



## CERTIFICATE OF CALIBRATION

Certificate No.: 24CA0419 01-01

Page 1 of 2

### Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	Nti	Nti Andio	Nti Andio
Type/Model No.:	XL2	MC230A	MA220
Serial/Equipment No.:	A2A-15360-EO	A14232	6830
Adaptors used:	-		

### Item submitted by

Customer Name: Lam Environmental Services Limited.  
Address of Customer: -  
Request No.: -  
Date of receipt: 19-Apr-2024

Date of test: 22-Apr-2024

### Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	28-Aug-2024	CIGISMEC
Signal generator	DS 360	61227	28-Jun-2024	CEPREI

### Ambient conditions

Temperature:  $21 \pm 1$  °C  
Relative humidity:  $55 \pm 10$  %  
Air pressure:  $1005 \pm 5$  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.

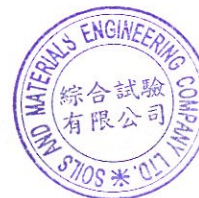
Actual Measurement data are documented on worksheets.

Approved Signatory:

  
Feng Junqi

Date: 23-Apr-2024

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. The results apply to the item as received.



## CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 24CA0419 01-01

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	2.1
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	2.2
	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	
	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Linearity range for SPL Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
	Single Burst Fast	Pass	0.3	
Time weightings	Single Burst Slow	Pass	0.3	
	Single 100µs rectangular pulse	Pass	0.3	
Peak response	Crest factor of 3	Pass	0.3	
R.M.S. accuracy	Single burst 5 ms at 2000 Hz	Pass	0.3	
Time weighting I	Repeated at frequency of 100 Hz	Pass	0.3	
	1 ms burst duty factor 1/10 <sup>3</sup> at 4kHz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 <sup>4</sup> 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	SPL	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 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

22-Apr-2024

- End -

Checked by:

Date:

Chan Yuk Yiu

23-Apr-2024

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 6

Sound level meter type: XL2 Serial No. A2A-15360-EO Date 22-Apr-2024  
Microphone type: MC230A Serial No. A14232

Report: 24CA0419 01-01

## 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 11.1 dB  
Noise level in C weighting 14.5 dB  
Noise level in Lin 20.4 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	99.0	99.0	0.7	0.0	0.0
104.0	104.0	104.0	0.7	0.0	0.0
109.0	109.0	109.0	0.7	0.0	0.0
114.0	114.0	114.0	0.7	0.0	0.0
115.0	115.0	115.0	0.7	0.0	0.0
116.0	116.0	116.0	0.7	0.0	0.0
117.0	117.0	117.0	0.7	0.0	0.0
118.0	118.0	118.0	0.7	0.0	0.0
119.0	119.0	119.0	0.7	0.0	0.0
120.0	120.0	120.0	0.7	0.0	0.0
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	49.0	49.0	0.7	0.0	0.0
44.0	44.0	44.0	0.7	0.0	0.0
39.0	39.0	39.0	0.7	0.0	0.0
34.0	34.1	34.1	0.7	0.1	0.1
33.0	33.1	33.1	0.7	0.1	0.1



Test Data for Sound Level Meter

Page 2 of 6

Sound level meter type: XL2 Serial No. A2A-15360-EO Date 22-Apr-2024  
Microphone type: MC230A Serial No. A14232

Report: 24CA0419 01-01

32.0	32.2	32.2	0.7	0.2	0.2
31.0	31.2	31.2	0.7	0.2	0.2
30.0	30.2	30.2	0.7	0.2	0.2

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
40-140	94.0	94.0	0.7	0.0
20-120	94.0	94.0	0.7	0.0
0-100	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
40-140	51.0	51.7	0.7	0.7
	138.0	138.0	0.7	0.0
20-120	30.0	30.2	0.7	0.2
	118.0	118.0	0.7	0.0
0-100	30.0	30.0	0.7	0.0
	98.0	98.0	0.7	0.0

## 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	77.9	1.0	1.0	0.0
251.2	94.0	85.4	85.4	1.0	1.0	0.0
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	95.0	1.0	1.0	0.0
7943.0	94.0	92.9	92.9	1.5	3.0	0.0
12590.0	94.0	89.7	89.6	3.0	6.0	-0.1

Frequency weighting C:

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





## Test Data for Sound Level Meter

Page 3 of 6

Sound level meter type: XL2 Serial No. A2A-15360-EO Date 22-Apr-2024  
Microphone type: MC230A Serial No. A14232

Report: 24CA0419 01-01

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
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	93.8	1.0	1.0	0.0
3981.0	94.0	93.2	93.2	1.0	1.0	0.0
7943.0	94.0	91.0	91.0	1.5	3.0	0.0
12590.0	94.0	87.8	87.6	3.0	6.0	-0.2

## Frequency weighting Lin:

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	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	94.0	1.0	1.0	0.0
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	94.0	94.0	1.0	1.0	0.0
3981.0	94.0	94.0	94.0	1.0	1.0	0.0
7943.0	94.0	94.0	94.0	1.5	3.0	0.0
12590.0	94.0	94.0	94.0	3.0	6.0	0.0

Note: No corrections for the frequency response of the microphone, instrument case and windshield are made to the sound level meter.

**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	Expected level	Actual level	Tolerance(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)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
dB	dB	dB	+	-	dB
116.0	111.9	111.9	1.0	1.0	0.0



## Test Data for Sound Level Meter

Page 4 of 6

Sound level meter type: XL2 Serial No. A2A-15360-EO Date 22-Apr-2024  
Microphone type: MC230A Serial No. A14232

Report: 24CA0419 01-01

**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
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	118.0+6.6	118.0	118.0	0.5	0.0

**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	111.2	2.0	0.0

Repeated at 100 Hz

Ref. Level	Repeated burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	117.3	117.2	1.0	-0.1

**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
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Test Data for Sound Level Meter

Page 5 of 6

Sound level meter type: XL2 Serial No. A2A-15360-EO Date 22-Apr-2024  
Microphone type: MC230A Serial No. A14232

Report: 24CA0419 01-01

msec	dB	dB	dB	+/- dB	dB	
1000	90.0	90.0	90.0	1.0	0.0	60s integ.
10000	80.0	80.0	80.0	1.0	0.0	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 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	88.0	58.0	58.0	1.7	0.0

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	88.0	68.0	68.0	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
122.3	121.3	118.3	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
128.3	127.3	87.3	87.3	2.2	0.0

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	Tolerance (dB)		Deviation
Hz	dB	Measured (dB)	+	-	dB



Test Data for Sound Level Meter

Page 6 of 6

Sound level meter type: XL2 Serial No. A2A-15360-EO Date 22-Apr-2024  
Microphone type: MC230A Serial No. A14232

Report: 24CA0419 01-01

1000	94.0	94.0	0.0	0.0	0.0
125	77.9	77.9	1.0	1.0	0.0
8000	92.9	90.3	1.5	3.0	-2.6

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## CERTIFICATE OF CALIBRATION

Certificate No.: 24CA0205 01-02

Page: 1 of 2

### Item tested

Description: Acoustical Calibrator (Class 1)  
Manufacturer: Larson Davis  
Type/Model No.: CAL200  
Serial/Equipment No.: 13128  
Adaptors used: -

### Item submitted by

Customer: Lam Environmental Services Ltd.  
Address of Customer: -  
Request No.: -  
Date of receipt: 05-Feb-2024

Date of test: 06-Feb-2024

### Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	3257888	15-Aug-2024	SCL
Preamplifier	B&K 2673	3353200	13-Jun-2024	CEPREI
Measuring amplifier	B&K 2610	2346941	13-Jun-2024	CEPREI
Signal generator	DS 360	61227	28-Jun-2024	CEPREI
Digital multi-meter	34401A	US36087050	01-Jun-2024	CEPREI
Audio analyzer	8903B	GB41300350	13-Jun-2024	CEPREI
Universal counter	53132A	MY40003662	07-Jun-2024	CEPREI

### Ambient conditions

Temperature:  $21 \pm 1$  °C  
Relative humidity:  $55 \pm 10$  %  
Air pressure:  $1005 \pm 5$  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.

