

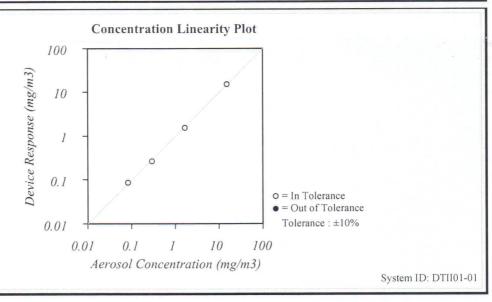
Appendix C Calibration Certificates of Monitoring Equipment



CERTIFICATE OF CALIBRATION AND TESTING

TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 http://www.tsi.com

Environment Condition			Model	AM510	
Temperature	68.2 (20.1)	°F (°C)	Model	AIVIOTO	
Relative Humidity	20	%RH	Serial Number	11302029	
Barometric Pressure	28.81 (975.6)	inHg (hPa)			



TSI Incorporated does hereby certify that all materials, components, and workmanship used in the manufacture of this equipment are in strict accordance with the applicable specifications agreed upon by TSI and the customer and with all published specifications. All performance and acceptance tests required under this contract were successfully conducted according to required specifications. There is no NIST standard for optical mass measurements. Calibration of this instrument performed by TSI has been done using emery oil and has been nominally adjusted to respirable mass of standard ISO 12103-1, A1 test dust (Arizona dust). Our calibration ratio is greater than 1.2:1

Kao Van Calibrated

Final Function Check

February 12, 2013

Date



TISCH ENVIROMENTAL, INC.
145 SOUTH MIAMI AVE.
VILLAGE OF CLEVES, OH 45002
513.467.9000
877.263.7610 TOLL FREE
513.467.9009 FAX
WWW.TISCH-ENV.COM

AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

METER ORFICE	96 84
PLATE VOLUME VOLUME DIFF DIFF) 00 00 00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
0.9916 0.9874 0.9854 0.9843 0.9790	0.6741 0.9521 1.0630 1.1134 1.3410	1.4113 1.9959 2.2315 2.3405 2.8227		0.9956 0.9914 0.9894 0.9883 0.9829	0.6768 0.9560 1.0673 1.1180 1.3465	0.8874 1.2549 1.4030 1.4715 1.7747
intercept (b) = -0.01714 intercept (b) = -0.01 coefficient (r) = 0.99999					1.32539 -0.01078 0.99999	

CALCULATIONS

Vstd = Diff. Vol[(Pa-Diff. Hg)/760](298/Ta)
Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
Qa = Va/Time

For subsequent flow rate calculations:

Qstd = $1/m\{ [SQRT(H2O(Pa/760)(298/Ta))] - b\}$ Qa = $1/m\{ [SQRT H2O(Ta/Pa)] - b\}$

TSP Sampler Calibration

SITE

Date: Location: Lian Tang 3 January 4, 2014 Sampler: TE-5170 MFC Tech:

CONDITIONS Barometric Pressure (in Hg): 40.20 Corrected Pressure (mm Hg): 1021 Temperature (deg K): 288 Temperature (deg F): Average Press. (in Hg): 40.20 Corrected Average (mm Hg): 1021 Average Temp. (deg K): Average Temp. (deg F): 59 288

CALIBRATION ORIFICE Qstd Slope: Make: Tisch 2.11662 TE-5025A Qstd Intercept: Model: -0.01714 Date Certified: April 9, 2013 Serial#: 1941

	CALIBRATIONS						
Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION		
1	12.40	1.970	58.0	68.39	Slope =	33.7251	
2	10.20	1.787	52.0	61.31	Intercept =	1.4016	
3	8.00	1.584	46.0	54.24	Corr. coeff.=	0.9994	
4	5.20	1.278	38.0	44.80			
5	3.20	1.005	30.0	35.37	<pre># of Observations:</pre>	5	

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]

IC = I[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)[Sqrt(298/Tav)(Pav/760)]-b)

