometric Pressure (in Hg): 29.86	Corrected Pressure (mm Hg): 758
Temperature (deg F): 82	Temperature (deg K): 301
Average Press. (in Hg): 29.86	Corrected Average (mm Hg): 758
Average Temp. (deg F): 82	Average Temp. (deg K): 301

Calibration Orifice

Make: Tisch	Qstd Slope: 1.29548
Model: TE-5025A	Qstd Intercept: -0.03015
Serial#: 3543	Date Certified: 8-Nov-19

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	Linear Regression
1	12.20	2.704	53.0	52.70	Slope: 18.8498 Intercept: 1.5317 Corr. Coeff: 0.9965 # of Observations: 5
2	10.30	2.487	48.0	47.73	
3	7.20	2.083	41.0	40.77	
4	4.10	1.577	33.0	32.81	
5	2.30	1.187	23.0	22.87	

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 response
 I = actual chart response
 m = calibrator Qstd slope
 b = calibrator Qstd intercept
 Ta = actual temperature during calibration (deg K)
 Pa = actual pressure during calibration (mm Hg)
 Tstd = 298 deg K
 Pstd = 760 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

Average I (chart): 40
Average Flow Calculation m3/min 2.007696665
Average Flow Calculation in CFM 70.89176925
Sample Time (Hrs): 1.0
Total Flow in m3/min 120.4617999
Total Flow in CFM 4253.506155

NOTE: Ensure calibration orifice has been certified within 12 months of use



TE-5170 Calibration Worksheet

Site Information

Location: AM5A	Zones 2A at West Site ID: Kowloon Cultural	Date: 11-Nov-20
Sampler: TE-5170	Serial No: 4344	Tech: CS Tang

Site Conditions

Barometric Pressure (in Hg): 30.14	Corrected Pressure (mm Hg): 766
Temperature (deg F): 73	Temperature (deg K): 296
Average Press. (in Hg): 30.14	Corrected Average (mm Hg): 766
Average Temp. (deg F): 73	Average Temp. (deg K): 296

Calibration Orifice

Make: Tisch	Qstd Slope: 2.03936
Model: TE-5025A	Qstd Intercept: -0.01298
Serial#: 3543	Date Certified: 2-11-2020

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	Linear Regression
1	12.10	1.725	53.0	53.39	Slope: 29.6386 Intercept: 2.0292 Corr. Coeff: 0.9975 # of Observations: 5
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

$$Qstd = 1/m[\text{sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate
 IC = corrected chart response
 I = actual chart response
 m = calibrator Qstd slope
 b = calibrator Qstd intercept
 Ta = actual temperature during calibration (deg K)
 Pa = actual pressure during calibration (mm Hg)
 Tstd = 298 deg K
 Pstd = 760 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

Average I (chart): 40
Average Flow Calculation m3/min 1.277533737
Average Flow Calculation in CFM 45.10971624
Sample Time (Hrs): 1.0
Total Flow in m3/min 76.6520242
Total Flow in CFM 2706.582975

NOTE: Ensure calibration orifice has been certified within 12 months of use



CERTIFICATE OF ACCREDITATION

This is to attest that

AQUALITY 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 the 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 maintained on the IAS website (www.iasonline.org).

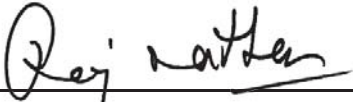
This certificate is valid up to December 1, 2020.

(See laboratory's scope of accreditation for fields of calibration and accredited calibration.)



This accreditation certificate supersedes any IAS accreditation bearing an earlier effective date. The certificate becomes invalid upon suspension, cancellation or revocation of accreditation. See www.iasonline.org for current accreditation information, or contact IAS at 562-364-8201.