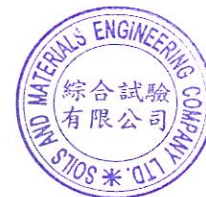
Details of the performed measurements are presented on page 2 of this certificate.

Approved Signatory:

  
Feng Junqi

Date: 07-Feb-2024

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. The results apply to the item as received.

**CERTIFICATE OF CALIBRATION**

(Continuation Page)

Certificate No.: 24CA0205 01-02

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.

(Output level in dB re 20 $\mu$ Pa)			
Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	93.74	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 = 0.016 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 = 999.4 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 = 0.8%

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.

- End -

Calibrated by:

Date:

Fung Chi Yip  
06-Feb-2024

Checked by:

Date:

Chan Yuk Yiu  
07-Feb-2024

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.





## Lam Environmental Services Limited

### Portable Dust Meter Performance Check Record

#### Portable Dust Meter

Type : Particulate Monitor  
Manufacturer : MET ONE INSTRUMENTS  
Model Number : BT-645  
Serial Number : X19295  
Performance Check Date : 17-Apr-24

#### Standard Equipment

Type : High Volume Sampler  
Manufacturer : TISCH  
Model Number : TE-5170  
Equipment Number : 2493  
Last Calibration Date : 17-Apr-24

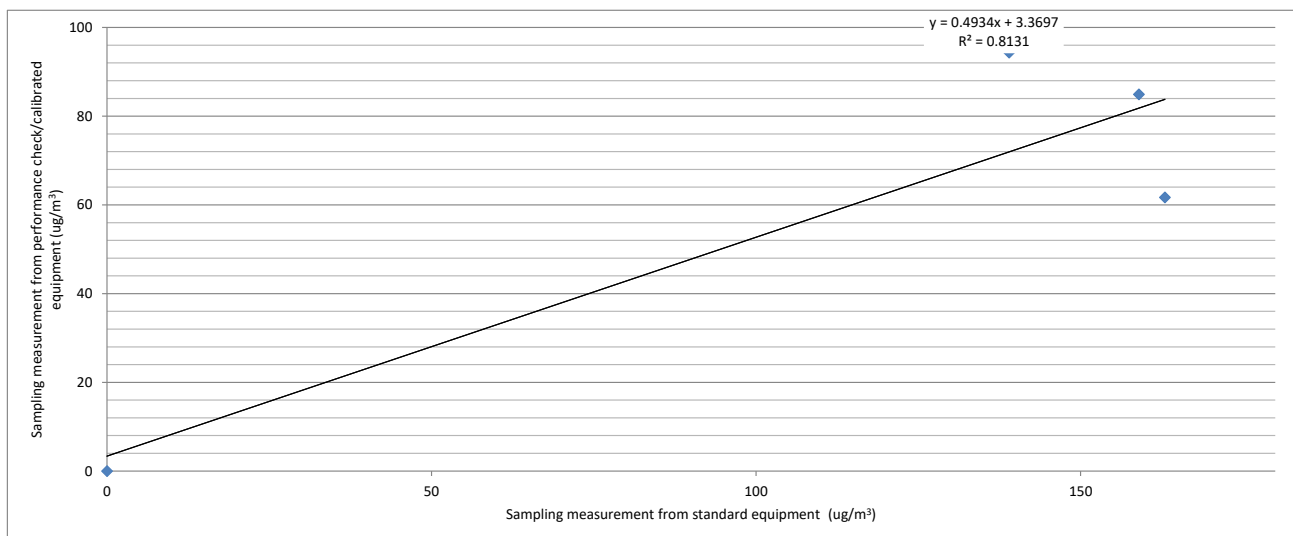
### Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
1	17/4/2024 9:50 -10:50	28	1010	163	62
2	17/4/2024 10:52 -11:52	28	#REF!	159	85
3	17/4/2024 11:54 -12:54	28	#REF!	139	94

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

#### Linear Regression of Y on X

Slope (K- factor) : 1.7000  
Correlation Coefficient : 0.9017  
Validity of Performance Check / Calibration Record : 17/4/2025



Operator: Alan Ng

Date: 19/4/2024

Checked by: Derek Lo

Date: 19/4/2024



## Lam Environmental Services Limited

### Portable Dust Meter Performance Check Record

#### Portable Dust Meter

Type : Particulate Monitor  
Manufacturer : MET ONE INSTRUMENTS  
Model Number : BT-645  
Serial Number : X19297  
Performance Check Date : 18-Aug-23

#### Standard Equipment

Type : High Volume Sampler  
Manufacturer : TISCH  
Model Number : TE-5170  
Equipment Number : 2493  
Last Calibration Date : 25-May-23

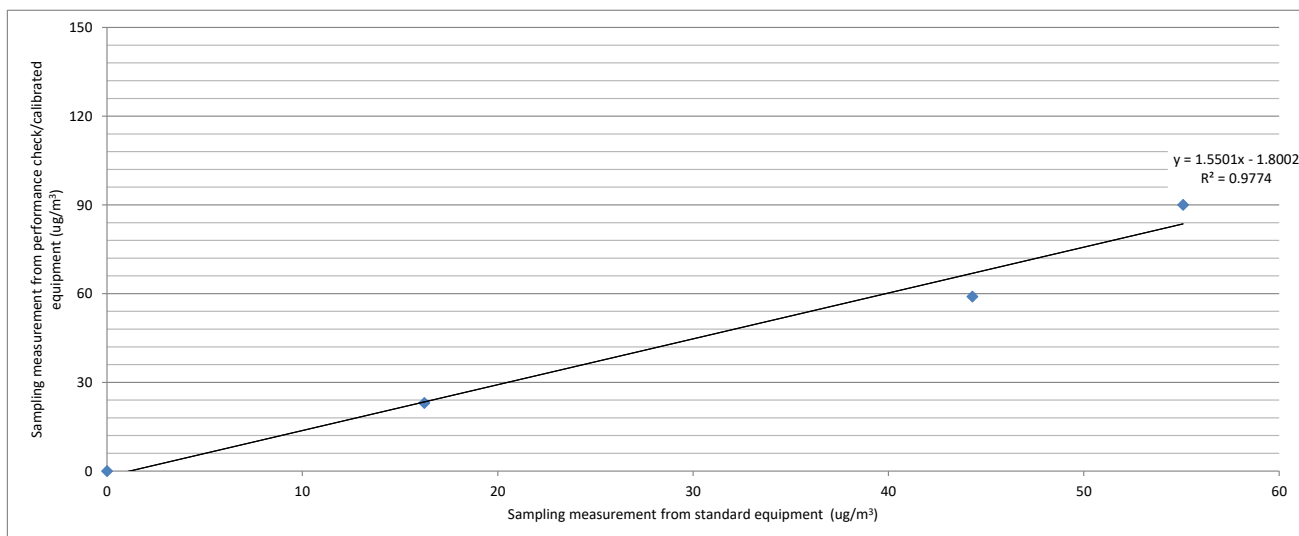
### Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
1	18/8/23 13:00	1004	29	23	16
2	18/8/23 14:02	1004	29	59	44
3	18/8/23 15:03	1004	29	90	55

