

High-Volume TSP Sampler  
5-Point Calibration Record

Location : AM1 (ICC)  
Calibrated by : K.T.Ho  
Date : 12/08/2017

Sampler

Model : TE-5170  
Serial Number : S/N 0767

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
Service Date : 20 Mar 2017  
Slope (m) : 2.08464  
Intercept (b) : -0.03684  
Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013  
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1007  
Ta(K) : 304

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1	18 holes	10.2	3.153	1.530	58	57.25
2	13 holes	8.4	2.861	1.390	52	51.33
3	10 holes	6.2	2.458	1.197	44	43.43
4	7 holes	4.4	2.071	1.011	36	35.54
5	5 holes	2.6	1.592	0.781	22	21.72

Notes:  $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$ ,  $X = Z/m - b$ ,  $Y(\text{Corrected Flow}) = IC * \{\sqrt{dH(Pa/Pstd)(Tstd/Ta)}\}$

Sampler Calibration Relationship

Slope(m): 46.559                      Intercept(b): -13.169                      Correlation Coefficient(r): 0.9959

Checked by:   
Magnum Fan

Date: 16/08/2017

High-Volume TSP Sampler  
5-Point Calibration Record

Location : AM1(ICC)  
Calibrated by : K.T.Ho  
Date : 12/10/2017

Sampler

Model : TE-5170  
Serial Number : S/N 0767

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
Service Date : 20 Mar 2017  
Slope (m) : 2.08464  
Intercept (b) : -0.03684  
Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013  
Tstd (K) : 298.18

Calibration Condition


Pa (hpa) : 1011  
Ta(K) : 304

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1	18 holes	10.4	3.190	1.548	60	59.35
2	13 holes	8.4	2.867	1.393	53	52.42
3	10 holes	6.1	2.443	1.190	44	43.52
4	7 holes	4.4	2.075	1.013	36	35.61
5	5 holes	2.6	1.595	0.783	22	21.76

Notes:  $Z = \sqrt{\text{dH}(\text{Pa}/\text{Pstd})(\text{Tstd}/\text{Ta})}$ ,  $X = Z/m - b$ ,  $Y(\text{Corrected Flow}) = \text{IC} * \{\sqrt{\text{Pa}/\text{Pstd}}(\text{Tstd}/\text{Ta})\}$

Sampler Calibration Relationship

Slope(m): 48.347                      Intercept(b): -14.767                      Correlation Coefficient(r): 0.9972

Checked by:   
Magnum Fan

Date: 15/10/2017

High-Volume TSP Sampler  
5-Point Calibration Record

Location : AM2A (Harbourside)  
Calibrated by : K.T.Ho  
Date : 12/08/2017

Sampler

Model : TE-5170  
Serial Number : S/N 8919

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
Service Date : 20 Mar 2017  
Slope (m) : 2.08464  
Intercept (b) : -0.03684  
Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013  
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1007  
Ta(K) : 304

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1	18 holes	12.2	3.448	1.672	59	58.24
2	13 holes	9.2	2.994	1.454	52	51.33
3	10 holes	7.2	2.649	1.288	44	43.43
4	7 holes	4.6	2.117	1.033	34	33.56
5	5 holes	2.6	1.592	0.781	24	23.69

Notes:  $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$ ,  $X = Z/m - b$ ,  $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship

Slope(m): 39.424      Intercept(b): -7.058      Correlation Coefficient(r): 0.9990

Checked by:   
Magnum Fan

Date: 16/08/2017

High-Volume TSP Sampler  
5-Point Calibration Record

Location : AM2A (Harbourside)  
Calibrated by : K.T.Ho  
Date : 12/10/2017

Sampler

Model : TE-5170  
Serial Number : S/N 8919

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
Service Date : 20 Mar 2017  
Slope (m) : 2.08464  
Intercept (b) : -0.03684  
Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013  
Tstd (K) : 298.18

Calibration Condition


Pa (hpa) : 1011  
Ta(K) : 304

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1	18 holes	12.2	3.455	1.675	58	57.37
2	13 holes	9.2	3.000	1.457	52	51.43
3	10 holes	7.2	2.654	1.291	44	43.52
4	7 holes	4.6	2.121	1.035	34	33.63
5	5 holes	2.6	1.595	0.783	24	23.74

Notes:  $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$ ,  $X = Z/m - b$ ,  $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship

Slope(m): 38.562      Intercept(b): -6.192      Correlation Coefficient(r): 0.9978

