

1600 Washington Blvd Grants Pass, OR 97526 (541) 471-7111 (541) 471-7116 (Fax) Service@metone.com

Calibration Certificate

The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ASTM and JIS.

Recommended calibration interval is 12 months from the first day of use.

Instrument Model#	Aer	ocet 83	1	Instrument Serial	# W1401	6
Date of Calibration	4/19	/2018		438	Sensor #	16206
Darleen Best	ATT			4 21		
Calibration Technic	cian			Quality Check		
Temp	erature	23	°c	Relative Humidity	31	%

Test Procedure: Aerocet 831-6100

PSL Size (µm)	Test Results	Test Spec.	Lot# NIST	Expiration
0.3	Pass	± 10%	183039	03/31/2020
0.5	Pass	± 10%	180556	02/28/2020
1.0	Pass	± 10%	169240	5/31/2019
2.5	Pass	± 10%	181944	3/31/2020
4.0	Pass	± 10%	REF	NA
5.0	Pass	± 10%	REF	NA
7.0	Pass	± 10%	REF	NA
10.0	Pass	± 10%	REF	NA

Standards	Model	SN	Cal Due
Particle Counter	GT-526	M1762	7/31/2018
Flowmeter	DCL-M	103751	1/29/2019
DMM	289	27720071	6/15/2018
RH/TEMP SENSOR	083E-1-6	R20313	9/18/2018

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Instruments

1600 Washington Blvd Grants Pass, OR 97526 (541) 471-7111 (541) 471-7116 (Fax) Service@metone.com

Calibration Certificate

Relative Humidity 38

The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.

Recommended calibration interval is 12 months from the first day of use.

Instrument Model#	Aerocet 83	31	Instrument Serial#	W15448
Date of Calibration	6/14/2018		Con	Sensor # 16438
Darleen Best	17		2522	
Calibration Technici	an		Quality Check	•
Temper	rature 23.5	°C	Relative Humidity 3	8 %

Test Procedure: Aerocet 831-6100

PSL Size (µm)	Test Results	Test Spec.	Lot# NIST	Expiration
0.3	Pass	± 10%	183039	03/31/2020
0.5	Pass	± 10%	180556	02/28/2020
1.0	Pass	± 10%	169240	5/31/2019
2.5	Pass	± 10%	REF	NA
4.0	Pass	± 10%	REF	NA
5.0	Pass	± 10%	REF	NA
7.0	Pass	± 10%	REF	ŇA
10.0	Pass	± 10%	REF	NA

Standards	Model	SN	Cal Due
Particle Counter	GT-526	M1762	7/31/2018
Flowmeter	DCL-M	103751	1/29/2019
DMM	289	27720071	6/15/2018
RH/TEMP SENSOR	083E-1-6	R20313	9/18/2018

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Calibration Certificate

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	mended calibration in	terval is 12 mor	ths fro	m the f	irst day of use.	
nstrum	ent Model# Aeroo	cet 831			Instrument Se	rial# W15449
Date of	Calibration 10/4/2	018				Sensor # 16439
Darle	en Best				A 25	
	tion Technician			Qual	lity Check	
	Temperature	23 ⁰ C			Relative Humidit	y <u>36.5</u> %
Cest Pro	ocedure: Aerocet	831-6100				
	PSL Size (µm)	Test Results	Test	Spec.	Lot# NIST	Expiration
	0.3	Pass	± 1	10%	183039	03/31/2020
	0.5	Pass	± 1	10%	180556	02/28/2020
	1.0	Pass	± 1	10%	169240	5/31/2019
	2.5	Pass	± 1	10%	REF	NA
	4.0	Pass	± 1	10%	REF	NA
	5.0	Pass	± 1	10%	REF	NA
	7.0	Pass	± 1	10%	REF	NA
	10.0	Pass	± 1	10%	REF	NA
Γ	Standards	Standards Model			SN	Cal Due
	Particle Counter	GT-526			M1760	10/9/2018
Г	Flowmeter	DCL-M			103751	1/29/2019
	DMM	289 083E-1-6		27720071 R20313		6/29/2019
	Binin					

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cument Aerocet 831-9600 Rev A



1600 Washington Blvd Grants Pass, OR 97526 (541) 471-7111 (541) 471-7116 (Fax) Service@metone.com

The calibration results on this report certify that this instrument complies with the product specifications at the time of calibration. Calibration was performed according to accepted industry methods using equipment, procedures, and standards that are traceable to NIST and ISO.

trument	Model# Aeroc	cet 831	Instrument Serial# W16848				
te of Calibration 8/3/2018				A 25	Sensor # 16574		
arleen	Best A			A] 25			
	n Technician		Qua	lity Check			
	Temperature	23.5 ⁰ C		Relative Humidit	ty 41 %		
st Proced	lure: Aerocet	831-6100					
	PSL Size (µm)	Test Results	Test Spec.	Lot# NIST	Expiration		
	0.3	Pass	± 10%	183039	03/31/2020		
-	0.5	Pass	± 10%	180556	02/28/2020		
	1.0	Pass	± 10%	169240	5/31/2019		
9	2.5	Pass	± 10%	REF	NA		
	4.0	Pass	± 10%	REF	NA		
	5.0	Pass	± 10%	REF	NA		
	7.0	Pass	± 10%	REF	NA		
	10.0	Pass	± 10%	REF	NA		
· · ·							
	Standards	Model		SN	Cal Due		
	Particle Counter	GT-526		M1760	10/9/2018		
	Flowmeter DCL-			103751	1/29/2019		
	Flowmeter			32270055	9/21/2018		
	Flowmeter DMM	289		32270055	9/21/2018		

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cument Aerocet 831-9600 Rev A