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

#### Linear Regression of Y on X

Slope (K- factor) : 1.6000  
Correlation Coefficient : 0.9887  
Validity of Performance Check / Calibration Record : 17/8/2024



Operator: Alan Ng

Date: 21/8/2023

Checked by: Derek Lo

Date: 21/8/2023





## Lam Environmental Services Limited

### Portable Dust Meter Performance Check Record

#### Portable Dust Meter

Type : Particulate Monitor  
Manufacturer : MET ONE INSTRUMENTS  
Model Number : Metone AEROCET 831  
Serial Number : R14332  
Performance Check Date : 17-Apr-24

#### Standard Equipment

Type : High Volume Sampler  
Manufacturer : TISCH  
Model Number : TE-5170  
Equipment Number : 2493  
Last Calibration Date : 17-Apr-24

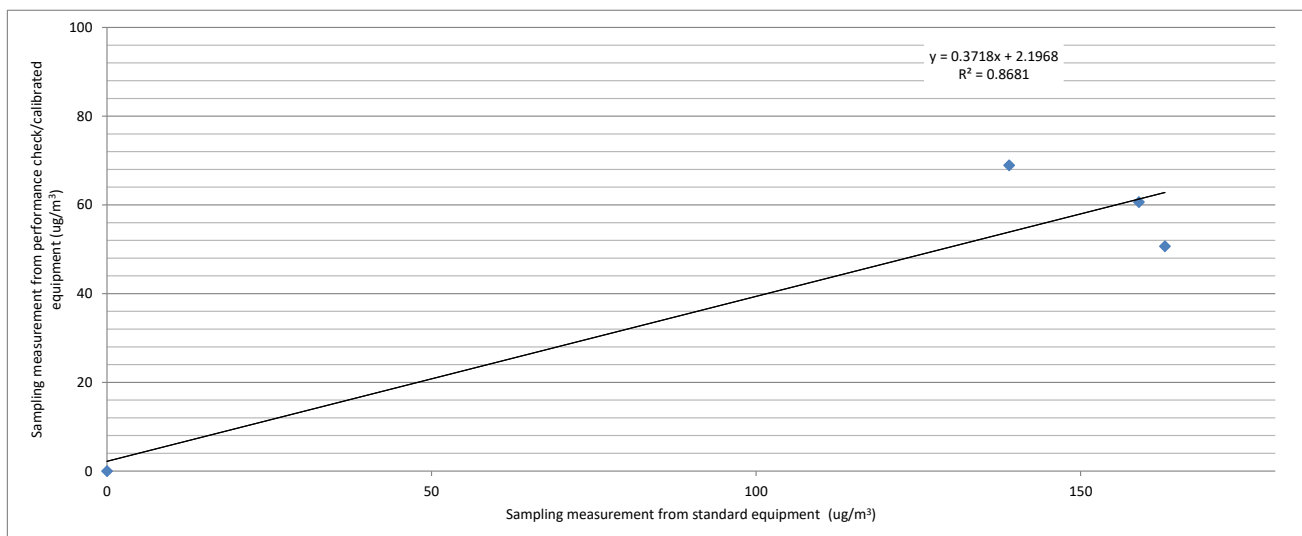
### Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
1	17/4/2024 9:50 -10:50	28	1010	163	51
2	17/4/2024 10:52 -11:52	28	1010	159	61
3	17/4/2024 11:54 -12:54	28	1010	139	69

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

#### Linear Regression of Y on X

Slope (K- factor) : 2.4000  
Correlation Coefficient : 0.9317  
Validity of Performance Check / Calibration Record : 17/4/2025



Operator: Alan Ng

Date: 19/4/2024

Checked by: Derek Lo

Date: 19/4/2024



## Lam Environmental Services Limited

### Portable Dust Meter Performance Check Record

#### Portable Dust Meter

Type : Particulate Monitor  
Manufacturer : MET ONE INSTRUMENTS  
Model Number : Metone AEROCET 831  
Serial Number : W15449  
Performance Check Date : 17-Apr-24

#### Standard Equipment

Type : High Volume Sampler  
Manufacturer : TISCH  
Model Number : TE-5170  
Equipment Number : 2493  
Last Calibration Date : 17-Apr-24

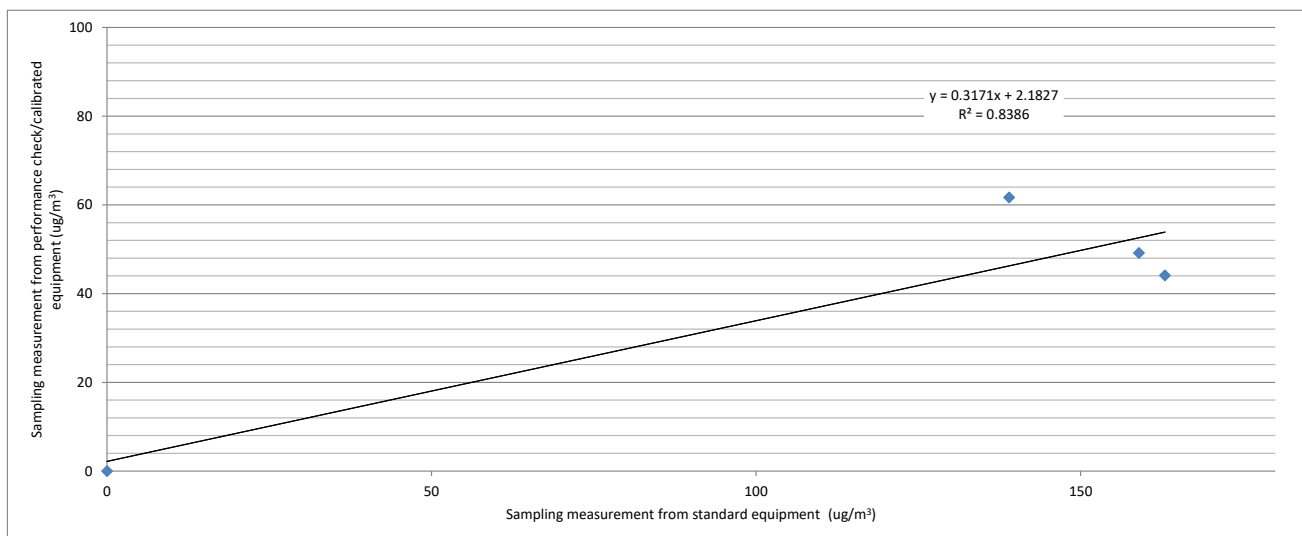
### Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
1	17/4/2024 9:50 -10:50	28	1010	163	44
2	17/4/2024 10:52 -11:52	28	1010	159	49
3	17/4/2024 11:54 -12:54	28	1010	139	62