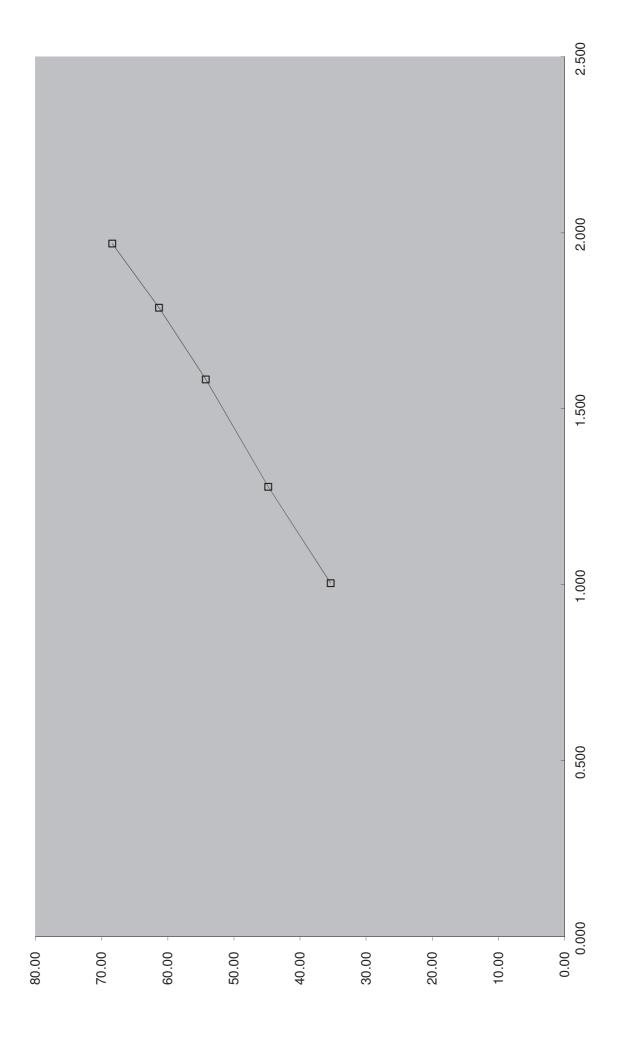
m = sampler slope
b = sampler intercept
I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrated By : Thomas WONG Sam WONG Checked By :

Thomas





37521 Certificate No.

1 of 2 Pages Page

Customer: Enovative Environmental Service Limited

Address: Room 3, 12/F., New City Centre, 2 Lei Yue Mun Road, Kwun Tong, Kowloon, H.K.

Order No.: Q32432

Date of receipt

16-Oct-13

Item Tested

Description: Sound Level Calibrator

Manufacturer: B&K

Model : Type 4231 Serial No.

: 2685684

Test Conditions

Date of Test: 31-Oct-13

Supply Voltage

Ambient Temperature:

 $(23 \pm 3)^{\circ}$ C

Relative Humidity: (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure: F21, Z02.

Test Results

All results were within the IEC 942 Class 1 specification.

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

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S014	Spectrum Analyzer	35730	NIM-PRC & SCL-HKSAR
S205	Ref. Sound Level Calibrator	PHCO40002	SCL-HKSAR
S041	Universal Counter	34621	SCL-HKSAR
S206	Sound Level Meter	36203	SCL-HKSAR
S031	6½ dgt. Multimeter	30128	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). The test results apply to the above Unit-Under-Test only

Calibrated by

Dorothy Cheuk

Approved by :

Date:

31-Oct-13

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



Certificate No. 37521

Page 2 of 2 Pages

Results:

1. Level Accuracy

UUT Nominal Value (dB)	Measured Value (dB)	IEC 942 Class 1 Spec.
94	94.08	± 0.3 dB
114	114.07	

Uncertainty: ± 0.1 dB

2. Frequency

UUT Nominal Value	Measured Value	IEC 942 Class 1 Spec.
1 kHz	1.002 kHz	± 2 %

Uncertainty: $\pm 3.6 \times 10^{-6}$

3. Level Stability: 0.0 dB

IEC 942 Class 1 Spec. : ± 0.1 dB

Uncertainty: ± 0.01 dB

4. Total Harmonic Distortion : < 0.7 %

IEC 942 Class 1 Spec. : < 3 % Uncertainty : ± 2.3 % of reading

Remark: 1. UUT: Unit-Under-Test

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

3. Atmospheric Pressure: 1014 hPa.

----- END -----



Certificate No. 36604

Page 1 of 4 Pages

Customer: Enovative Environmental Service Limited

Address: Room 3, 12/F., New City Centre, 2 Lei Yue Mun Road, Kwun Tong, Kowloon, H.K.