	1-7111 Fax (541	cate o	of Co 2T-645 ulate Monitor	alibra	tion
Recom	mended cali	bration inter	val is 24 m	onths from firs	st day of use.
Unit Info	Model:	BT-645	81865-1 F	irmware Rev:	1.1.0
		¥/10205			
Serial	Number:	X19295	-		1.0.1
Calibra	ated By:	R. von Krohn		Cal. Date:	7/27/2018
	-	A	~		7 ma sold
Qualit	y Inspector: _	Klan		_ Date: _	7-27-2018
Calibration	Hz/μg/m ³ :	5.9	-	and descent to the second second	
Final Test	Hz/μg/m ³ :	С.,	- Aml	oient T (C) <u>24.8</u> RH, % <u>39</u>	9
Final Test		'S	- Aml		9
Final Test	v (2.0 L/M): Pas	'S	- Aml Standard Conc:	RH, %39	
Final Test Flow Serial Commun	v (2.0 L/M): Pas nication: Pas onc.: <u>400.</u>	'S		RH, %39	
Final Test Flow Serial Commun BT-645 Co	v (2.0 L/M): Pas nication: Pas onc.: <u>400.</u>	s 12		RH, %39	
Final Test Flow Serial Commun BT-645 Co Calibration Standard Standards DMM Multimeter	v (2.0 L/M): Pas nication: Pas onc.: <u>400.</u> ds Manufactu Fluke	s s <u>12</u> Jrer <u>N</u> 189	Standard Conc: Model	RH, % 39	7 Cal Due 8/28/2018
Final Test Flow Serial Commun BT-645 Co Calibration Standard Standards DMM Multimeter RH &TEMPERATURE	v (2.0 L/M): Pas nication: Pas onc.: <u>400.</u> ds Manufactu Fluke Met One Instrur	ss ss <u>12</u> Jrer <u>N</u> 189 ments 08	Standard Conc: Model Multimeter 3E-1-35	RH, % 39 399.6 SN 94060816 R17149	7 Cal Due 8/28/2018 July 28, 2018
Final Test Flow Serial Commun BT-645 Co Calibration Standard Standards	v (2.0 L/M): Pas nication: Pas onc.: <u>400.</u> ds Manufactu Fluke	ss ss <u>12</u> Jrer <u>N</u> 189 ments 08	Standard Conc: Model	RH, %399.6 399.6 	7 Cal Due 8/28/2018
Final Test Flow Serial Commun BT-645 Co Calibration Standard Standards DMM Multimeter RH &TEMPERATURE BAROMETRIC	v (2.0 L/M): Pas nication: Pas onc.: <u>400.</u> ds Manufactu Fluke Met One Instrur	ss ss <u>12</u> Jrer N 189 ments 08 ments 08	Standard Conc: Model Multimeter 3E-1-35	RH, % 39 399.6 SN 94060816 R17149	7 Cal Due 8/28/2018 July 28, 2018

Document No. BT-645-9600, Rev A

С	ertifica	te of Ca BT-645 Particulate Monitor	librati	on
Recom	mended calibration	n interval is 24 mont	ths from first da	y of use.
Unit Info	Model: BT-		ware Rev:	1.1.0
Serial	Number: X19	296		1.0.1
Calibra	ated By: <i>R. von</i>	Krohn	Cal. Date: 7/	/27/2018
	ty Inspector:/ Hz/μg/m ³ :6.	7h-	Date: 7	27-2018
Final Test				
	w (2.0 L/M): Pass		t T (C) <u>24.8</u>	
			t T (C) <u>24.8</u> RH, % <u>39</u>	
Flov Serial Commu				
Flov Serial Commu	nication: Pass		RH, % <u>39</u>	
Flov Serial Commu BT-645 Co	nication: Pass		RH, % <u>39</u>	Cal Due
Flow Serial Commu BT-645 Co Calibration Standar Standards	nication: Pass onc.: <u>416.59</u>	Standard Conc:	RH, % <u>39</u> <u>412.22</u>	Cal Due 8/28/2018
Flov Serial Commu BT-645 Cc Calibration Standar Standards DMM Multimeter RH &TEMPERATURE	nication: Pass onc.: <u>416.59</u> rds Manufacturer Fluke Met One Instruments	Standard Conc: Model 189 Multimeter 083E-1-35	RH, % <u>39</u> 412.22 SN	
Flov Serial Commu BT-645 Cc Calibration Standar Standards DMM Multimeter RH &TEMPERATURE BAROMETRIC	nication: Pass onc.: <u>416.59</u> rds Manufacturer Fluke	Standard Conc: Model 189 Multimeter	RH, % <u>39</u> <u>412.22</u> <u>SN</u> 94060816	8/28/2018
Flov Serial Commu BT-645 Co Calibration Standar	nication: Pass onc.: <u>416.59</u> rds Manufacturer Fluke Met One Instruments	Standard Conc: Model 189 Multimeter 083E-1-35	RH, % <u>39</u> <u>412.22</u> <u>SN</u> 94060816 R17149	8/28/2018 July 28, 2018
Flov Serial Commu BT-645 Co Calibration Standar Standards DMM Multimeter RH &TEMPERATURE BAROMETRIC PRESSURE	nication: Pass onc.: <u>416.59</u> rds Manufacturer Fluke Met One Instruments Met One Instruments	Standard Conc: Model 189 Multimeter 083E-1-35 092	RH, % <u>39</u> <u>412.22</u> <u>SN</u> 94060816 R17149 P22757	8/28/2018 July 28, 2018 April 2, 2019