Raj Nathan
President



SCOPE OF ACCREDITATION

CALIBRATION AND MEASUREMENT CAPABILITY (CMC)^{1,2}

CALIBRATION AREA	RANGE	EXPANDED UNCERTAINTY ³ (±)	TECHNIQUE, REFERENCE STANDARD, EQUIPMENT
Flow table ⁴	15 kg to 17 kg 1 mm up to 71 mm	12 g 600 µm	Weighing Balance, Reference caliper & Reference steel ruler by direct measurement
Test Sieve ⁴	4 mm to 50 mm	50 µm	Reference Caliper by direct measurement
<i>Mechanical</i>			
Force Measuring Machine ⁴ (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 ⁴	Dust particles 0.001 mg/m ³ to 10.00 mg/m ³	0.9 mg/m ³	By comparison method by using reference laser dust meter
Rebound Hammer ⁴	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 ⁴	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
<i>Thermal</i>			
Digital/Liquid in Glass Thermometers & RTD/ 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 Indicator by Comparison Method (OIML R133)



Mutual Recognition Arrangements (MRA) / Multilateral Recognition Arrangements (MLA)

- ➔ [HOKLAS - Mutual Recognition Arrangements \(MRA\)](#).
- ➔ [HKCAS - Multilateral Recognition Arrangements \(MLA\)](#).
- ➔ [HKIAS - Mutual Recognition Arrangement \(MRA\)](#).

HOKLAS - Mutual Recognition Arrangements (MRA)

Every effort is made to promote acceptance of test data from accredited laboratories, both internationally and locally. HKAS has concluded mutual recognition arrangements with accreditation bodies listed below by being one of the signatories of the [International Laboratory Accreditation Cooperation Mutual Recognition Arrangement \(ILAC MRA\)](#) and the [Asia Pacific Accreditation Cooperation Mutual Recognition Arrangement \(APAC MRA\)](#) for testing, calibration, medical testing, Proficiency Testing Providers (PTP) and Reference Material Producers (RMP). Click [here](#) to view the up-to-date signatories of ILAC and [here](#) to access the up-to-date signatories of APAC.

Visitors checking the names, logos and accreditation symbols shown on an endorsed certificate or report should note that some of our MRA partners may have their names, logos or accreditation symbols changed recently and test reports or certificates endorsed by displaying their old accreditation symbols may still be valid during the change-over period. For details, please visit their websites or contact them directly.

- [Mutual Recognition Arrangement \(MRA\) Partners for HOKLAS](#)

HKAS MRA partners will recognise HOKLAS endorsed test certificates as having the same technical validity as certificates endorsed by their respective schemes.

HKCAS - Multilateral Recognition Arrangements

HKAS has been a signatory of [Asia Pacific Accreditation Cooperation Mutual Recognition Arrangement \(APAC MRA\)](#) for Quality Management System (QMS), Environmental Management System (EMS), Food Safety Management System (FSMS), Energy Management System (EnMS), Occupational Health and Safety Management System (OHSMS) certifications, product certifications, and Greenhouse Gas (GHG) validation and verification.

HKAS has also been a signatory of the [International Accreditation Forum Multilateral Recognition Arrangement \(IAF MLA\)](#) for Quality Management System (QMS), Environmental Management System (EMS), Food Safety Management System (FSMS), Energy Management System (EnMS) certifications, product certifications, and Greenhouse Gas (GHG) validation and verification.

Click [here](#) to view the up-to-date signatories of IAF and [here](#) to access the up-to-date signatories of APAC.

- [Mutual / Multilateral Recognition Arrangements \(MRA / MLA\) Partners for HKCAS](#)

HKIAS - Mutual Recognition Arrangements (MRA)

HKAS has concluded mutual recognition arrangements with accreditation bodies listed below by being one of the signatories of the [International Laboratory Accreditation Cooperation Mutual Recognition Arrangement \(ILAC MRA\)](#) and [Asia Pacific Accreditation Cooperation Mutual Recognition Arrangement \(APAC MRA\)](#) for inspection. Click [here](#) to view the up-to-date signatories of ILAC and [here](#) to access the up-to-date signatories of APAC.

HKAS MRA partners will recognise HKIAS endorsed inspection reports or certificates having the same technical validity as reports or certificates endorsed by their respective schemes.

- [Mutual Recognition Arrangement \(MRA\) Partners for HKIAS](#)

FAQ / Information

Mutual Recognition Arrangements (MRA) / Multilateral Recognition Arrangements (MLA)

Mutual Recognition Arrangement (MRA) Partners for HOKLAS ^

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Visitors checking the names, logos and accreditation symbols shown on an endorsed certificate or report should note that some of our MRA partners may have their names, logos or accreditation symbols changed recently and test reports or certificates endorsed by displaying their old accreditation symbols may still be valid during the change-over period. For details, please visit their websites or contact them directly.