Order No.: Q32395

Date of receipt

4-Sep-13

Item Tested

Description: Sound Level Meter (N12-RION-004)

Manufacturer: Rion

Model: NL-52

Serial No.

: 00220553

Test Conditions

Date of Test: 10-Sep-13

Supply Voltage

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

Relative Humidity: (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure: Z01.

Test Results

All results were within the IEC 61672 Type1 specification.

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

Main Test equipment used:

Equipment No. Description

Cert. No.

Traceable to

S017

Multi-Function Generator

C127181

SCL-HKSAR

S205

Ref. Sound Level Calibrator

PHCO40002

SCL-HKSAR

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). The test results apply to the above Unit-Under-Test only

Calibrated by:

Dorothy Cheuk

Approved by:

16-Sep-13

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

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Certificate No. 36604 Pages

Results:

1. Self-generated noise: 16.4 dBA (Mfr's Spec ≤17 dBA)

2. Acoustical signal test

UUT Setting				
Level Range (dB)	Weight	Response	Applied Value (dB)	UUT Reading (dB)
30 - 130	L_{A}	Fast	94.0	94.0
		Slow		94.0
	L_{C}	Fast		94.0
	L_{Z}	Fast		94.0
	L_{A}	Fast	114.0	114.0
		Slow		114.0
	L_{C}	Fast		114.0
	L_{Z}	Fast		114.0

IEC 61672 Type 1 Spec. : ± 1.1 dB

Uncertainty: $\pm 0.1 \text{ dB}$

3 Electrical signal tests of frequency weightings (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.8	- 39.4 dB, ± 2 dB
63 Hz	-26.4	- 26.2 dB, ± 1.5 dB
125 Hz	-16.3	- 16.1 dB, ± 1.5 dB
250 Hz	-8.7	- 8.6 dB, ± 1 dB
500 Hz	-3.3	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.2	+ 1.2 dB, ± 1.6 dB
4 kHz	+0.9	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.1	- 1.1 dB , + $2.1 \text{ dB} \sim -3.1 \text{ dB}$
16 kHz	-8.0	$-6.6 \text{ dB}, +3.5 \text{ dB} \sim -17.0 \text{ dB}$

Uncertainty: $\pm 0.1 \text{ dB}$



Certificate No. 36604

Page 3 of 4 Pages

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

iii I I I I I I I I I I I I I I I I I I	(
UUT	Applied	UUT	Difference	IEC 61672
Setting	Value (dB)	Reading (dB)	(dB)	Type 1 Spec.
A	94.0	94.0 (Ref.)		± 0.4 dB
С	94.0	94.0	0.0	
Z	94.0	94.0	0.0	

4.2 Time Weighting (A-weighted)

UUT	Applied	UUT	Difference	IEC 61672
Setting	Value (dB)	Reading (dB)	(dB)	Type 1 Spec.
Fast	94.0	94.0 (Ref.)		± 0.3 dB
Slow	94.0	94.0	0.0	
Time-averaging	94.0	94.0	0.0	

Uncertainty: ± 0.1 dB

5. Level linearity on the reference level range

	Applied			
UUT Range	Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
130 dB	129.0	129.0	0.0	± 1.1 dB
(Ref Level)	124.0	124.0	0.0	
	119.0	119.0	0.0	
	114.0	114.0	0.0	
	109.0	109.0	0.0	
	104.0	104.0	0.0	
	99.0	99.0	0.0	
	94.0	94.0 (Ref)		
*	89.0	89.0	0.0	
	84.0	84.0	0.0	
	. 79.0	79.0	0.0	
	74.0	74.0	0.0	
	69.0	69.0	0.0	
	64.0	64.0	0.0	
	59.0	59.0	0.0	
	54.0	54.0	0.0	
	49.0	49.0	0.0	
	44.0	44.0	0.0	