Checked by:   
Magnum Fan

Date: 15/10/2017



TISCH ENVIRONMENTAL, INC.  
 145 SOUTH MIAMI AVE  
 VILLAGE OF CLEVELAND, OH  
 44110  
 513.467.9000  
 877.263.7610 TOLL FREE  
 513.467.9009 FAX

# ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Mar 20, 2017 Rootsmeter S/N 0438320 Ta (K) - 293  
 Operator Tisch Orifice I.D. - 2454 Pa (mm) - 759.46

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.4390	3.2	2.00
2	NA	NA	1.00	1.0240	6.4	4.00
3	NA	NA	1.00	0.9170	7.9	5.00
4	NA	NA	1.00	0.8730	8.8	5.50
5	NA	NA	1.00	0.7200	12.8	8.00

## DATA TABULATION

Vstd	(x axis) Qstd	(y axis)		Va	(x axis) Qa	(y axis)
1.0120	0.7033	1.4257		0.9958	0.6920	0.8784
1.0078	0.9842	2.0163		0.9916	0.9683	1.2423
1.0057	1.0967	2.2543		0.9895	1.0791	1.3889
1.0045	1.1507	2.3643		0.9884	1.1322	1.4567
0.9992	1.3878	2.8514		0.9831	1.3654	1.7568
Qstd slope (m) = 2.08464				Qa slope (m) = 1.30537		
intercept (b) = -0.03684				intercept (b) = -0.02270		
coefficient (r) = 0.99994				coefficient (r) = 0.99994		
y axis = SQRT[H2O(Pa/760) (298/Ta)]				y axis = SQRT[H2O(Ta/Pa)]		

## CALCULATIONS

$$Vstd = \text{Diff. Vol}[(Pa - \text{Diff. Hg})/760] (298/Ta)$$

$$Qstd = Vstd/Time$$

$$Va = \text{Diff Vol} [(Pa - \text{Diff Hg})/Pa]$$

$$Qa = Va/Time$$

For subsequent flow rate calculations:

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

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

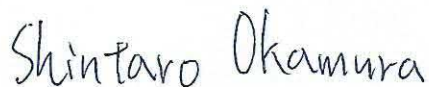
**CALIBRATION CERTIFICATE**

Date: December 21, 2016

Equipment Name	: Digital Dust Indicator, Model LD-3B
Code No.	: 080000-42
Quantity	: 1 unit
Serial No.	: 276020
Sensitivity	: 0.001 mg/m <sup>3</sup>
Sensitivity Adjustment	: 787CPM
Scale Setting	: December 16, 2016

We hereby certify that the above mentioned instrument has been calibrated satisfactorily.

Sincerely

**SIBATA SCIENTIFIC TECHNOLOGY LTD.**

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
Shintaro Okamura

Overseas Sales Division

# TEST CERTIFICATE

Report No. 16-1879-1.

CUSTOMER : INNOTECH INSTRUMENTATION CO. LTD.



SIBATA SCIENTIFIC TECHNOLOGY LTD.

DATE 19/ December /2016

APPROVE BY	VERIFIED BY	ISSUED BY

PRODUCT NAME	:	Digital Dust Indicator
MODEL NUMBER	:	LD-3B
SERIAL NUMBER	:	276020
CALIBRATION DATE	:	16- December -2016

Testing Category	Judging Standard	Judgment			
Function Test	Switch, Display, Wiring will nomally function	OK			
Sensitivity Calibration	Count is $\pm 2\%$ accurate to the master by the standard calibration particle	Reading of Master	Reading of this Instrument	Correction	Inspection chart  Reference Value(S)  787 CPM
		799 CPM	795 CPM	-0.5 %	
		2053 CPM	1979 CPM	-3.6 %	
Dust Concentration Measuring	Count is $\pm 10\%$ accurate to the master under the 3 different concentration.	978 CPM	957 CPM	-2.1 %	Test atmosphere
Reproducibility	The difference between maximum and minimum value of sensitivity adjustment scale setting must be 5.0 % or less of maximum value. (The results of measurement of sensitivity adjustment in 5 times are within this range.)	516 CPM	507 CPM	-1.7 %	
		OK			
		Temperature Humidity			
		23 °C	45 %		
	Synthetic Judgment	Good			





## REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

REPORT NO. : HK1710039  
 PROJECT NAME : PERFORMANCE CHECK / CALIBRATION OF DUST METER  
 DATE OF ISSUE : 17/01/2017

CUSTOMER : Envirotech Services Company  
 ADDRESS : Rm. 113, 1/F., MY LOFT, 9 HOI WING ROAD, TUEN MUN, N.T.