Document No. BT-645-9600, Rev A

C	ertifi	_	OJ Co 2T-645 ulate Monitor		tion
Recom	mended calil	bration inter	val is 24 m	onths from firs	st day of use.
Unit Info	Model:	BT-645	81865-1 F	irmware Rev:	1.1.0
~ • •		XX10207	2		101
Serial	Number:	X19297	-	-	1.0.1
Calibra	ated By:	R. von Krohn		Cal. Date:	7/27/2018
	-	14			7-27-2018
Qualit	ty Inspector:	R' m		Date:	+-C+-CAIN
Calibration	$H_{z/ua/m^3}$.	5.8			
	Hz/μg/m ³ :	5.8	-		
Final Test			- 		
Final Test	w (2.0 L/M): Pas		- Am	bient T (C) _ 24.8	
Final Test	w (2.0 L/M): Pas	S S	- Am Standard Conc	bient T (C) <u>24.8</u> RH, % <u>39</u>	9
Final Test Flow Serial Commu	w (2.0 L/M): Pas inication: Pas onc.: <u>421.</u>	S S		bient T (C) <u>24.8</u> RH, % <u>39</u>	9
Final Test Flow Serial Commu BT-645 Co Calibration Standar Standards	w (2.0 L/M): Pas unication: Pas onc.: <u>421.</u> rds Manufactu	s s 14 urer	Standard Conc	bient T (C) <u>24.8</u> RH, % <u>39</u> : <u>413.04</u> SN	9 4 Cal Due
Final Test Flow Serial Commu BT-645 Co Calibration Standar Standards DMM Multimeter	w (2.0 L/M): Pas unication: Pas onc.: <u>421.</u> rds Manufactu Fluke	s s <u>14</u> urer 189	Standard Conc Model Multimeter	bient T (C) <u>24.8</u> RH, % <u>39</u> : <u>413.04</u> SN 94060816	9 4 Cal Due 8/28/2018
Final Test Flow Serial Commu BT-645 Co Calibration Standar Standards DMM Multimeter RH &TEMPERATURE	w (2.0 L/M): Pas unication: Pas onc.: <u>421.</u> rds Manufactu Fluke Met One Instrur	s s <u>14</u> 	Standard Conc Model Multimeter 33E-1-35	bient T (C) <u>24.8</u> RH, % <u>39</u> : <u>413.04</u> : <u>8N</u> 94060816 R17149	9 4 Cal Due 8/28/2018 July 28, 2018
Final Test Flow Serial Commu BT-645 Co Calibration Standar Standards DMM Multimeter RH &TEMPERATURE BAROMETRIC PRESSURE	w (2.0 L/M): Pas unication: Pas onc.: <u>421.</u> rds <u>Manufactu</u> Fluke Met One Instrur Met One Instrur	S S 14 Urer N 189 ments 08 ments 08	Standard Conc Model Multimeter 33E-1-35 092	bient T (C) <u>24.8</u> RH, % <u>39</u> : <u>413.04</u> : <u>413.04</u> SN 94060816 R17149 P22757	9 4 Cal Due 8/28/2018 July 28, 2018 April 2, 2019
Final Test Flow Serial Commu BT-645 Co Calibration Standar	w (2.0 L/M): Pas unication: Pas onc.: <u>421.</u> rds Manufactu Fluke Met One Instrur	S S 14 	Standard Conc Model Multimeter 33E-1-35	bient T (C) <u>24.8</u> RH, % <u>39</u> : <u>413.04</u> : <u>8N</u> 94060816 R17149	9 4 Cal Due 8/28/2018 July 28, 2018

Document No. BT-645-9600, Rev A

	u ments, Inc. hington Blvd, Grants Pa 7111 Fax (541) 471-7 ⁻			
C_{c}	ertifica	te of Co BT-645 Particulate Monitor	alibratio	on
Recom	mended calibration	n interval is 24 me	onths from first day	of use.
Unit Info	Model: <u>BT-</u>	645 81865-1 F	irmware Rev:	1.1.0
Serial I	Number:	298		1.0.1
Calibra	tod By: D	K	Cal. Date: 7/2	27/2018
Cambra	ted By: <u><i>R. von</i></u>	Kronn		
Quality	Inspector:	h	Date: 7-	27-2018
Calibration	Hz/μg/m ³ : 7.	7		
Cambration	Π <i>μ</i> g/m ·/.	/		
Final Test				
Flow	(2.0 L/M): Pass	Aml	bient T (C) _24.8	
			RH, % 39	
Serial Commun	ication: Pass			
BT-645 Cor	nc.: <u>413.48</u>	Standard Conc:	412.22	
Calibration Standard	Is			
Standards	Manufacturer	Model	SN	Cal Due
DMM Multimeter RH &TEMPERATURE	Fluke Met One Instruments	189 Multimeter 083E-1-35	94060816 R17149	8/28/2018 July 28, 2018
BAROMETRIC	Met One Instruments	092	P22757	April 2, 2019
PRESSURE Primary Flow Meter	BIOS	DC-Lite	R537	May 29, 2019
LD-3B	SIBATA	LD-3B	6X7759	Nov 17, 2018
		alate da la la de la la la la composición de la		
standards are on recor	rd and traceable to NIS struments are calibrated	T to the extent allowed	or greater than the inst ed by the institute's calit urer's published specific	oration facility. Unless



EQUIPMENT REF NO.

LAST CALIBRATION DATE

REPORT OF PERFORMANCE CHECK / CALIBRA PROJECT NAME DATE OF ISSUE REPORT NO.	ION : PERFORMANCE CHECK / CALIBRATION OF DUST METE : 13/5/2018 : HK1810447	ĒR
PERFORMANCE CHECK / CALIBRATED EQUIPM	INT	
TYPE	: AEROSOL MASS MONITOR	
MANUFACTURER	: MET ONE INSTRUMENTS	
MODEL NO.	: AEROCET - 831	
SERIAL NO.	: W14016	
EQUIPMENT NO.		
PERFORMANCE CHECK / CALIBRATION DATE	: 11/5/2018	
STANDARD EQUIPMENT	:	
TYPE	: HIGH VOLUME AIR SAMPLER	
MANUFACTURER	: TISCH	
MODEL NO.	: TE-5170	

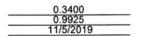
PTL_HV002

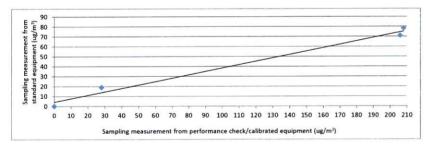
27/4/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Concentration in ug/m ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	11/5/2018,9:00:00 AM	24	1014	0	0
1	11/5/2018,10:05:00 AM	24	1014	78	208
2	11/5/2018,11:29:00 AM	24	1014	71	206
3	11/5/2018,12:35:00 AM	24	1014	19	28

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record





Notes: 1.

Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.

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Performance Check / Calibration result relates to performance check / calibration item(s) as received. 3.