» [Mutual Recognition Arrangement \(MRA\) Partners for HOKLAS](#)

HKAS MRA partners will recognise HOKLAS endorsed test certificates as having the same technical validity as certificates endorsed by their respective schemes.

Multilateral Recognition Arrangements (MLA) for HKCAS v

Mutual Recognition Arrangement (MRA) Partners for HKIAS v

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Economy	Logo	Name of Partner	URL	Calibration	Testing	ISO 15189 (Medical Testing)	RMP	PTP
Ukraine		National Accreditation Agency of Ukraine (NAAU)	www.naaau.org.ua	•	•			
United Arab Emirates		Emirates National Accreditation System (ENAS)	http://www.enas.gov.ae	•	•			
United Arab Emirates		Emirates International Accreditation Center (EIAC)	www.eiac.gov.ae	•	•	•		
United Kingdom of Great Britain and Northern Ireland		United Kingdom Accreditation Service (UKAS)	www.ukas.com	•	•	•		•
United States of America		Perry Johnson Laboratory Accreditation, Inc. (PJLA)	www.pjlab.com	•	•	•	•	
United States of America		International Accreditation Service Inc. (IAS)	www.iasonline.org	•	•			
United States of America		ANSI-ASQ National Accreditation Board (ANAB)	www.anab.org	•	•	•	•	•
United States of America		American Association for Laboratory Accreditation (A2LA)	www.a2la.org	•	•	•	•	•
United States of America		AIHA Laboratory Accreditation Programs, LLC (AIHA-LAP, LLC)	www.aihaaccreditedlabs.org		•			
United States of America		National Voluntary Laboratory Accreditation Program (NVLAP)	www.nist.gov/nvlap	•	•			
Uruguay		Organismo Uruguayo De Acreditación (OUA)	www.organismouruguayodeacreditacion.org	•	•			

RMP: Reference Material Producer ; PTP: Proficiency Testing Provider



CERTIFICATE OF CALIBRATION

Report Number : 1911ICA-122F
Date of Report : 22-Nov-19
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. : 235811
Scale Division : 0.001 mg/m³
Range : 0.001 to 1 mg/m³
Condition of Item : Normal

Date Item Received : 17-Nov-19
Date Calibrated : 17-Nov-19
Calibration Location : AQuality Calibration Lab.
Date of Next Calibration : 16-Nov-20
Calibrated By : Jessica Liu

Test Environment

Ambient Temperature : 26.5 °C to 21.4 °C
Relative Humidity : 66 % to 87 %

Calibration Results

Reference True Reading (mg/m ³)	Average IUC Reading (mg/m ³)	Correction (mg/m ³)	Error of IUC Reading (%)	Expanded Uncertainty (mg/m ³)	Coverage Factor K
0.062	0.067	-0.005	7.6	0.082	2.0
0.307	0.305	0.002	-0.7	0.036	2.0
0.546	0.568	-0.022	3.8	0.060	2.0

Remarks :

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

Approved by: _____

LEE Mei Yee, Julia
Managing Director

The results shown in this certificate are metrologically traceable to the International System of Units (SI) or recognised measurement standards.

The certificate shall not be reproduced except in full without approval of the laboratory.



CERTIFICATE OF CALIBRATION

Report Number : 1911ICA-122F
Date of Report : 22-Nov-19
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 :

<u>Equipment Number</u>	<u>Certificate Number</u>	<u>Description</u>
CH-LDM-1	HBW201901312	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 -



CERTIFICATE OF CALIBRATION

Apex Testing & Certification Ltd. Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Test Report No.	1911MCA-133Fa
	Date of Issue	16-Dec-19
	Date of Testing	17-Nov-19
	Page	1 of 1