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

#### Linear Regression of Y on X

Slope (K- factor) : 2.7000  
Correlation Coefficient : 0.9157  
Validity of Performance Check / Calibration Record : 17/4/2025



Operator: Alan Ng

Date: 19/4/2024

Checked by: Derek Lo

Date: 19/4/2024





## Lam Environmental Services Limited

### Portable Dust Meter Performance Check Record

#### Portable Dust Meter

Type : Particulate Monitor  
Manufacturer : MET ONE INSTRUMENTS  
Model Number : Metone AEROCET 831  
Serial Number : W16848  
Performance Check Date : 17-Apr-24

#### Standard Equipment

Type : High Volume Sampler  
Manufacturer : TISCH  
Model Number : TE-5170  
Equipment Number : 2493  
Last Calibration Date : 17-Apr-24

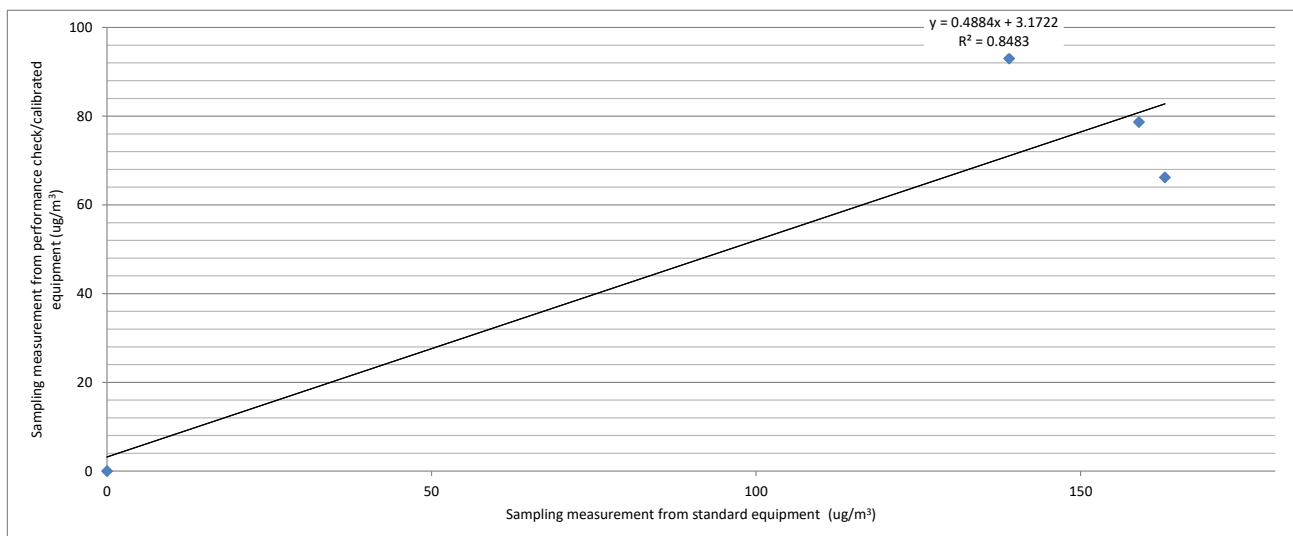
### Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
1	17/4/2024 9:50 -10:50	28	1010	163	66
2	17/4/2024 10:52 -11:52	28	1010	159	79
3	17/4/2024 11:54 -12:54	28	1010	139	93

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

#### Linear Regression of Y on X

Slope (K- factor) : 1.8000  
Correlation Coefficient : 0.9210  
Validity of Performance Check / Calibration Record : 17/4/2025



Operator: Alan Ng

Date: 19/4/2024

Checked by: Derek Lo

Date: 19/4/2024



## Lam Environmental Services Limited

### Portable Dust Meter Performance Check Record

#### Portable Dust Meter

Type : Particulate Monitor  
Manufacturer : MET ONE INSTRUMENTS  
Model Number : Metone AEROCET 831  
Serial Number : Y23153  
Performance Check Date : 17-Apr-24

#### Standard Equipment

Type : High Volume Sampler  
Manufacturer : TISCH  
Model Number : TE-5170  
Equipment Number : 2493  
Last Calibration Date : 17-Apr-24

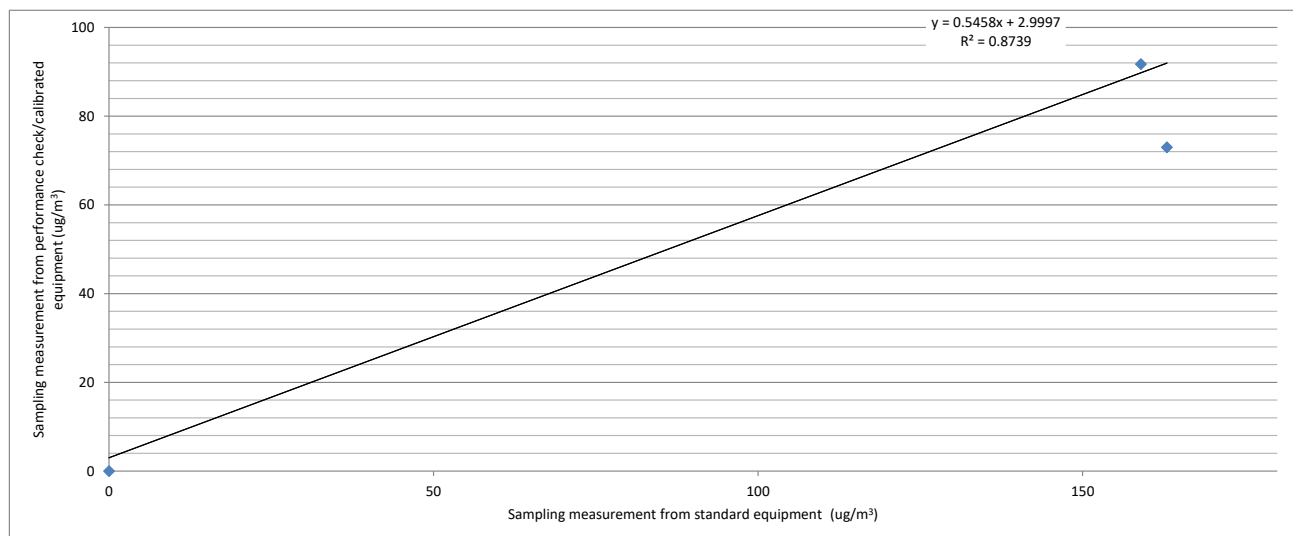
### Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
1	17/4/2024 9:50 -10:50	28	1010	163	73
2	17/4/2024 10:52 -11:52	28	1010	159	92
3	17/4/2024 11:54 -12:54	28	1010	139	99