REPORT NO. : HK1710039  
 PROJECT ITEM NO. : HK1710039-01  
 PERFORMANCE CHECK / CALIBRATED EQUIPMENT  
 TYPE : Digital Dust Indicator  
 MANUFACTURER : SIBATA  
 MODEL NO. : LD-3B  
 SERIAL NO. : 276020  
 EQUIPMENT NO. : ---  
 RECEIPT DATE : 11/01/2017  
 PERFORMANCE CHECK / CALIBRATION DATE : 12/01/2017

## PERFORMANCE CHECK / CALIBRATION Information

CODE	Calibration Parameter	Method Procedure	Reference Method
Dust PC/CAL	Performance Check / Calibration of Dust Meter	CAL003	General Technical Requirements of Environmental Monitoring, Environmental Monitoring & Audit Guidelines for Development Projects in HK

- Notes : 1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.  
 2. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Approved Signatory

Wong Po Yan Pauline  
 (Testing Engineer)

Issue Date: 17/01/2017





## REPORT OF PERFORMANCE CHECK / CALIBRATION

PROJECT NAME : PERFORMANCE CHECK / CALIBRATION OF DUST METER  
 DATE OF ISSUE : 17/01/2017  
 REPORT NO. : HK1710039

## PERFORMANCE CHECK / CALIBRATED EQUIPMENT

TYPE : Digital Dust Indicator  
 MANUFACTURER : SIBATA  
 MODEL NO. : LD-3B  
 SERIAL NO. : 276020  
 EQUIPMENT NO. : ---  
 SENSITIVITY ADJUSTMENT : ---  
 PERFORMANCE CHECK / CALIBRATION DATE : 12/01/2017

## STANDARD EQUIPMENT

TYPE : HIGH VOLUME AIR SAMPLER  
 MANUFACTURER : TISCH  
 MODEL NO. : TE-5170  
 EQUIPMENT REF NO. : PTL\_HV002  
 LAST CALIBRATION DATE : 23/11/2016

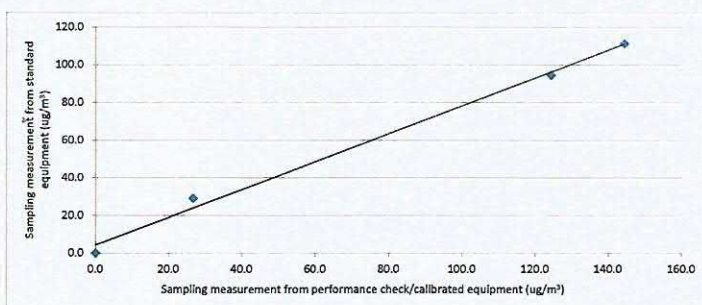
## EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Sensitivity Adjustment Scale Setting (Before Performance check / Calibration): 787 CPM  
 Sensitivity Adjustment Scale Setting (After Performance check / Calibration): 787 CPM

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Total Count <sup>2</sup> (Performance Check / Calibrated equipment)	Concentration in Count/Minute <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
Zero Check <sup>1</sup>	12/01/2017, 10:00:00 AM	19	1016	0	0	0
1	12/01/2017, 11:10:00 AM	19	1016	95	7462	124
2	12/01/2017, 2:30:00 PM	19	1016	111	8670	145
3	12/01/2017, 3:34:00 PM	19	1016	29	1600	27

## Linear Regression of Y on X

Slope (K- factor) : 0.7  
 Correlation Coefficient : 0.9972  
 Validity of Performance Check / Calibration Record : 12/01/2018



- Notes : 1. Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.  
 2. Total Count was measured by Digital Dust Indicator.  
 3. Count/minute was calculated by (Total Count/60)  
 4. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.  
 5. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator: MA Ching Him, Jackey Signature: [Signature] Date: 12/01/2017

Checked by: Wong Po Yan, Pauline Signature: [Signature] Date: 17/01/2017

## **CALIBRATION CERTIFICATE**

Date: December 21, 2016

Equipment Name	: Digital Dust Indicator, Model LD-3B
Code No.	: 080000-42
Quantity	: 1 unit
Serial No.	: 2Z6240
Sensitivity	: 0.001 mg/m <sup>3</sup>
Sensitivity Adjustment	: 565CPM
Scale Setting	: December 16, 2016

We hereby certify that the above mentioned instrument has been calibrated satisfactorily.