Operator:	MA Ching Him, Jackey	Signature:	2944	Date:	11/5/2018
Checked by:	Wong Po Yan, Pauline	Signature:	Dont	Date:	13/5/2018

mulululu

LAST CALIBRATION DATE

REPORT OF PERFORMANCE CHECK / CALIBRATION

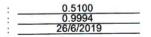
PROJECT NAME DATE OF ISSUE REPORT NO.	:	PERFORMANCE CHECK / CALIBRATION OF DUST METER 27/6/2018 HK1810626
PERFORMANCE CHECK / CALIBRATED EQUIPM	AEN	т
TYPE	:	AEROSOL MASS MONITOR
MANUFACTURER	:	MET ONE INSTRUMENTS
MODEL NO.	:	AEROCET - 831
SERIAL NO.	:	W15448
EQUIPMENT NO.	:	
PERFORMANCE CHECK / CALIBRATION DATE	:	26/6/2018
STANDARD EQUIPMENT	:	
TYPE	:	HIGH VOLUME AIR SAMPLER
MANUFACTURER	:	TISCH
MODEL NO.	:	TE-5170
EQUIPMENT REF NO.	:	PTL_HV002
전 그 것 가 잘 하는 것 같아요. 것 같아요. 것 같아요. 것 같아요. 이 같은 것 같아요. 같아요. 아이는 것 같아요. 아이는 것 같아요. 아이는 것 같아요. 아이는 것 같아요. 한 것 같아요. 한 것 같아요. 아이는 것 않는 것 같아요. 아이는 것 않는 것 같아요. 아이는 것 않는 것 않는 것 같아요. 아이는 것 않는 것 같아요. 아이는 것 않는 것		

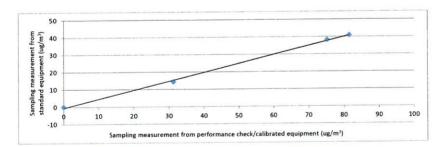
27/4/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Concentration in ug/m ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	26/6/2018,8:15:00 AM	29.2	1011	0	0
1	26/6/2018,9:59:00 AM	29.2	1011	38	75
2	26/6/2018,11:06:00 AM	29.2	1011	41	82
3	26/6/2018,12:11:00 PM	29.2	1011	14	31

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record





Notes : 1.

Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.

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Performance Check / Calibration result relates to performance check / calibration item(s) as received. 3.

Operator:	Lau, Natalie	Signature:	Date:	26/6/2018
Checked by:	Wong Po Yan, Pauline	Signature:	Date:	27/6/2018



EQUIPMENT REF NO.

LAST CALIBRATION DATE

REPORT OF PERFORMANCE CHECK / CALIBRA PROJECT NAME DATE OF ISSUE REPORT NO.	:	DN PERFORMANCE CHECK / CALIBRATION OF DUST METER 24/10/2018 HK1811054	
PERFORMANCE CHECK / CALIBRATED EQUIPM	IEN	т	
TYPE	:	AEROSOL MASS MONITOR	
MANUFACTURER	:	MET ONE INSTRUMENTS	
MODEL NO.	:	AEROCET - 831	
SERIAL NO.	:	W15449	
EQUIPMENT NO.	:		
PERFORMANCE CHECK / CALIBRATION DATE	:	23/10/2018	
STANDARD EQUIPMENT	:		
TYPE	:	HIGH VOLUME AIR SAMPLER	
MANUFACTURER	:	TISCH	
MODEL NO.	:	TE-5170	

PTL_HV002

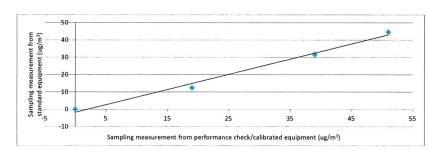
25/7/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Concentration in ug/m ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	23/10/2018,9:05:00 AM	25.3	1017	0	0
1	23/10/2018,10:20:00 AM	25.3	1017	45	51
2	23/10/2018,11:22:00 AM	25.3	1017	32	39
3	23/10/2018,12:29:00 PM	25.3	1017	12	19

0.8800 23/10/2019

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record



Notes: 1.

2.

Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.

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3. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator:	Lau, Natalie	_Signature:	fotieri	_Date:	23/10/2018
Checked by:	Wong Po Yan, Pauline	_Signature:	Junt	_Date:	24/10/2018



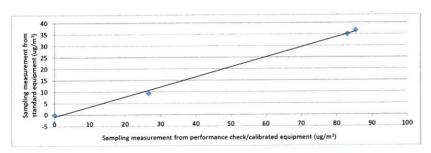
REPORT OF PERFORMANCE CHECK / CALIBRA PROJECT NAME DATE OF ISSUE REPORT NO.	ATIC : :	ON PERFORMANCE CHECK / CALIBRATION OF DUST METER 16/8/2018 HK1810819
PERFORMANCE CHECK / CALIBRATED EQUIPM	AEN	T
TYPE	:	AEROSOL MASS MONITOR
MANUFACTURER	:	MET ONE INSTRUMENTS
MODEL NO.	:	AEROCET - 831
SERIAL NO.	:	W16848
EQUIPMENT NO.	:	
PERFORMANCE CHECK / CALIBRATION DATE	:	15/8/2018
STANDARD EQUIPMENT	:	
TYPE	:	HIGH VOLUME AIR SAMPLER
MANUFACTURER	:	TISCH
MODEL NO.	:	TE-5170
EQUIPMENT REF NO.	:	PTL_HV002
LAST CALIBRATION DATE	:	25/7/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Concentration in ug/m ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	15/8/2018,9:05:00 AM	28.2	999	0	0
1	15/8/2018,10:20:00 AM	28.2	999	37	85
2	15/8/2018,11:22:00 AM	28.2	999	35	83
3	15/8/2018,12:29:00 PM	28.2	999	9	27

0.4400 0.9988 15/8/2019

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record



Notes: 1.

Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.

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Performance Check / Calibration result relates to performance check / calibration item(s) as received. 3.