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

#### Linear Regression of Y on X

Slope (K- factor) : 1.7000  
Correlation Coefficient : 0.9348  
Validity of Performance Check / Calibration Record : 17/4/2025



Operator: Alan Ng

Date: 19/4/2024

Checked by: Derek Lo

Date: 19/4/2024





## Lam Environmental Services Limited

### Portable Dust Meter Performance Check Record

#### Portable Dust Meter

Type : Particulate Monitor  
Manufacturer : MET ONE INSTRUMENTS  
Model Number : AEROCET831  
Serial Number : Y23160  
Performance Check Date : 9-Jun-23

#### Standard Equipment

Type : High Volume Sampler  
Manufacturer : TISCH  
Model Number : TE-5170  
Equipment Number : 2493  
Last Calibration Date : 25-May-23

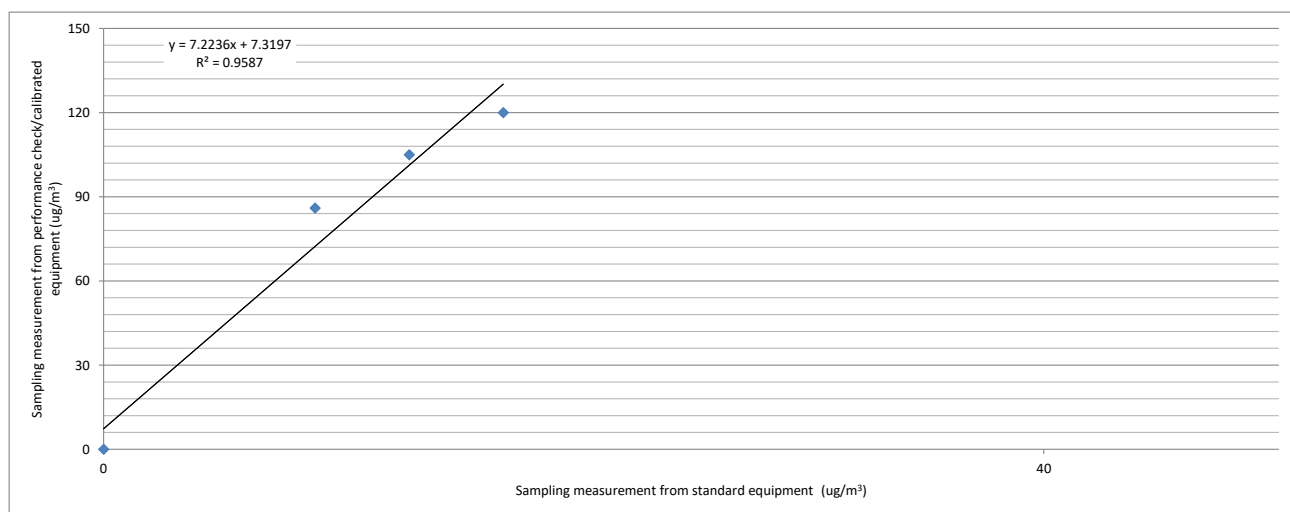
### Portable Dust Meter Performance Check Results

Trial no. in 1-hr period	Time	Mean Pressure (hPa)	Mean Temp (°C)	Concentration in ug/m <sup>3</sup> (Standard equipment) (X - Axis)	Concentration in ug/m <sup>3</sup> (Performance Check / Calibrated equipment) (Y - Axis)
1	9/6/23 09:30	1004	29	120	17
2	9/6/23 11:35	1004	29	86	9
3	9/6/23 12:38	1004	29	105	13

\* Filter paper weighting was conducted by HOKLAS accredited laboratory.

#### Linear Regression of Y on X

Slope (K- factor) : 7.3000  
Correlation Coefficient : 0.9977  
Validity of Performance Check / Calibration Record : 9/6/2024



Operator: Alan Ng

Date: 14-Jun-23

Checked by: Derek Lo

Date: 14-Jun-23



# Calibration Certificate

Certificate No. **304672**

Page 1 of 2 Pages

**Customer :** Lam Environmental Services Limited

**Address :** 19/F, Remex Centre, 42 Wong Chuk Hang Road, Hong Kong

**Order No. :** Q31684

**Date of receipt :** 24-May-23

## Item Tested

**Description :** Particulate Monitor

**Manufacturer :** Met One

**I.D. :** 3

**Model :** BT-645

**Serial No. :** X19295

## Test Conditions

**Date of Test :** 2-Jun-23

**Supply Voltage :** --

**Ambient Temperature :**  $(23 \pm 3)^{\circ}\text{C}$

**Relative Humidity :**  $(50 \pm 25) \%$

## Test Specifications

Calibration check.

Calibration procedure : Manufacturer recommended method (gravimetric), Z28.

## Test Results

All results were within the tolerance(s).

The results are shown in the attached page(s).

Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S136B	Stop Watch	303117	SCL-HKSAR
S238	Micro Balance	108228	NIM-PRC
S201	Std. Test Dust	61291	NIST
S207B	Std. Flowmeter	LL-2104002489	NIM-PRC

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.  
The test results apply to the above Unit-Under-Test only

**Calibrated by :** 

Kin Wong

**Approved by :** 

Steve Kwan

**Date:** 2-Jun-23



# Calibration Certificate

Certificate No. 304672

Page 2 of 2 Pages

Results :

## 1. Timer

Reference Value	UUT Reading (min : sec)	Tolerance	Uncertainty
9' 59" 89	10 : 00	± 2 sec/hr	± 0.5 sec/hr

## 2. Dust Particle (TSP)

Applied Value ( $\mu\text{g}/\text{m}^3$ )	UUT Reading ( $\mu\text{g}/\text{m}^3$ )	Tolerance	Uncertainty
270	290	± 20 %	± 10 %

Remark : 1. UUT: Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. ISO 12103-1 A1 respirable standard test dust was used for the calibration.

4. K Factor had been adjusted from 1.0 to 1.2.

----- END -----





# Calibration Certificate

Certificate No. **305750**

Page **1** of **2** Pages

**Customer :** Lam Environmental Services Limited

**Address :** 19/F, Remex Centre, 42 Wong Chuk Hang Road, Hong Kong

**Order No. :** Q32167

**Date of receipt :** 26-Jun-23

## Item Tested

**Description :** Particulate Monitor

**Manufacturer :** Met One

**I.D. :** 4

**Model :** BT-645

**Serial No. :** X19297

## Test Conditions

**Date of Test :** 14-Jul-23

**Supply Voltage :** --

**Ambient Temperature :**  $(23 \pm 3)^{\circ}\text{C}$

**Relative Humidity :**  $(50 \pm 25) \%$

## Test Specifications

Calibration check.

Calibration procedure : Manufacturer recommended method (gravimetric), Z28.

## Test Results

The results are shown in the attached page(s).

Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S136B	Stop Watch	303117	SCL-HKSAR
S238	Micro Balance	108228	NIM-PRC
S201	Std. Test Dust	61291	NIST
S207B	Std. Flowmeter	LL-2104002489	NIM-PRC

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.  
The test results apply to the above Unit-Under-Test only

**Calibrated by :**   
Kin Wong

**Approved by :**   
Steve Kwan

**Date:** 14-Jul-23

This Certificate is issued by:

Hong Kong Calibration Ltd.

Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.

Tel: 2425 8801 Fax: 2425 8646

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# Calibration Certificate

Certificate No. 305750

Page 2 of 2 Pages

Results :

## 1. Timer

Reference Value	UUT Reading (min : sec)	Tolerance	Uncertainty
9' 59" 91	10 : 00	± 2 sec/hr	± 0.5 sec/hr

## 2. Dust Particle (TSP)

Applied Value ( $\mu\text{g}/\text{m}^3$ )	UUT Reading ( $\mu\text{g}/\text{m}^3$ )	Tolerance	Uncertainty
220	228	± 20 %	± 10 %

Remark : 1. UUT: Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. ISO 12103-1 A1 respirable standard test dust was used for the calibration.

4. The K Factor Had been adjusted from 1.0 to 0.8.

----- END -----



# Calibration Certificate

Certificate No. **304673**

Page 1 of 2 Pages

**Customer :** Lam Environmental Services Limited

**Address :** 19/F, Remex Centre, 42 Wong Chuk Hang Road, Hong Kong

**Order No. :** Q31684

**Date of receipt :** 24-May-23

## Item Tested

**Description :** Aerosol Mass Monitor

**Manufacturer :** Met One

**I.D. :** --

**Model :** Aerocet 831

**Serial No. :** R14332

## Test Conditions

**Date of Test :** 2-Jun-23

**Supply Voltage :** --

**Ambient Temperature :**  $(23 \pm 3)^{\circ}\text{C}$

**Relative Humidity :**  $(50 \pm 25) \%$

## Test Specifications

Calibration check.

Calibration procedure : Manufacturer recommended method (gravimetric), Z28.

## Test Results

All results were within the tolerance(s).

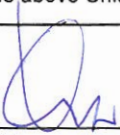
The results are shown in the attached page(s).


Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S136B	Stop Watch	303117	SCL-HKSAR
S238	Micro Balance	108228	NIM-PRC
S201	Std. Test Dust	61291	NIST
S207B	Std. Flowmeter	LL-2104002489	NIM-PRC

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.  
The test results apply to the above Unit-Under-Test only

**Calibrated by :**   
Kin Wong

**Approved by :**   
Steve Kwan

This Certificate is issued by:

Hong Kong Calibration Ltd.

Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.

Tel: 2425 8801 Fax: 2425 8646

**Date:** 2-Jun-23





# Calibration Certificate

Certificate No. 304673

Page 2 of 2 Pages

Results :

## 1. General

Internal Filters : checked and found clean.

## 2. Flow Meter

UUT Nominal Value (LPM)	Measured Value (LPM)	Tolerance (LPM)
2.83	2.85	$\pm 0.15$

Uncertainty :  $\pm 0.05$  LPM

## 3. Timer

Reference Value	UUT Reading	Tolerance	Uncertainty
9' 59" 81	10 min	$\pm 2$ sec/hr	$\pm 0.5$ sec/hr

## 4. Dust Particle (TSP)

Applied Value ( $\mu\text{g}/\text{m}^3$ )	UUT Reading ( $\mu\text{g}/\text{m}^3$ ) K Factor : 0.85	Tolerance	Uncertainty
980	1 018	$\pm 20 \%$	$\pm 10 \%$

Remark : 1. UUT: Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. ISO 12103-1 A1 respirable standard test dust was used for the calibration.

4. The K Factor had been adjusted from 1.00 to 0.85.

----- END -----

# Calibration Certificate

Certificate No. 401106

Page 1 of 2 Pages

**Customer :** Lam Environmental Services Limited

**Address :** 19/F, Remex Centre, 42 Wong Chuk Hang Road, Hong Kong

**Order No. :** Q40468

**Date of receipt :** 5-Feb-24

## Item Tested

**Description :** Aerosol Mass Monitor

**Manufacturer :** Met One

**I.D. :** --

**Model :** Aerocet 831

**Serial No. :** W15449

## Test Conditions

**Date of Test :** 1-Mar-24

**Supply Voltage :** --

**Ambient Temperature :**  $(23 \pm 3)^{\circ}\text{C}$

**Relative Humidity :**  $(50 \pm 25) \%$

## Test Specifications

Calibration check.

Calibration procedure : Manufacturer recommended method (gravimetric), Z28.

## Test Results

All results were within the tolerance(s).

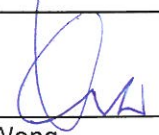
The results are shown in the attached page(s).

Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S136B	Stop Watch	303117	SCL-HKSAR
S238	Micro Balance	108228	NIM-PRC
S201	Std. Test Dust	61291	NIST
S207B	Std. Flowmeter	LL-2104002489	NIM-PRC

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.  
The test results apply to the above Unit-Under-Test only

**Calibrated by :**   
Kin Wong

**Approved by :**   
Steve Kwan

**Date:** 1-Mar-24



# Calibration Certificate

Certificate No. 401106

Page 2 of 2 Pages

Results :

## 1. General

Internal Filters : checked and found clean.

## 2. Flow Meter

UUT Nominal Value (LPM)	Measured Value (LPM)	Tolerance (LPM)	Uncertainty
2.83	2.80	$\pm 0.15$	$\pm 0.05$

## 3. Timer

Reference Value	UUT Reading	Tolerance	Uncertainty
10' 00" 19	10 min	$\pm 2 \text{ sec/hr}$	$\pm 0.5 \text{ sec/hr}$

## 4. Dust Particle (TSP)

Applied Value ( $\mu\text{g}/\text{m}^3$ )	UUT Reading ( $\mu\text{g}/\text{m}^3$ ) K Factor : 0.66	Tolerance	Uncertainty
410	391	$\pm 20 \%$	$\pm 10 \%$

Remark : 1. UUT: Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. ISO 12103-1 A1 respirable standard test dust was used for the calibration.

4. The K Factor had been adjusted from 0.62 to 0.66.

----- END -----



# Calibration Certificate

Certificate No. 401105

Page 1 of 2 Pages

**Customer :** Lam Environmental Services Limited

**Address :** 19/F, Remex Centre, 42 Wong Chuk Hang Road, Hong Kong

**Order No. :** Q40468

**Date of receipt :** 5-Feb-24

## Item Tested

**Description :** Aerosol Mass Monitor

**Manufacturer :** Met One

**I.D. :** --

**Model :** Aerocet 831

**Serial No. :** W16848

## Test Conditions

**Date of Test :** 1-Mar-24

**Supply Voltage :** --

**Ambient Temperature :**  $(23 \pm 3)^{\circ}\text{C}$

**Relative Humidity :**  $(50 \pm 25) \%$

## Test Specifications

Calibration check.

Calibration procedure : Manufacturer recommended method (gravimetric), Z28.

## Test Results

All results were within the tolerance(s).

The results are shown in the attached page(s).

Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S136B	Stop Watch	303117	SCL-HKSAR
S238	Micro Balance	108228	NIM-PRC
S201	Std. Test Dust	61291	NIST
S207B	Std. Flowmeter	LL-2104002489	NIM-PRC

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.  
The test results apply to the above Unit-Under-Test only

**Calibrated by :**   
Kin Wong

**Approved by :**   
Steve Kwan

This Certificate is issued by:

Hong Kong Calibration Ltd.

Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.

Tel: 2425 8801 Fax: 2425 8646

**Date:** 1-Mar-24





# Calibration Certificate

Certificate No. 401105

Page 2 of 2 Pages

Results :

## 1. General

Internal Filters : checked and found clean.

## 2. Flow Meter

UUT Nominal Value (LPM)	Measured Value (LPM)	Tolerance (LPM)	Uncertainty
2.83	2.90	$\pm 0.15$	$\pm 0.05$

## 3. Timer

Reference Value	UUT Reading	Tolerance	Uncertainty
10' 00" 04	10 min	$\pm 2$ sec/hr	$\pm 0.5$ sec/hr

## 4. Dust Particle (TSP)

Applied Value ( $\mu\text{g}/\text{m}^3$ )	UUT Reading ( $\mu\text{g}/\text{m}^3$ ) K Factor : 1.50	Tolerance	Uncertainty
450	471	$\pm 20$ %	$\pm 10$ %

Remark : 1. UUT: Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. ISO 12103-1 A1 respirable standard test dust was used for the calibration.

4. The K Factor had been adjusted from 1.32 to 1.50..

----- END -----



# Calibration Certificate

Certificate No. 401107

Page 1 of 2 Pages

**Customer :** Lam Environmental Services Limited

**Address :** 19/F, Remex Centre, 42 Wong Chuk Hang Road, Hong Kong

**Order No. :** Q40468

**Date of receipt :** 5-Feb-24

## Item Tested

**Description :** Aerosol Mass Monitor

**Manufacturer :** Met One

**I.D. :** --

**Model :** Aerocet 831

**Serial No. :** Y23153

## Test Conditions

**Date of Test :** 1-Mar-24

**Supply Voltage :** --

**Ambient Temperature :**  $(23 \pm 3)^{\circ}\text{C}$

**Relative Humidity :**  $(50 \pm 25) \%$

## Test Specifications

Calibration check.

Calibration procedure : Manufacturer recommended method (gravimetric), Z28.

## Test Results

All results were within the tolerance(s).

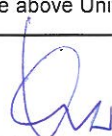
The results are shown in the attached page(s).


Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S136B	Stop Watch	303117	SCL-HKSAR
S238	Micro Balance	108228	NIM-PRC
S201	Std. Test Dust	61291	NIST
S207B	Std. Flowmeter	LL-2104002489	NIM-PRC

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.  
The test results apply to the above Unit-Under-Test only

**Calibrated by :**   
Kin Wong

**Approved by :**   
Steve Kwan

This Certificate is issued by:

Hong Kong Calibration Ltd

Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.

Tel: 2425 8801 Fax: 2425 8646

**Date:** 1-Mar-24



# Calibration Certificate

Certificate No. 401107

Page 2 of 2 Pages

Results :

## 1. General

Internal Filters : checked and found clean.

## 2. Flow Meter

UUT Nominal Value (LPM)	Measured Value (LPM)	Tolerance (LPM)	Uncertainty
2.83	2.80	$\pm 0.15$	$\pm 0.05$

## 3. Timer

Reference Value	UUT Reading	Tolerance	Uncertainty
9' 59" 91	10 min	$\pm 2$ sec/hr	$\pm 0.5$ sec/hr

## 4. Dust Particle (TSP)

Applied Value ( $\mu\text{g}/\text{m}^3$ )	UUT Reading ( $\mu\text{g}/\text{m}^3$ ) K Factor : 2.25	Tolerance	Uncertainty
670	704	$\pm 20$ %	$\pm 10$ %

Remark : 1. UUT: Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. ISO 12103-1 A1 respirable standard test dust was used for the calibration.

4. The K Factor had been adjusted from 1.00 to 2.25.

----- END -----



# Calibration Certificate

Certificate No. **305751**

Page 1 of 2 Pages

**Customer :** Lam Environmental Services Limited

**Address :** 19/F, Remex Centre, 42 Wong Chuk Hang Road, Hong Kong

**Order No. :** Q32167

**Date of receipt :** 26-Jun-23

## Item Tested

**Description :** Aerosol Mass Monitor

**Manufacturer :** Met One

**I.D. :** --

**Model :** Aerocet 831

**Serial No. :** Y23160

## Test Conditions

**Date of Test :** 14-Jul-23

**Supply Voltage :** --

**Ambient Temperature :** (23 ± 3)°C

**Relative Humidity :** (50 ± 25) %

## Test Specifications

Calibration check.

Calibration procedure : Manufacturer recommended method (gravimetric), Z28.

## Test Results

All results were within the tolerance(s).

The results are shown in the attached page(s).

Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S136B	Stop Watch	303117	SCL-HKSAR
S238	Micro Balance	108228	NIM-PRC
S201	Std. Test Dust	61291	NIST
S207B	Std. Flowmeter	LL-2104002489	NIM-PRC

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.  
The test results apply to the above Unit-Under-Test only

**Calibrated by :**   
Kin Wong

**Approved by :**   
Steve Kwan

**Date:** 14-Jul-23





# Calibration Certificate

Certificate No. 305751

Page 2 of 2 Pages

Results :

## 1. General

Internal Filters : checked and found clean.

## 2. Flow Meter

UUT Nominal Value (LPM)	Measured Value (LPM)	Tolerance (LPM)
2.83	2.85	$\pm 0.15$

Uncertainty :  $\pm 0.05$  LPM

## 3. Timer

Reference Value	UUT Reading	Tolerance	Uncertainty
12' 00" 30	12 min	$\pm 2$ sec/hr	$\pm 0.5$ sec/hr

## 4. Dust Particle (TSP)

Applied Value ( $\mu\text{g}/\text{m}^3$ )	UUT Reading ( $\mu\text{g}/\text{m}^3$ ) K Factor : 0.80	Tolerance	Uncertainty
560	514	$\pm 20 \%$	$\pm 10 \%$

Remark : 1. UUT: Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. ISO 12103-1 A1 respirable standard test dust was used for the calibration.

4. The K Factor had been adjusted from 1.00 to 0.80.

----- END -----



## REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

**CONTACT:** DEREK LO  
**CLIENT:** LAM ENVIRONMENTAL SERVICES LTD  
**ADDRESS:** 19/F, REMEX CENTRE,  
42 WONG CHUK HANG ROAD,  
HONG KONG

**WORK ORDER:** HK2408931  
**SUB-BATCH:** 0  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 06-Mar-2024  
**DATE OF ISSUE:** 14-Mar-2024

### GENERAL COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principle as practised by the laboratory or quoted from relevant international standards.

The validity of equipment/ meter performance only applies to the result(s) stated in the report.

This report superseded any previous report(s) with same work order number.

### EQUIPMENT INFORMATION

Equipment information (Brand name, Model No., Serial No. and Equipment No.) is provided by client.