Sincerely

**SIBATA SCIENTIFIC TECHNOLOGY LTD.**

Shintaro Okamura

Shintaro Okamura

Overseas Sales Division



# TEST CERTIFICATE

CUSTOMER : INNOTECH INSTRUMENTATION CO.LTD.

Report No. 16-1879-2



SIBATA SCIENTIFIC TECHNOLOGY LTD.

DATE 19/ December /2016

APPROVE BY 	VERIFIED BY 	ISSUED BY 
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PRODUCT NAME	: Digital Dust Indicator
MODEL NUMBER	: LD-3B
SERIAL NUMBER	: 2Z6240
CALIBRATION DATE	: 16-- December --2016

Testing Category Function Test	Judging Standard	Judgment		
		Reading of Master	Reading of this Instrument	Correction
Sensitivity Calibration	Switch, Display, Wiring will nomally function Count is $\pm 2\%$ accurate to the master by the standard calibration particle	798 CPM	796 CPM	$-0.3\%$
Dust Concentration Measuring	Count is $\pm 10\%$ accurate to the master under the 3 different concentration.	2053 CPM	1989 CPM	$-3.1\%$
		978 CPM	966 CPM	$-1.2\%$
		516 CPM	515 CPM	$-0.2\%$
Reproducibility	The difference between maximum and minimum value of sensitivity adjustment scale setting must be 5.0 % or less of maximum value. (The results of measurement of sensitivity adjustment in 5 times are within this range.)	OK		
Synthetic Judgment		Good		
		Inspection chart		
		Reference Value(S)		
		565 CPM		
		Test atmosphere		
		Temperature	Humidity	
		23 °C	45 %	



## REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

REPORT NO. : HK1710040  
 PROJECT NAME : PERFORMANCE CHECK / CALIBRATION OF DUST METER  
 DATE OF ISSUE : 17/01/2017

CUSTOMER : Envirotech Services Company  
 ADDRESS : Rm. 113, 1/F., MY LOFT, 9 HOI WING ROAD, TUEN MUN, N.T.

REPORT NO. : HK1710040  
 PROJECT ITEM NO. : HK1710040-01  
 PERFORMANCE CHECK / CALIBRATED EQUIPMENT  
 TYPE : Digital Dust Indicator  
 MANUFACTURER : SIBATA  
 MODEL NO. : LD-3B  
 SERIAL NO. : 2Z6240  
 EQUIPMENT NO. : ---  
 RECEIPT DATE : 11/01/2017  
 PERFORMANCE CHECK / CALIBRATION DATE : 12/01/2017

## PERFORMANCE CHECK / CALIBRATION Information

CODE	Calibration Parameter	Method Procedure	Reference Method
Dust PC/CAL	Performance Check / Calibration of Dust Meter	CAL003	General Technical Requirements of Environmental Monitoring, Environmental Monitoring & Audit Guidelines for Development Projects in HK

- Notes : 1. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.  
 2. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Approved Signatory

:

Issue Date:

17/01/2017

Wong Po Yan Pauline  
 (Testing Engineer)





## REPORT OF PERFORMANCE CHECK / CALIBRATION

PROJECT NAME : PERFORMANCE CHECK / CALIBRATION OF DUST METER  
 DATE OF ISSUE : 17/01/2017  
 REPORT NO. : HK1710040

## PERFORMANCE CHECK / CALIBRATED EQUIPMENT

TYPE : Digital Dust Indicator  
 MANUFACTURER : SIBATA  
 MODEL NO. : LD-3B  
 SERIAL NO. : 2Z6240  
 EQUIPMENT NO. : ---  
 SENSITIVITY ADJUSTMENT : ---  
 PERFORMANCE CHECK / CALIBRATION DATE : 12/01/2017

## STANDARD EQUIPMENT

TYPE : HIGH VOLUME AIR SAMPLER  
 MANUFACTURER : TISCH  
 MODEL NO. : TE-5170  
 EQUIPMENT REF NO. : PTL\_HV002  
 LAST CALIBRATION DATE : 23/11/2016