Item for Calibration

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

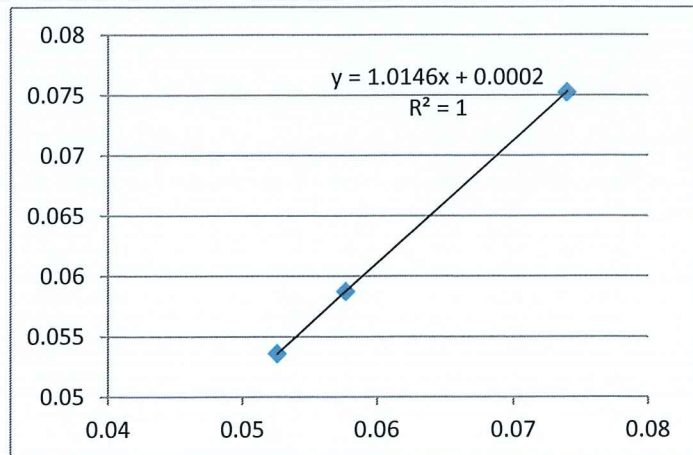
Standard Equipment

Description : High Volume Sampler / Calibration Orifice
 Manufacturer : Tisch Environmental, Inc.
 Model No. : TE-5170 / TE-5025A
 Serial No. : 4344 / 3543
 Last Calibration : 17-Nov-19 / 8-Nov-19

Date	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration Standard Equipment (mg/m3)	Concentration Calibrated Equipment (mg/m3)
17-Nov-19	9:30	24.0	1018.1	0.0740	0.0753
17-Nov-19	10:35	24.0	1018.1	0.0526	0.0536
17-Nov-19	11:40	24.0	1018.1	0.0577	0.0587

By Linear Regression of Y or X

Slope (K-factor) : 1.0146
 Correlation Coefficient : 1.0000
 Validity of Calibration : 16-Nov-20



Remark: : Revised the "Recorded by" & "Checked by" information
 : Superseding to Test Report Serial Number 1911MCA-133F

Recorded by : Jessica Liu Signature: Jessica Liu Date: 17-Nov-19
 Checked by : S Tang Signature: S Tang Date: 17-Nov-19



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
Model No. : 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

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

Calibration Results

Reference True Reading (mg/m ³)	Average IUC Reading (mg/m ³)	Correction (mg/m ³)	Error of IUC Reading (%)	Expanded Uncertainty (mg/m ³)	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

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.

Approved by: _____

LEE Mei Yee, Julia
Managing Director



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 :

<u>Equipment Number</u>	<u>Certificate Number</u>	<u>Description</u>
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 -



CERTIFICATE OF CALIBRATION

Apex Testing & Certification Ltd. Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Test Report No.	201108MCA-126F
	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

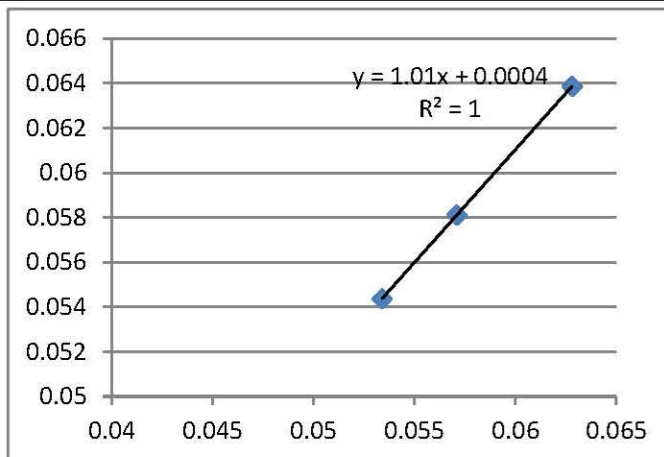
Standard Equipment

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

Date	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration Standard Equipment (mg/m3)	Concentration Calibrated Equipment (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 Y or X

Slope (K-factor)	: 1.0100
Correlation Coefficient	: 1.0000
Validity of Calibration	: 7-Nov-21



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

Checked by : S Tang Signature: S Tang Date: 8-Nov-20



CERTIFICATE OF CALIBRATION

Report Number : 1911ICA-121F
Date of Report : 22-Nov-19
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. : 336338
Scale Division : 0.001 mg/m³
Range : 0.001 to 1 mg/m³
Condition of Item : Normal

Date Item Received : 17-Nov-19
Date Calibrated : 17-Nov-19
Calibration Location : AQuality Calibration Lab.
Date of Next Calibration : 16-Nov-20
Calibrated By : Jessica Liu