Uncertainty: $\pm 0.1 \text{ dB}$



Certificate No. 36604

Page 4 of 4 Pages

6. Toneburst response (4kHz)

UUT	Tone Burst	UUT	Difference	IEC 61672
Setting	Duration(ms)	Reading(dB)	(dB)	Type 1 Spec.
Fast	Steady	127.0(Ref)		
	200	126.0	-1.0	-1.0 ± 0.8 dB
	2	108.9	-18.1	-18.0, +1.3 dB ~ -1.8 dB
	0.25	99.9	-27.1	-27.0, +1.3 dB ~ -3.3 dB
Slow	Steady	127.0(Ref)		
	200	120.2	-6.8	-7.4 ± 0.8 dB
	2	100.6	-26.4	-27.0, +1.3 dB ~ -3.3 dB
Time	Steady	127.0(Ref)		
averaging	200	120.1	-6.9	-7.0±0.8dB
	2	99.5	-27.5	-27.0, +1.3 dB ~ -1.8 dB
	0.25	91.7	-35.3	-36.0 , $+1.3 \text{ dB} \sim -3.3 \text{ dB}$

Uncertainty: ± 0.1 dB

7. Overload indication (130 dB range, A-weighted, Time-average, 4kHz)

UUT Reading at overload (dB)			
+ ve one half cycle	- ve one half cycle	Difference (dB)	IEC 61672 Type 1 Spec.
138.4	138.2	0.2	< 1.8 dB
	+ ve one half cycle	+ ve one half cycle - ve one half cycle	+ ve one half cycle - ve one half cycle Difference (dB)

The overload indicator latched on until reset

Uncertainty: $\pm 0.1 \text{ dB}$

Remarks: 1. UUT: Unit-Under-Test

- 2. The uncertainty claimed is for a confidence probability of not less than 95%.
- 3. Atmospheric Pressure: 996 hPa.
- 4. Preamplifier model: NH-25, S/N: 10553
- 5. Firmware Version: 1.2
- 6. Power Supply Check: OK
- 7. The UUT was adjusted with the laboratory's sound calibrator at the reference sound pressure level before the calibration.

 END	



ALS Technichem (HK) Pty Ltd

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:

MR IVAN LEUNG

CLIENT:

ALS TECHNICHEM (HK) PTY LTD

ADDRESS:

11/F., CHUNG SHUN KNITTING CENTRE,

1-3 WING YIP STREET.

KWAI CHUNG.

N.T., HONG KONG

PROJECT:

WORK ORDER:

HK1324468

LABORATORY:

HONG KONG

DATE RECEIVED: DATE OF ISSUE:

25/10/2013

31/10/2013

COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.

Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal aceptance criteria of ALS will be followed.

Scope of Test:

Turbidity

Description:

Turbidity meter

Brand Name:

HACH

Model No.: Serial No.:

HACH 21000 12010C015757

Equipment No.:

Date of Calibration: 31 October, 2013

NOTES

This is the Final Report and supersedes any preliminary report with this batch number. Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

ISSUING LABORATORY: HONG KONG

Address

ALS Technichem (HK) Pty Ltd

11/F Chung Shun Knitting Centre

1-3 Wing Yip Street

Kwai Chung HONG KONG Phone:

852-2610 1044

Fax:

852-2610 2021

Email:

hongkong@alsglobal.com

Mr. Fung Lim Chee, Richard General Manager

Greater China & Hong Kong

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Page 1 of 2

ADDRESS 11/F, Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, N.T., Hong Kong PHONE +852 2610 1044 FAX +852 2610 2021 ALS TECHNICHEM (HK) PTY LTD Part of the ALS Laboratory Group A Campbell Brothers Limited Company

Life Sciences

www.alsglobal.com

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order:

HK1324468

Date of Issue:

31/10/2013

Client:

ALS TECHNICHEM (HK) PTY LTD



Description:

Turbidity meter

Brand Name:

HACH

Model No.:

HACH 2100Q

Serial No.:

12010C015757

Equipment No.:

--

Date of Calibration:

31 October, 2013

Date of next Calibration:

31 January, 2014

Parameters:

Turbidity

Method Ref: APHA (21st edition), 2130B

Method Ref. AFTIA (21st edition), 2130B				
Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)		
0	0.40	1==		
4	3.93	-1.8		
40	40.5	1.3		
80	79.2	-1.0		
400	399	-0.3		
800	808	1.0		
	Tolerance Limit (±%)	10.0		

Mr. Fung Lim Chee, Richard General Manager -

Greater China & Hong Kong



ALS Technichem (HK) Pty Ltd 11/F, Chung Shun Knitting Centre 1-3 Wing Yip Street

WORK ORDER: HK1334794

HONG KONG

01/12/2013

27/12/2013

Kwai Chung, N.T., Hong Kong

T: +852 2610 1044 F: +852 2610 2021 www.alsglobal.com

LABORATORY:

DATE RECEIVED:

DATE OF ISSUE:

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:

MR THOMAS WONG

CLIENT:

ENOVATIVE ENVIRONMENTAL SERVICE LIMITED

ADDRESS:

RM 3704, SIK MAN HOUSE,

HOMANTIN ESTATE,

KOWLOON, HONG KONG

PROJECT:

COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.

Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

Scope of Test:

Conductivity, Dissolved Oxygen, pH, Salinity and Temperature

Equipment Type:

Multimeter

Brand Name:

YSI

Model No.:

Professional Plus

Serial No.:

09K100735

Equipment No.:

Date of Calibration: 01 December, 2013

NOTES

This is the Final Report and supersedes any preliminary report with this batch number. Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

> Mr. Fung Lim Chee, Rig General Manager -

Greater China & Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order:

HK1334794

Date of Issue:

27/12/2013

Client:

ENOVATIVE ENVIRONMENTAL SERVICE LIMITED



Description:

Multimeter

Brand Name:

YSI

Model No.:

Professional Plus

Serial No.:

09K100735

Equipment No.:

Date of Calibration:

01 December, 2013

Date of next Calibration:

01 March, 2014

Parameters:

Conductivity

Method Ref: APHA (21st edition), 2510B

Method Ref. Al HA (213t cutton), 2310B				
Expected Reading (uS/cm)	Displayed Reading (uS/cm)	Tolerance (%)		
146.9	148.9	1.4		
6667	6326	-5.1		
12890	12227	-5.1		
58670	54000	-8.0		
	Tolerance Limit (±%)	10.0		

Dissolved Oxygen

Method Ref: APHA (21st edition), 45000: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.11	2.20	0.10
3.11	3.30	0.19
5.16	5.36	0.20
8.82	8.82	0.00
	Tolerance Limit (±mg/L)	0.20

pH Value

Method Ref: APHA 21st Ed. 4500H:B

Methou Kel. APRA 213t Eu. 43	ооп.в	
Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.0	4.20	0.20
4.0	4.20 7.16	0.20 0.16
10.0	10.06	0.16
10.0	10.00	0.00
	Tolerance Limit (±pH unit)	0.20

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	
10	10.09	0.9
20	20.01	0.1
30	30.26	0.9
	Tolerance Limit (±%)	10.0

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

Mr. Fung Lim Chee, Richard General Manager -Greater China & Hong Kong

ALS Technichem (HK) Pty Ltd

ALS Environmental

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order:

HK1334794

Date of Issue:

27/12/2013

Client:

ENOVATIVE ENVIRONMENTAL SERVICE LIMITED



Description:

Multimeter

Brand Name:

YSI

Model No.:

Professional Plus 09K100735

Serial No.: Equipment No.:

09

Date of Calibration:

01 December, 2013

Date of next Calibration:

01 March, 2014

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)
9.0	8.4	-0.6
20.0	19.6	-0.4
38.0	38.3	0.3
	Tolerance Limit (±°C)	2.0

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

Mr. Fung Lim Chee, Richard General Manager -

Greater China & Hong Kong