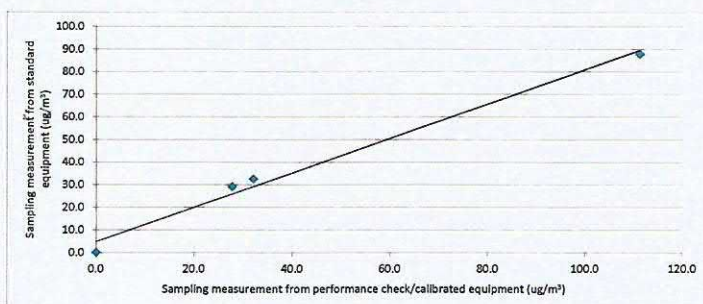
## EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Sensitivity Adjustment Scale Setting (Before Performance check / Calibration): 565 CPM  
 Sensitivity Adjustment Scale Setting (After Performance check / Calibration): 565 CPM

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m <sup>3</sup> (Standard equipment) (Y - Axis)	Total Count <sup>2</sup> (Performance Check / Calibrated equipment)	Concentration in Count/Minute <sup>3</sup> (Performance Check / Calibrated equipment) (X - Axis)
Zero Check <sup>1</sup>	12/01/2017, 10:00:00 AM	19	1016	0	0	0
1	12/01/2017, 12:15:00 PM	19	1016	88	6680	111
2	12/01/2017, 1:25:00 PM	19	1016	33	1924	32
3	12/01/2017, 3:34:00 PM	19	1016	29	1664	28

## Linear Regression of Y on X

Slope (K- factor) : 0.8  
 Correlation Coefficient : 0.9940  
 Validity of Performance Check / Calibration Record : 12/01/2018



- Notes : 1. Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.  
 2. Total Count was measured by Digital Dust Indicator.  
 3. Count/minute was calculated by (Total Count/60)  
 4. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.  
 5. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator: MA Ching Him, Jackey Signature: Date: 12/01/2017

Checked by: Wong Po Yan, Pauline Signature: Date: 17/01/2017



# Certificate of Calibration

## 校正證書

Certificate No. : C174093

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-1613)

Date of Receipt / 收件日期 : 11 July 2017

Description / 儀器名稱 : Precision Integrating Sound Level Meter  
Manufacturer / 製造商 : Rion  
Model No. / 型號 : NL-18  
Serial No. / 編號 : 00360030  
Supplied By / 委託者 : Envirotech Services Co.  
Room 113, 1/F, My Loft, 9 Hoi Wing Road, Tuen Mun,  
New Territories, Hong Kong

### TEST CONDITIONS / 測試條件

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$   
Line Voltage / 電壓 : ---

Relative Humidity / 相對濕度 :  $(55 \pm 20)\%$

### TEST SPECIFICATIONS / 測試規範

Calibration

DATE OF TEST / 測試日期 : 22 July 2017

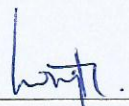
### TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.  
The results do not exceed manufacturer's specification. (after adjustment)  
The results are detailed in the subsequent page(s).

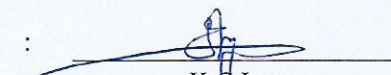
The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By  
測試

  
H T Wong  
Technical Officer

Certified By  
核證

  
K C Lee  
Engineer

Date of Issue  
簽發日期

24 July 2017

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗所書面批准。



# Certificate of Calibration

## 校正證書

Certificate No. : C174093  
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- Self-calibration using the internal standard (After Adjustment) was performed before the test from 6.1.1.2 to 6.4.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C170048
CL281	Multifunction Acoustic Calibrator	PA160023

- Test procedure : MA101N.

- Results :

### 6.1 Sound Pressure Level

#### 6.1.1 Reference Sound Pressure Level

##### 6.1.1.1 Before Adjustment

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	* 92.9	± 0.7

\* Out of IEC 60651 Type 1 Spec.