Test Environment

Ambient Temperature : 26.5 °C to 21.4 °C
Relative Humidity : 66 % to 87 %

Calibration Results

Reference True Reading (mg/m ³)	Average IUC Reading (mg/m ³)	Correction (mg/m ³)	Error of IUC Reading (%)	Expanded Uncertainty (mg/m ³)	Coverage Factor K
0.062	0.061	0.001	-2.5	0.120	2.0
0.307	0.306	0.001	-0.4	0.046	2.0
0.546	0.573	-0.027	4.6	0.052	2.0

Remarks :

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

Approved by: _____

LEE Mei Yee, Julia
Managing Director



CERTIFICATE OF CALIBRATION

Report Number : 1911ICA-121F
Date of Report : 22-Nov-19
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 :

<u>Equipment Number</u>	<u>Certificate Number</u>	<u>Description</u>
CH-LDM-1	HBW201901312	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

香港新界粉嶺坪輦路啟芳園11A&11B號

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

TEL : 852-3582-9589

FAX : 852-2674-1177

EMAIL : cal.aqtl@gmail.com

WEBSITE: www.aqtlgroup.com

CERTIFICATE OF CALIBRATION

Apex Testing & Certification Ltd. Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Test Report No.	1911MCA-132Fa
	Date of Issue	16-Dec-19
	Date of Testing	17-Nov-19
	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

Description : High Volume Sampler / Calibration Orifice

Manufacturer : Tisch Environmental, Inc.

Model No. : TE-5170 / TE-5025A

Serial No. : 4344 / 3543

Last Calibration : 17-Nov-19 / 8-Nov-19

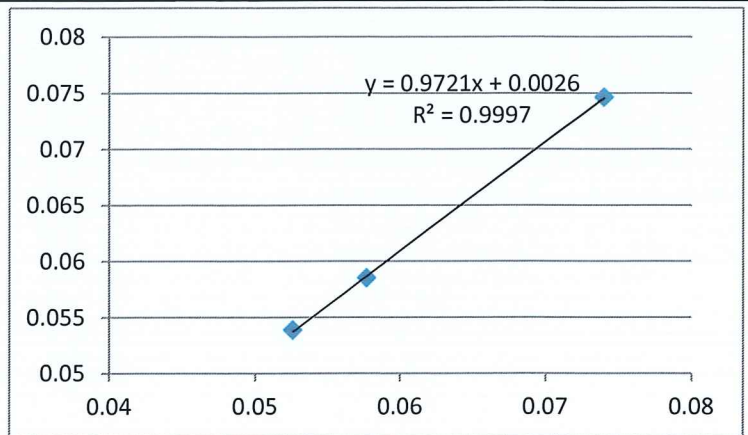
Date	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration Standard Equipment (mg/m3)	Concentration Calibrated Equipment (mg/m3)
17-Nov-19	9:30	24.0	1018.1	0.0740	0.0746
17-Nov-19	10:35	24.0	1018.1	0.0526	0.0539
17-Nov-19	11:40	24.0	1018.1	0.0577	0.0585

By Linear Regression of Y or X

Slope (K-factor) : 0.9721

Correlation Coefficient : 0.9997

Validity of Calibration : 16-Nov-20



Remark: : Revised the "Recorded by" & "Checked by" information
 : Superseding to Test Report Serial Number 1911MCA-114F

Recorded by : Jessica Liu Signature: Jessica Liu Date: 17-Nov-19

Checked by : S Tang Signature: S Tang Date: 17-Nov-19



香港新界粉嶺坪輦路啟芳園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. : N/A
Manufacturer : Sibata Scientific Technology Ltd
Model No. : LD-3B
Serial No. : 336338
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

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

Calibration Results

Reference True Reading (mg/m ³)	Average IUC Reading (mg/m ³)	Correction (mg/m ³)	Error of IUC Reading (%)	Expanded Uncertainty (mg/m ³)	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

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.