Equipment Type: Multifunctional Meter

Service Nature: Performance Check

Scope: Dissolved Oxygen, pH Value, Salinity and Temperature

Brand Name/ Model No.: [YSI]/ [ProQuatro]

Serial No./ Equipment No.: [20M100002/20M101455]/ [N/A]

Date of Calibration: 12-March-2024

Ms. Lin Wai Yu, Iris  
Assistant Manager - Inorganics

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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



**WORK ORDER:** HK2408931  
**SUB-BATCH:** 0  
**DATE OF ISSUE:** 14-Mar-2024  
**CLIENT:** LAM ENVIRONMENTAL SERVICES LTD

Equipment Type: Multifunctional Meter  
Brand Name/ Model No.: [YSI]/ [ProQuatro]  
Serial No./ Equipment No.: [20M100002/20M101455]/ [N/A]  
Date of Calibration: 12-March-2024 Date of Next Calibration: 12-June-2024

## PARAMETERS:

### Dissolved Oxygen Method Ref: APHA (23rd edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.04	2.07	+0.03
5.00	5.18	+0.18
6.89	6.89	+0.00
Tolerance Limit (mg/L)		±0.20

### pH Value Method Ref: APHA (23rd edition), 4500H: B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.96	-0.04
7.0	7.11	+0.11
10.0	10.00	+0.00
Tolerance Limit (pH unit)		±0.20

### Salinity Method Ref: APHA (23rd edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.01	--
10	10.42	+4.2
20	20.61	+3.1
30	30.68	+2.3
Tolerance Limit (%)		±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Ms. Lin Wai Yu, Iris  
Assistant Manager - Inorganics

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



**WORK ORDER:** HK2408931  
**SUB-BATCH:** 0  
**DATE OF ISSUE:** 14-Mar-2024  
**CLIENT:** LAM ENVIRONMENTAL SERVICES LTD

Equipment Type: Multifunctional Meter  
Brand Name/ Model No.: [YSI]/ [ProQuatro]  
Serial No./ Equipment No.: [20M100002/20M101455]/ [N/A]  
Date of Calibration: 12-March-2024 Date of Next Calibration: 12-June-2024

## PARAMETERS:

### Temperature

**Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.**

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
10.0	8.5	-1.5
21.0	19.5	-1.5
47.0	45.1	-1.9
	Tolerance Limit (°C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Ms. Lin Wai Yu, Iris  
Assistant Manager - Inorganics





## Calibration Report

Calibration No. : 52508051- B06E3801

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Laboratory : FT Laboratories Ltd.

Address : Lot No. DD77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, Fanling, New Territories

Telephone : (852) 2758 4861

Facsimile : (852) 2758 8962

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Customer : **Lam Environmental Services Limited**

Address : **19/F., Remex Centre, 42 Wong Chuk Hang Road, Hong Kong**

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Item Calibrated : Name/Description: Turbidimeter

Manufacturer: Shanghai Xinrui Instruments & Meters co.,Ltd

Model no: WGZ-3B

Equipment no.: 1807063

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Reference Standard / : C23/01 under NCRM reference material number GBW(E) 120125.

Major Measurement : Standard Solution of Formazine Turbidity

### Equipment

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Calibration Method : In-house calibration method according to Ref: APHA22nd ed 213 OB

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Date of item received : 06 Feb.,2024

Date of Calibration : 15 Feb.,2024

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Location of Calibration : Chemical Laboratory of FT Laboratories Ltd.

### Calibration Conditions

Temperature :  $20 \pm 3$  °C

Relative Humidity : 30% to 80%

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Test Results : The test results are detailed in the subsequent page(s).

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Certified by :

Date of Issue: 20 FEB 2024

  
☒ CHAN Joseph Nicolas (Senior Technical Engineer)

- Notes:
- (1) The above equipment has been calibrated against standards which are traceable to internationally recognized standards.
  - (2) This certificate shall not be reproduced, except in full, without the written approval of FT Laboratories Ltd.



## Calibration Report

Calibration No. : 52508051- B06E3801

### Results

Turbidity of standard solution used (NTU)	Measured value (NTU)	Error (%)
0	0	---
4	4.02	0.50%
10	10.02	0.20%
40	40.01	0.02%
100	100.30	0.30%
400	400.2	0.05%
1000	999.3	-0.07%

### Remarks:

- (A) Each reported result is the mean of three measurements on UUT (unit-under-test).
- (B) The values given in this Calibration Report only relate to the unit-under-test and the values measured at the time of the test. Any uncertainties quoted will not include allowances for the environmental changes, variation and shock during transportation, or the capability of any other laboratory to repeat the measurement.
- (C) Before calibration, UUT and reference equipment was placed in the laboratory for at least one hour.

< End of Report >

Calibrated by: CH Cheung  
Date: 15 Feb., 2024

Checked by: Joseph Chan  
Date: 20 FEB 2024



## Calibration Report

Calibration No.	:	52508051 - D22E2401
Laboratory	:	FT Laboratories Ltd.
Address	:	Lot No. DD77 Section 1552 S.Ass 1RP, Ng Chow South Road, Ping Che, Fanling, New Territories
Telephone	:	(852) 2758 4861
Facsimile	:	(852) 2758 8962
Customer	:	Lam Environmental Services Limited
Address	:	19/F., Remex Centre, 42 Wong Chuk Hang Road, Hong Kong
Item Calibrated	:	Name/Description: Turbidimeter Manufacturer: Shanghai Xinrui Instruments & Meters co.,Ltd Model no: WGZ-3B Equipment no.: 1807063
Reference Standard / Major Measurement	:	C23/01 under NCRM reference material number GBW(E) 120125. Standard Solution of Formazine Turbidity
Equipment	:	
Calibration Method	:	In-house calibration method according to Ref: APHA22nd ed 213 OB
Date of item received	:	22 Apr.,2024
Date of Calibration	:	30 Apr.,2024
Location of Calibration	:	Chemical Laboratory of FT Laboratories Ltd.
Calibration Conditions	:	
Temperature	:	20 ± 3 °C
Relative Humidity	:	30% to 80%
Test Results	:	The test results are detailed in the subsequent page(s).

Certified by :

Date of Issue: - 3 MAY 2024

☒ CHAN Joseph Nicolas (Senior Technical Engineer)

- Notes:
- (1) The above equipment has been calibrated against standards which are traceable to internationally recognized standards.
  - (2) This certificate shall not be reproduced, except in full, without the written approval of FT Laboratories Ltd.



## Calibration Report

Calibration No. : 52508051 - D22E2401

### Results

Turbidity of standard solution used (NTU)	Measured value (NTU)	Error (%)
0	0	---
4	3.99	-0.25%
10	9.98	-0.20%
40	39.98	-0.05%
100	99.80	-0.20%
400	399.0	-0.25%
1000	998.0	-0.20%

### Remarks:

- (A) Each reported result is the mean of three measurements on UUT (unit-under-test).
- (B) The values given in this Calibration Report only relate to the unit-under-test and the values measured at the time of the test. Any uncertainties quoted will not include allowances for the environmental changes, variation and shock during transportation, or the capability of any other laboratory to repeat the measurement.
- (C) Before calibration, UUT and reference equipment was placed in the laboratory for at least one hour.

< End of Report >

Calibrated by: CH Cheung  
Date: 30 Apr., 2024

Checked by: Joseph Chan  
Date: 8 MAY 2024