Operator:	Lau, Natalie	_Signature:	fotier	Date:	15/8/2018
Checked by:	Wong Po Yan, Pauline	_Signature:	port	Date:	16/8/2018

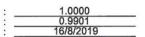


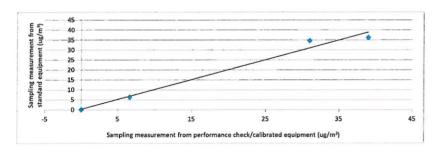
REPORT OF PERFORMANCE CHECK / CALIBRA		
PROJECT NAME DATE OF ISSUE	:	PERFORMANCE CHECK / CALIBRATION OF DUST METER 16/8/2018
REPORT NO.		HK1810826
KEI OKT HO.		
PERFORMANCE CHECK / CALIBRATED EQUIPM	NEN	NT .
TYPE	:	PARTICULATE MONITOR
MANUFACTURER	:	MET ONE INSTRUMENTS
MODEL NO.	;	BT 645
SERIAL NO.	:	X19295
EQUIPMENT NO.	:	
PERFORMANCE CHECK / CALIBRATION DATE	:	16/8/2018
STANDARD EQUIPMENT	:	
TYPE	:	HIGH VOLUME AIR SAMPLER
MANUFACTURER	:	TISCH
MODEL NO.	:	TE-5170
EQUIPMENT REF NO.	:	PTL_HV002
LAST CALIBRATION DATE	:	25/7/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Concentration in ug/m ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	16/8/2018,8:30:00 AM	27.8	1000	0	0
1	16/8/2018,2:16:00 PM	27.8	1000	36	39
2	16/8/2018,3:21:00 PM	27.8	1000	35	31
3	16/8/2018,4:24:00 PM	27.8	1000	6	7

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record





Notes : 1.

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3. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator:	Lau, Natalie	_Signature:	fatine	Date:	16/8/2018
Checked by:	Wong Po Yan, Pauline	_Signature:	AM#	_Date:	16/8/2018

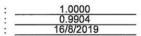


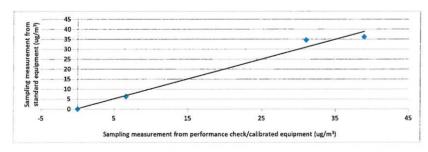
REPORT OF PERFORMANCE CHECK / CALIBRA PROJECT NAME DATE OF ISSUE REPORT NO.	ATIO : :	ON PERFORMANCE CHECK / CALIBRATION OF DUST METER 16/8/2018 HK1810827
PERFORMANCE CHECK / CALIBRATED EQUIPM	NEN	NT
TYPE	:	PARTICULATE MONITOR
MANUFACTURER	1	MET ONE INSTRUMENTS
MODEL NO.	:	BT 645
SERIAL NO.	:	X19296
EQUIPMENT NO.	:	
PERFORMANCE CHECK / CALIBRATION DATE	:	16/8/2018
STANDARD EQUIPMENT	:	Contraction and an and the second second second second second
TYPE	:	HIGH VOLUME AIR SAMPLER
MANUFACTURER	:	TISCH
MODEL NO.	:	TE-5170
EQUIPMENT REF NO.	:	PTL_HV002
LAST CALIBRATION DATE	:	25/7/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Concentration in ug/m ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	16/8/2018,8:30:00 AM	27.8	1000	0	0
1	16/8/2018,2:16:00 PM	27.8	1000	36	39
2	16/8/2018,3:21:00 PM	27.8	1000	35	31
3	16/8/2018,4:24:00 PM	27.8	1000	6	7

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record





Notes: 1.

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3. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator:	Lau, Natalie	_ Signature:	Lotie	Date:	16/8/2018
Checked by:	Wong Po Yan, Pauline	Signature:	DME	Date:	16/8/2018



REPORT OF PERFORMANCE CHECK / CALIE PROJECT NAME DATE OF ISSUE REPORT NO.	BRATION PERFORMANCE CHECK / CALIBRATION OF DUST METER 22/8/2018 HK1810828
PERFORMANCE CHECK / CALIBRATED EQU	IPMENT
TYPE	: PARTICULATE MONITOR
MANUFACTURER	: MET ONE INSTRUMENTS
MODEL NO.	: BT 645
SERIAL NO.	: X19297
EQUIPMENT NO.	

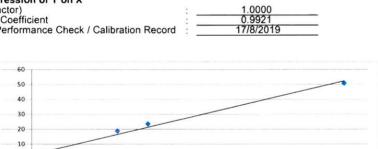
PERFORMANCE CHECK / CALIBRATION DATE	17/8/2018
STANDARD EQUIPMENT	:
TYPE	: HIGH VOLUME AIR SAMPLER
MANUFACTURER	: TISCH
MODEL NO.	: TE-5170
EQUIPMENT REF NO.	: PTL_HV002
LAST CALIBRATION DATE	: 25/7/2018

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Concentration in ug/m ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	17/8/2018,7:20:00 AM	28	1005	0	0
1	17/8/2018,8:24:00 PM	28	1005	51	51
2	17/8/2018,9:26:00 PM	28	1005	24	19
3	17/8/2018,10:28:00 PM	28	1005	19	14

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record

5



25

Sampling measurement from performance check/calibrated equipment (ug/m³)

15



measurement from ient (ug/m³)

Sampling r standard

equipr

-5

0

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3. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

35

Operator:	Lau, Natalie	_Signature:	Jetim	Date:	17/8/2018
Checked by:	Wong Po Yan, Pauline	Signature:	port	Date:	22/8/2018

45

55



EQUIPMENT NO.

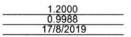
REPORT OF PERFORMANCE CHECK / CAI PROJECT NAME DATE OF ISSUE REPORT NO.	LIBRATION PERFORMANCE CHECK / CALIBRATION OF DUST METER 22/8/2018 HK1810829
PERFORMANCE CHECK / CALIBRATED EC	QUIPMENT
TYPE	: PARTICULATE MONITOR
MANUFACTURER	: MET ONE INSTRUMENTS
MODEL NO.	: BT 645
SERIAL NO.	X19298

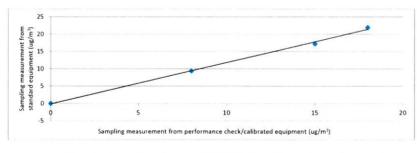
EQUIPMENT NO.	:	
PERFORMANCE CHECK / CALIBRATION DATE	;	17/8/2018
STANDARD EQUIPMENT	2	
TYPE	:	HIGH VOLUME AIR SAMPLER
MANUFACTURER	:	TISCH
MODEL NO.	:	TE-5170
EQUIPMENT REF NO.	:	PTL_HV002
LAST CALIBRATION DATE	:	25/7/2018
TYPE MANUFACTURER MODEL NO. EQUIPMENT REF NO.		TISCH TE-5170 PTL_HV002