Approved by:

LEE Mei Yee, Julia
Managing Director



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 :

<u>Equipment Number</u>	<u>Certificate Number</u>	<u>Description</u>
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 -



CERTIFICATE OF CALIBRATION

Apex Testing & Certification Ltd. Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Test Report No.	201108MCA-123F
	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

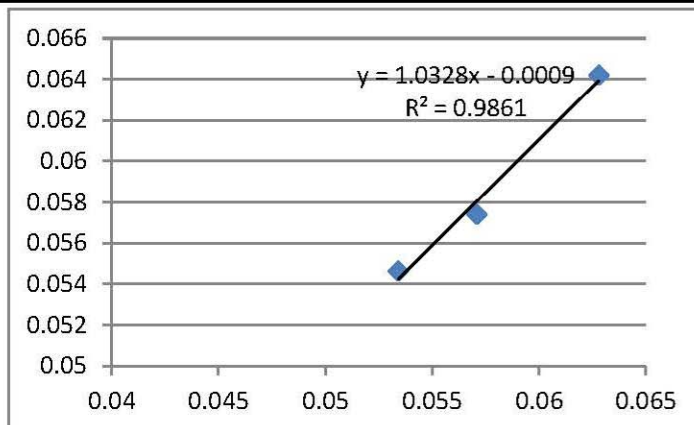
Standard Equipment

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

Date	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration Standard Equipment (mg/m3)	Concentration Calibrated Equipment (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

By Linear Regression of Y or X

Slope (K-factor)	: 1.0328
Correlation Coefficient	: 0.9861
Validity of Calibration	: 7-Nov-21



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

Checked by : S Tang Signature: S Tang Date: 8-Nov-20



CERTIFICATE OF CALIBRATION

Report Number : 1911ICA-121F
Date of Report : 22-Nov-19
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

Date Item Received : 17-Nov-19
Date Calibrated : 17-Nov-19
Calibration Location : AQuality Calibration Lab.
Date of Next Calibration : 16-Nov-20
Calibrated By : Jessica Liu

Test Environment

Ambient Temperature : 26.5 °C to 21.4 °C
Relative Humidity : 66 % to 87 %

Calibration Results

Reference True Reading (mg/m ³)	Average IUC Reading (mg/m ³)	Correction (mg/m ³)	Error of IUC Reading (%)	Expanded Uncertainty (mg/m ³)	Coverage Factor K
0.062	0.059	0.003	-5.6	0.124	2.0
0.307	0.307	0.001	-0.3	0.044	2.0
0.546	0.582	-0.035	6.0	0.051	2.0

Remarks :

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

Approved by: _____

LEE Mei Yee, Julia
Managing Director

The results shown in this certificate are metrologically traceable to the International System of Units (SI) or recognised measurement standards.

The certificate shall not be reproduced except in full without approval of the laboratory.



CERTIFICATE OF CALIBRATION

Report Number : 1911ICA-121F
Date of Report : 22-Nov-19
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 :

<u>Equipment Number</u>	<u>Certificate Number</u>	<u>Description</u>
CH-LDM-1	HBW201901312	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
 香港新界粉嶺坪輦路啟芳園11A&11B號
 No. 11A&11B, KAI FONG GARDEN, PING CHE ROAD, FANLING, N.T., HONG KONG

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

CERTIFICATE OF CALIBRATION

Apex Testing & Certification Ltd. Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Test Report No.	1911MCA-132Fa
	Date of Issue	16-Dec-19
	Date of Testing	17-Nov-19
	Page	1 of 1

Item for Calibration

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

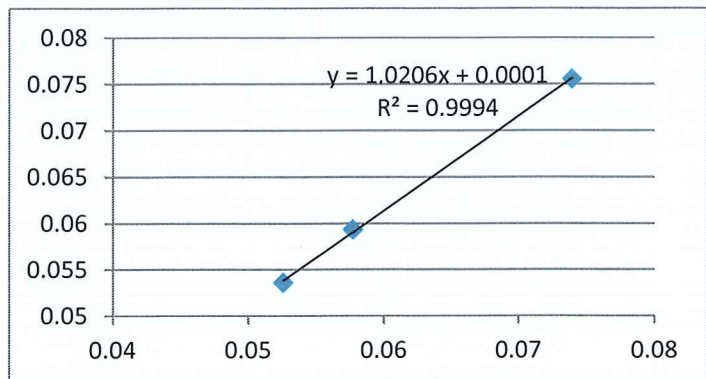
Standard Equipment

Description : High Volume Sampler / Calibration Orifice
 Manufacturer : Tisch Environmental, Inc.
 Model No. : TE-5170 / TE-5025A
 Serial No. : 4344 / 3543
 Last Calibration : 17-Nov-19 / 8-Nov-19