##### 6.1.1.2 After Adjustment

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	94.1	± 0.7

##### 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
60 - 120	LA	A	Fast	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。

Sun Creation Engineering Limited Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

輝創工程有限公司 - 校正及檢測實驗室

c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel 電話: 2927 2606

Fax 傳真: 2744 8986

E-mail 電郵: callab@suncreation.com

Website 網址: www.suncreation.com



# Certificate of Calibration

## 校正證書

Certificate No. : C174093  
證書編號

### 6.2 Time Weighting

#### 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	94.1	Ref.
			Slow			94.0	$\pm 0.1$

#### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
50 -110	LA	A	Fast	106.00	Continuous	106.0	Ref.
	LAmx				200 ms	105.1	-1.0 ± 1.0
	LA	Slow	Continuous		106.0	Ref.	
	LAmx		500 ms		102.4	-4.1 ± 1.0	

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LA	A	Fast	94.00	31.5 Hz	54.5	$-39.4 \pm 1.5$
					63 Hz	67.7	$-26.2 \pm 1.5$
					125 Hz	77.7	$-16.1 \pm 1.0$
					250 Hz	85.3	$-8.6 \pm 1.0$
					500 Hz	90.7	$-3.2 \pm 1.0$
					1 kHz	94.1	Ref.
					2 kHz	95.4	$+1.2 \pm 1.0$
					4 kHz	95.1	$+1.0 \pm 1.0$
					8 kHz	93.0	$-1.1 (+1.5 ; -3.0)$
					12.5 kHz	89.8	$-4.3 (+3.0 ; -6.0)$

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LC	C	Fast	94.00	31.5 Hz	90.9	-3.0 ± 1.5
					63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.1	0.0 ± 1.0
					500 Hz	94.2	0.0 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	94.0	-0.2 ± 1.0
					4 kHz	93.3	-0.8 ± 1.0
					8 kHz	91.1	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.8	-6.2 (+3.0 ; -6.0)

### 6.4 Time Averaging

UUT Setting				Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Integrating Time	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
50 - 110	LAeq	A	10 sec.	4	1	1/10	110	100	100.1	± 0.5
						1/10 <sup>2</sup>		90	90.1	± 0.5
			60 sec.			1/10 <sup>3</sup>		80	79.5	± 1.0
			5 min.			1/10 <sup>4</sup>		70	69.8	± 1.0

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# Certificate of Calibration

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Certificate No. : C174093

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Remarks : - UUT Microphone Model No. : UC-53A & S/N : 307435

- Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value : 94 dB : 31.5 Hz - 125 Hz :  $\pm 0.35$  dB  
250 Hz - 500 Hz :  $\pm 0.30$  dB  
1 kHz :  $\pm 0.20$  dB  
2 kHz - 4 kHz :  $\pm 0.35$  dB  
8 kHz :  $\pm 0.45$  dB  
12.5 kHz :  $\pm 0.70$  dB  
104 dB : 1 kHz :  $\pm 0.10$  dB (Ref. 94 dB)  
114 dB : 1 kHz :  $\pm 0.10$  dB (Ref. 94 dB)  
Burst equivalent level :  $\pm 0.2$  dB (Ref. 110 dB  
continuous sound level)

- The uncertainties are for a confidence probability of not less than 95 %.

### Note :

Only the original copy or the laboratory's certified true copy is valid.

The values given in this 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 environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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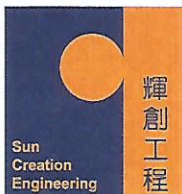
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輝創工程有限公司

Sun Creation Engineering Limited

Calibration and Testing Laboratory

# Certificate of Calibration

## 校正證書

Certificate No. : C171447

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-0633) Date of Receipt / 收件日期 : 16 March 2017

Description / 儀器名稱 : Sound Level Calibrator  
Manufacturer / 製造商 : Rion  
Model No. / 型號 : NC-73  
Serial No. / 編號 : 10486660  
Supplied By / 委託者 : Envirotech Services Co.  
Room 113, 1/F, My Loft, 9 Hoi Wing Road, Tuen Mun,  
New Territories, Hong Kong

### TEST CONDITIONS / 測試條件

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$

Relative Humidity / 相對濕度 :  $(55 \pm 20)\%$

Line Voltage / 電壓 : ---

### TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 17 March 2017

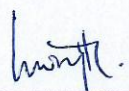
### TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.  
The results do not exceed manufacturer's specification.  
The results are detailed in the subsequent page(s).


The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By :  
測試

  
H T Wong  
Technical Officer

Certified By :  
核證

  
K C Lee  
Project Engineer

Date of Issue : 23 March 2017  
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

## 校正證書

Certificate No. : C171447

證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C163709
CL281	Multifunction Acoustic Calibrator	PA160023
TST150A	Measuring Amplifier	C161175

- Test procedure : MA100N.

- Results :

### 5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	93.6	$\pm 0.5$	$\pm 0.2$

### 5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	0.987	1 kHz $\pm 2\%$	$\pm 1$

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :

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