EQUIPMENT PERFORMANCE CHECK / CALIBRATION RESULTS:

Trial no. in 1-hr period	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration in ug/m ³ (Standard equipment) (Y - Axis)	Concentration in ug/m ³ (Performance Check / Calibrated equipment) (X - Axis)
Zero Check ¹	17/8/2018,4:50:00 PM	28	1005	0	0
1	17/8/2018,5:52:00 PM	28	1005	22	18
2	17/8/2018,6:58:00 PM	28	1005	17	15
3	17/8/2018,8:00:00 PM	28	1005	9	8

Linear Regression of Y on X Slope (K- factor) Correlation Coefficient Validity of Performance Check / Calibration Record





Notes : 1.

Zero check conducted as per CAL003 SOP and manufacturer's manual as appropriate.

2. This report shall not be reproduced, except in full, without prior approval from Pilot Testing Limited.

3. Performance Check / Calibration result relates to performance check / calibration item(s) as received.

Operator:	Lau, Natalie	_ Signature: _	fotier	Date:	17/8/2018
Checked by:	Wong Po Yan, Pauline	_ Signature: _	₽m=f	Date:	22/8/2018



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



CERTIFICATE OF CALIBRATION

Certificate No.:	18CA0322 01			Page	1	of	2
Item tested							
Description: Manufacturer: Type/Model No.: Serial/Equipment No.: Adaptors used:	Sound Level Meter (Larson Davis LxT1 0003737 -	Type 1)	, , ,	Microphone PCB 377B02 171529			
Item submitted by							
Customer Name: Address of Customer: Request No.: Date of receipt:	Lam Geotechnics Lto - - 22-Mar-2018	d.					
Date of test:	28-Mar-2018						
Reference equipment	used in the calibra	tion					
Description: Multi function sound calibrator Signal generator	Model: B&K 4226 DS 360	Serial No. 2288444 61227		Expiry Date: 08-Sep-2018 01-Apr-2018		Traceabl CIGISMEC CEPREI	
Ambient conditions							
Temperature: Relative humidity:	21 ± 1 °C 50 ± 10 %						

ZI±IC
50 ± 10 %
1005 ± 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 ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

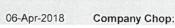
This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

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

Actual Measurement data are documented on worksheets.

Approved Signatory:







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.

Date:

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



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2

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0322 01

Page 2 of

1, Electrical Tests

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

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	А	Pass	0.3	
	С	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	N/A	N/A	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

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

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

3, Response to associated sound calibrator

N/A

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

2	Λ	- End -	J.	
Calibrated by:	1~1	Checked by:	1	
	Fung Chi Yip		Lam Tze Wai	
Date:	28-Mar-2018	Date:	06-Apr-2018	

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

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



CERTIFICATE OF CALIBRATION

Certificate No.:	18CA0322 02			Page	1	of	2
Item tested							
Description: Manufacturer: Type/Model No.: Serial/Equipment No.: Adaptors used:	Sound Level Meter Honglim Co., Ltd. HLES-01 201692136 -	(Type 1)	, , ,	Microphone - CDM101 05866 -			
Item submitted by							
Customer Name: Address of Customer: Request No.: Date of receipt:	Lam Environmenta - - 22-Mar-2018	I Service Ltd.					
Date of test:	28-Mar-2018						
Reference equipment	used in the calibr	ation					
Description: Multi function sound calibrator Signal generator Signal generator	Model: B&K 4226 DS 360 DS 360	Serial No. 2288444 33873 61227		Expiry Date: 08-Sep-2018 25-Apr-2018 01-Apr-2018		Traceab CIGISME CEPREI CEPREI	
Ambient conditions							
Temperature: Relative humidity: Air pressure:	21 ± 1 °C 50 ± 10 % 1000 ± 5 hPa						

Test specifications

- 1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- 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 ±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 responsess of the Sound Level Meter.

Test results

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

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

Actual Measurement data are documented on worksheets.

Approved Signatory:	24	Date:	06-Apr-2018	Company Chop:	STAN STAR
, pprored orginatory.	Feng Jun Qi	Date.	00-10-2010	company chop.	STOS * COL

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

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Page



2

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0322 02

2 of

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 Uncertanity (dB)	Coverage Factor
Self-generated noise	А	Pass	0.3	
	С	Pass	0.8	2.1
	Lin	N/A	N/A	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С	Pass	0.3	
	Lin	N/A	N/A	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	N/A	N/A	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	N/A	N/A	
	Repeated at frequency of 100 Hz	N/A	N/A	
Time averaging	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

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

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

3, Response to associated sound calibrator

N/A

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

/	1 /	- End -	
alibrated by:		Checked by:	4
Date:	Fung Chi Yip 28-Mar-2018	Date:	Lam Tze Wai 06-Apr-2018

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

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



CERTIFICATE OF CALIBRATION

18CA0309 02	Page:	1	of	2	
Acoustical Calibrator (Class 1)					
Larson Davis					
CAL200					
-					
Lam Environmental Service I td					
-					
09-Mar-2018					
12-Mar-2018					
	Acoustical Calibrator (Class 1) Larson Davis CAL200 13098 - Lam Environmental Service Ltd. - - 09-Mar-2018	Acoustical Calibrator (Class 1) Larson Davis CAL200 13098 - Lam Environmental Service Ltd. - - 09-Mar-2018	Acoustical Calibrator (Class 1) Larson Davis CAL200 13098 - - Lam Environmental Service Ltd. - - 09-Mar-2018	Acoustical Calibrator (Class 1) Larson Davis CAL200 13098 - Lam Environmental Service Ltd. - 09-Mar-2018	Acoustical Calibrator (Class 1) Larson Davis CAL200 13098 - Lam Environmental Service Ltd. - 09-Mar-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	11-Apr-2018	SCL
Preamplifier	B&K 2673	2239857	05-May-2018	CEPREI
Measuring amplifier	B&K 2610	2346941	03-May-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI
Digital multi-meter	34401A	US36087050	25-Apr-2018	CEPREI
Audio analyzer	8903B	GB41300350	21-Apr-2018	CEPREI
Universal counter	53132A	MY40003662	22-Apr-2018	CEPREI