Date	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration Standard Equipment (mg/m3)	Concentration Calibrated Equipment (mg/m3)
17-Nov-19	9:30	24.0	1018.1	0.0740	0.0756
17-Nov-19	10:35	24.0	1018.1	0.0526	0.0536
17-Nov-19	11:40	24.0	1018.1	0.0577	0.0593

By Linear Regression of Y or X

Slope (K-factor) : 1.0206
 Correlation Coefficient : 0.9994
 Validity of Calibration : 16-Nov-20



Remark: : Revised the "Recorded by" & "Checked by" information
 : Superseding to Test Report Serial Number 1911MCA-132F

Recorded by : Jessica Liu Signature: Jessica Date: 17-Nov-19
 Checked by : S Tang Signature: S Tang Date: 17-Nov-19



香港新界粉嶺坪輦路啟芳園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

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/m ³)	Average IUC Reading (mg/m ³)	Correction (mg/m ³)	Error of IUC Reading (%)	Expanded Uncertainty (mg/m ³)	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.

Approved by: _____

LEE Mei Yee, Julia
Managing Director



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 :

<u>Equipment Number</u>	<u>Certificate Number</u>	<u>Description</u>
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 -



CERTIFICATE OF CALIBRATION

Apex Testing & Certification Ltd. Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Test Report No.	201108MCA-125F
	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

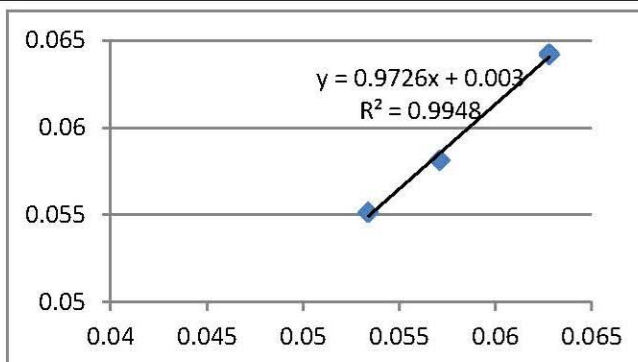
Standard Equipment

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

Date	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration Standard Equipment (mg/m3)	Concentration Calibrated Equipment (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 Y or X

Slope (K-factor) : 0.9726
 Correlation Coefficient : 0.9948
 Validity of Calibration : 7-Nov-21



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

Checked by : S Tang Signature: S Tang Date: 8-Nov-20



CERTIFICATE OF CALIBRATION

Certificate No.: 20CA0408 04-02 Page 1 of 2

Item tested

Description:	Sound Level Meter (Class 1)	Microphone
Manufacturer:	Hangzhou Aihua Instruments Co., Ltd	-
Type/Model No.:	AWA5661	AWA14425
Serial/Equipment No.:	304723	9792
Adaptors used:	-	-

Item submitted by

Customer Name: Apex Testing & Certification Ltd.
Address of Customer: Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T.
Request No.: -
Date of receipt: 08-Apr-2020

Date of test: 10-Apr-2020

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2020	CIGISMEC
Signal generator	DS 360	33873	10-May-2020	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 55 ± 10 %
Air pressure: 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.
- 2, 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 $\pm 20\%$.
- 3, 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 response of the Sound Level Meter.

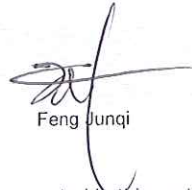
Test results

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.

Approved Signatory:



Feng Junqi

Date: 14-Apr-2020

Company Chop:



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.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 20CA0408 04-02

Page 2 of 2

1. Electrical Tests

The electrical tests were performed 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 Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	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	
		Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	A	Pass	0.3	
	C	Pass	0.3	
Frequency weightings	Lin	Pass	0.3	
	Single Burst Fast	Pass	0.3	
	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	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	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 Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	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.

Calibrated by:

Date:

Fung Chi Yip
10-Apr-2020

- End -

Checked by:

Date:

Shek Kwong Tat
14-Apr-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.



Test Data for Sound Level Meter

Page 1 of 5

Sound level meter type: AWA5661 Serial No. 304723 Date 10-Apr-2020
Microphone type: AWA14425 Serial No. 9792
Report: 20CA0408 04-02

SELF GENERATED NOISE TEST

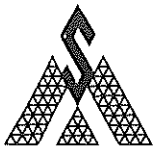
The noise test is performed in the most sensitive range of the SLM with the microphone replaced by an equivalent impedance.