Ambient conditions

Temperature:	21 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1000 ± 5 hPa

Test specifications

- 1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- 2. The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 3. The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

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

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



Approved Signatory:

A Fena Jun Qi

12-Mar-2018 Company Chop:

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

Date:

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



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

Page:



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0309 02

Website: www.cigismec.com

2 of 2

1, Measured Sound Pressure Level

E-mail: smec@cigismec.com

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

Frequency	Output Sound Pressure Level Setting	Measured Output Sound Pressure Level	Estimated Expanded Uncertainty
Hz	dB	dB	dB
1000	94.0	93.81	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 = 0.011 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 = 1000.0 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 = 0.6 %
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.

	4	- End -	. /	
Calibrated by:	$1 \sim ($	Checked by:	4	
	Fung Chi Yip		Lam Tze Wai	
Date:	12-Mar-2018	Date:	12-Mar-2018	

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

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



徐介 合 試 550 有 限 公 司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑道37號利達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.

E-mail: smec@cigismec.com

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



CERTIFICATE OF CALIBRATION

Website: www.cigismec.com

Certificate No.:	18CA1023 02		Page:	1 of	2
Item tested					
Description:	Acoustical Calibra	tor (Class 1)			
Manufacturer:	Larson Davis				
Type/Model No.:	CAL200				
Serial/Equipment No.:	13437				
Adaptors used:	-				
Item submitted by					
Curstomer:	Lam Geotechnics	Ltd.			
Address of Customer:	-				
Request No.:	-				
Date of receipt:	23-Oct-2018				
Date of test:	24-Oct-2018				
Reference equipment	used in the calib	oration			
Description:	Model:	Serial No.	Expiry Date:	Tracea	ble to:
Lab standard microphone	B&K 4180	2412857	20-Apr-2019	SCL	
Preamplifier	B&K 2673	2239857	27-Apr-2019	CEPRE	
Measuring amplifier	B&K 2610	2346941	08-May-2019	CEPRE	
Signal generator	DS 360	33873	24-Apr-2019	CEPRE	
Digital multi-meter	34401A	US36087050	23-Apr-2019	CEPRE	
Audio analyzer	8903B	GB41300350	23-Apr-2019	CEPRE	
Universal counter	53132A	MY40003662	24-Apr-2019	CEPRE	I
Ambient conditions					
Temperature:	20 ± 1 °C				
• • • • • • • •	50 ± 10 %				
Relative humidity:	1005 ± 5 hPa				

Test specifications

- 1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- 2. The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 3. The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

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

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



Feng Junqi

24-Oct-2018 Company Chop:



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

Date:

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



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香 港 黄 竹 坑 道 3 7 號 利 達 中 心 1 2 樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA1023 02

Page: 2 of 2

2 01 2

1, Measured Sound Pressure Level

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

Frequency	Output Sound Pressure	Measured Output	Estimated Expanded
Shown	Level Setting	Sound Pressure Level	Uncertainty
_{Hz}	dB	dB	dB
1000	94.00	93.77	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 = 0.015 dB

Estimated expanded uncertainty

0.005 dB

3, Actual Output Frequency

1

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 = 1000.2 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 = 0.5%
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 -	Ana
Calibrated by:	1~7	Checked by:	7 1444
	Fung Chi Yip		Shek Kwong Tat
Date:	24-Oct-2018	Date:	24-Oct-2018

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

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



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CERTIFICATE OF CALIBRATION

Certificate No.:	18CA1114 02			Page	1	of	2
Item tested							
Description:	Sound Level Mete	r (Type 1)	,	Microphone			
Manufacturer:	B & K		,	B&K			
Type/Model No.:	2236		,	4188			
Serial/Equipment No.:	2100736		,	2288941			
Adaptors used:	-		,	-			
tem submitted by							
Customer Name:	Lam Environmenta	al Service Ltd.					
Address of Customer:	-						
Request No.:	-						
Date of receipt:	14-Nov-2018						
Date of test:	15-Nov-2018						
	and the second second second	ration					
Reference equipment u	used in the calib	ration					
	used in the calib Model:	Serial No.		Expiry Date:		Traceab	le to:
Description:				Expiry Date: 23-Aug-2019		Traceab CIGISME	
Description: Multi function sound calibrator	Model:	Serial No.					
Description: Multi function sound calibrator Signal generator	Model: B&K 4226	Serial No. 2288444		23-Aug-2019		CIGISME	
Description: Multi function sound calibrator Signal generator Signal generator	Model: B&K 4226 DS 360	Serial No. 2288444 33873		23-Aug-2019 24-Apr-2019		CIGISME CEPREI	
Description: Multi function sound calibrator Signal generator Signal generator Ambient conditions	Model: B&K 4226 DS 360	Serial No. 2288444 33873		23-Aug-2019 24-Apr-2019		CIGISME CEPREI	
Reference equipment u Description: Multi function sound calibrator Signal generator Signal generator Ambient conditions Temperature: Relative humidity:	Model: B&K 4226 DS 360 DS 360	Serial No. 2288444 33873		23-Aug-2019 24-Apr-2019		CIGISME CEPREI	

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 ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

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

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

Actual Measurement data are documented on worksheets.

	20/				每限公司 3
Approved Signatory:	AT	Date:	15-Nov-2018	Company Chop:	\$7105 * 3015
	Feng Junqi				

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

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

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Page



2

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA1114 02

2 of

1, Electrical Tests

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

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
-	С	Pass	1.0	2.1
	Lin	Pass	2.0	2.2
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

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

Test:	Subtest	Status	Expanded Uncertanity (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.