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)

Reference/Expected level	Actual level		Tolerance	Deviation	
	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



Test Data for Sound Level Meter

Sound level meter type:	AWA5661	Serial No.	304723	Date	10-Apr-2020
Microphone type:	AWA14425	Serial No.	9792	Report:	20CA0408 04-02

27.0	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
25-120	27.0	27.0	0.7	0.0
	118.0	117.9	0.7	-0.1
45-140	47.0	46.8	0.7	-0.2
	138.0	137.8	0.7	-0.2

FREQUENCY WEIGHTING TEST

The frequency response of the weighting networks 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:

Frequency	Ref. level	Expected level	Actual level	Tolerance(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 weighting C:

Frequency	Ref. level	Expected level	Actual level	Tolerance(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
125.9	94.0	93.8	93.8	1.0	1.0	0.0



Test Data for Sound Level Meter

Sound level meter type: AWA5661 Serial No. 304723 Date 10-Apr-2020
Microphone type: AWA14425 Serial No. 9792 Report: 20CA0408 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	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 weighting Lin:

Frequency Hz	Ref. level dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation 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
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)

Ref. level dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation 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)

Ref. level dB	Expected level dB	Actual level dB	Tolerance(dB)		Deviation 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. Positive polarities: (Weighting Z, set the generator signal to single, Lzpeak)

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
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Test Data for Sound Level Meter

Sound level meter type: AWA5661 Serial No. 304723 Date 10-Apr-2020
Microphone type: AWA14425 Serial No. 9792 Report: 20CA0408 04-02

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 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz. (Set to INT)

	Ref. Level	Expected level	Tone burst signal	Tolerance	Deviation
Time weighting	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 on the reference range (Set the SLM to LAImax)

Test frequency: 2000 Hz
Amplitude: The upper limit of the primary indicator range.

Single sinusoidal burst of duration 5 ms:

Ref. Level	Single burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	111.2	111.1	2.0	-0.1

Repeated at 100 Hz

Ref. Level	Repeated burst 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: 4000 Hz
Duration of tone burst: 1 ms

Repetition Time	Level of tone burst	Expected Leq	Actual Leq	Tolerance	Deviation	Remarks
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



Test Data for Sound Level Meter

Sound level meter type: AWA5661 Serial No. 304723 Date 10-Apr-2020
Microphone type: AWA14425 Serial No. 9792

Report: 20CA0408 04-02

Test frequency: 4000 Hz

Integration time: 10 sec

The integrating sound level meter set to Leq:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10	90.0	60.0	59.8	1.7	-0.2

The integrating sound level meter set to SEL:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10.0	90.0	70.0	70.0	1.7	0.0

OVERLOAD INDICATION TEST

For SLM capable of operating in a non-integrating mode.

Test frequency: 2000 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz.

Level	Level reduced by	Further reduced	Difference	Tolerance	Deviation
at overload (dB)	1 dB	3 dB	dB	dB	dB
115.8	114.8	111.8	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

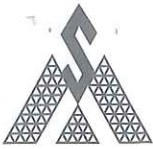
Rms level	Level reduced by	Expected level	Actual level	Tolerance	Deviation
at overload (dB)	1 dB	dB	dB	dB	dB
122.0	121.0	81.0	80.8	2.2	-0.2

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	Tolerance (dB)		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-----



CERTIFICATE OF CALIBRATION

Certificate No.: 20CA0616 03-02

Page: 1 of 2

Item tested

Description: Acoustical Calibrator (Class 1)
Manufacturer: Pulsar
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, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T.
Request No.: -
Date of receipt: 16-Jun-2020

Date of test: 20-Jun-2020

Reference equipment used in the calibration

Description:	Model:	Serial No.	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
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.
- The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 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.

Approved Signatory:

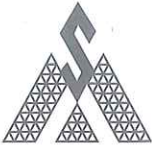

Feng Junqi

Date: 22-Jun-2020

Company Chop:



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.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 20CA0616 03-02

Page: 2 of 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 Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	(Output level in dB re 20 µPa)
			Estimated Expanded Uncertainty 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.

Calibrated by: 
 Date: 20-Jun-2020

- End -

Checked by: 
 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.