	1	- End -	Attain	
Calibrated by:	1~7	Checked by:	Man	
	Fung Chi Yip		Shek Kwong Tat	
Date:	15-Nov-2018	Date:	15-Nov-2018	

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

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR CHAN KA CHUN	WORK ORDER:	HK1903608
CLIENT:	LAM ENVIRONMENTAL LTD		
ADDRESS:	11/F, CENTRE POINT, 181 - 185 GLOUCESTER ROAD WAN CHAI	SUB-BATCH: LABORATORY: DATE RECEIVED: DATE OF ISSUE:	0 HONG KONG 23-Jan-2019 31-Jan-2019

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 ALS Hong Kong laboratory or quoted from relevant international standards.

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

Scope of Test:	Turbidity
Equipment Type:	Turbidimeter
Brand Name:	XINRUI
Model No.:	
Serial No.:	1309192
Equipment No.:	
Date of Calibration:	25 January, 2019

<u>NOTES</u>

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.

Ma Si

Mr Chan Siu Ming, Vico Manager - Inorganic

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER:	HK1903608		ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 31-Jan-2019 LAM ENVIRONMENTAL LTD		
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Turbidimeter XINRUI 1309192 25 January, 2019	Date of Next Calibration:	25 April, 2019
PARAMETERS: Turbidity	Method Ref: APHA (21st edition)), 2130B	
-	Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.01	
40	39.06	-2.3
400	384.5	-3.9
800	868.3	+8.5
	Tolerance Limit (%)	±10.0

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

Ma Ain

Mr Chan Siu Ming, Vico Manager - Inorganic



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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: MR CHAN KA CHUN CLIENT: LAM ENVIRONMENTAL LTD

ADDRESS: 11/F, CENTRE POINT, 181 - 185 GLOUCESTER ROAD WAN CHAI, HONG KONG WORK ORDER: H

HK1900006

SUB-BATCH:0LABORATORY:HONG KONGDATE RECEIVED:31- Dec- 2018DATE OF ISSUE:10- Jan- 2019

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 ALS Hong Kong laboratory or quoted from relevant international standards.

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

Scope of Test:Dissolved Oxygen, pH Value, Salinity and TemperatureEquipment Type:Multifunctional MeterBrand Name:YSIModel No.:Professional PlusSerial No.:14M100277Equipment No.:--

10 January, 2019

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.

Ma Aij

Mr Chan Siu Ming, Vico Manager - Inorganic

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Date of Calibration:

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER:	HK1900006		ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 10- Jan- 2019 LAM ENVIRONMENTAL LTD		
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter YSI Professional Plus 14M100277 10 January, 2019	Date of Next Calibration:	10 April, 2019

PARAMETERS: Dissolved Oxygen

/gen Method Ref: APHA (21st edition), 4500–O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)	
2.67	2.47	- 0.20	
6.20	6.28	+ 0.08	
8.88	8.83	- 0.05	
	Tolerance Limit (mg/L)	±0.20	

pH Value

Method Ref: APHA (21st edition), 4500H:B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)	
4.0	3.97	- 0.03	
7.0	6.84	- 0.16	
10.0	10.03	+ 0.03	
	Tolerance Limit (pH unit)	±0.20	

Salinity

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	
10	10.36	+ 3.6
20	18.90	- 5.5
30	27.77	- 7.4
	Tolerance Limit (%)	±10.0

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

Ma Alin

Mr Chan Siu Ming, Vico Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER:	HK1900006			ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 10- Jan- 2019 LAM ENVIRONMENTAL LTD			
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter YSI Professional Plus 14M100277 10 January, 2019	Date of Next Calibration:	10 April, 2019	
DADAMETERS.				

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)
10.5	11.3	+ 0.8
21.0	19.8	- 1.2
40.5	39.4	- 1.1
	Tolerance Limit (°C)	±2.0

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

Ma Alin

Mr Chan Siu Ming, Vico Manager - Inorganic



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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR CHAN KA CHUN	WORK ORDER:	HK1901812
CLIENT:	LAM ENVIRONMENTAL LTD		
ADDRESS:	11/F, CENTRE POINT, 181 - 185 GLOUCESTER ROAD	SUB-BATCH: LABORATORY:	0 Hong Kong
	WAN CHAI	DATE RECEIVED:	10-Jan-2019
		DATE OF ISSUE:	18-Jan-2019

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 ALS Hong Kong laboratory or quoted from relevant international standards.

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

Scope of Test:	Dissolved Oxygen, pH Value, Salinity and Temperature
Equipment Type:	Multifunctional Meter
Brand Name:	YSI
Model No.:	Professional Plus
Serial No.:	17F100236
Equipment No.:	
Date of Calibration:	18 January, 2019

<u>NOTES</u>

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.

Ma Ai

Mr Chan Siu Ming, Vico Manager - Inorganic

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER:	HK1901812		ALS	
SUB-BATCH:	0			
DATE OF ISSUE:	18-Jan-2019			
CLIENT:	LAM ENVIRONMENTAL LTD			
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.:	Multifunctional Meter YSI Professional Plus 17F100236			
Date of Calibration:	18 January, 2019	Date of Next Calibration:	18 April, 2019	

PARAMETERS:

Dissolved Oxygen

gen Method Ref: APHA (21st edition), 4500-O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.65	2.45	-0.20
6.02	5.92	-0.10
8.88	8.94	+0.06
	Tolerance Limit (mg/L)	±0.20

pH Value

Method Ref: APHA (21st edition), 4500H:B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	4.03	+0.03
7.0	7.08	+0.08
10.0	10.16	+0.16
	Tolerance Limit (pH unit)	±0.20

Salinity

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	
10	10.20	+2.0
20	19.68	-1.6
30	29.74	-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.

Ma Sing

Mr Chan Siu Ming, Vico Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER:	HK1901812			ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 18-Jan-2019 LAM ENVIRONMENTAL LTD			(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter YSI Professional Plus 17F100236 18 January, 2019	Date of Next Calibration:	18 April, 2019	
PARAMETERS: Temperature		rnational Accreditation New Zealar Iarch 2008: Working Thermometer		e

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
10.0	9.5	-0.5
22.0	21.3	-0.7
41.5	42.3	+0.8
	Tolerance Limit (°C)	±2.0

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

Ma Si

Mr Chan Siu Ming, Vico Manager - Inorganic