15	30	Cŀ		7	)		D	ALIBRATION UE DATE: ary 11, 2020
vir	Ce	rtifa	a I			2002/02/2020	ation	
-	12 10 124		Contraction of the local division of the loc				0.97	
Cal. Date:	January 11,	2019	Rootsn	neter S/N:	438320		293	°К
Operator:	Jim Tisch					Pa:	760.7	mm Hg
Calibration	Model #:	TE-5025A	Calib	rator S/N:	0005			
		Vol. Init	Mat. Plant	avet	ATT	4.0		1
	Bun	10.000	Vol. Final	ΔVol.	∆Time (min)	ΔP	ΔH (i= μ2O)	
	Run	(m3)	(m3)	(m3)	(min) 1.4090	(mm Hg)	(in H2O)	
	1	1	2	1	the state of the s	3.2	2.00	1
	2	3	4	1	0.9980	6.4	4.00	1
	3	5	6	1	0.8900	7.8	5.00	1
	4	9	8	1	0.8450	8.7	5.50	4
	>	э	10	1	0.6990	12.6	8.00	
			D	ata Tabulat	tion			
	Vstd	Qstd	$\sqrt{\Delta H \left(\frac{Pa}{Pstd}\right)}$	Tstd )		Qa	√∆н(та/Ра)	
	(m3)	(x-axis)	(y-axis	5)	Va	(x-axis)	(y-axis)	
	1.0138	0.7195	1.426	9	0.9958	0.7067	0.8777	
	1.0095	1.0115	2.018	0	0.9916	0.9936	1.2412	
	1.0076	1.1321	2.256	1	0.9897	1.1121	1.3877	
	1,0064	1.1910	2.366	3	0.9886	1.1699	1.4555	
	1,0012	1.4323	2.853		0.9834	1.4059	1.7553	
		m=	1.998			m=	1.25149	
	QSTD	b=	-0.008		QA	b=	-0.00543	
		r=	0.999	97		r=	0.99997	
				Calculation	15			
			/Pstd)(Tstd/Ta	) [		∆Vol((Pa-∆i	P)/Pa)	
	Qstd=	√std/∆Time			Qa=	Va/∆Time		
			For subseque	ent flow rat	e calculation	ts:		
	Qstd=	1/т (( √Δн(-	$\frac{Pa}{Pstd}$ $\left(\frac{Tstd}{Ta}\right)$	)-b)	Qa=	$1/m \left( \sqrt{\Delta F} \right)$	(Ta/Pa))-b)	
	Standard	Conditions						
Tstd:	and the second se			- E		RECA	LIBRATION	
Pstd:		mm Hg						1000
		еү					nnual recalibratio	
		er reading (in					Regulations Part !	The second s
		ter reading (	mm Hg)				, Reference Meth	
and a second s	osolute temp	essure ("K)					ended Particulati re, 9.2.17, page 1	
las actual he								

ch Environmental, Inc.

Ľ

5 South Miami Avenue

lage of Cleves, OH 45002

www.tisch-env.com TOLL FREE: (877)263-7610 FAX: (513)467-9009



## Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA1b	Calbration Date	:	16-Aug-19
Equipment no.	:	HVS001	Calbration Due Date	:	16-Oct-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition									
Temperature, T <sub>a</sub>		303		Kelvin	Pressure, P	a	1	1003 mmHg	
	Orifice Transfer Standard Information								
Equipment No.		0005		Slope, m <sub>c</sub>	1.998	61	Intercept, bc	-0.00882	
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10	13.3 x 298 /	T <sub>a</sub> ) <sup>1/2</sup>	
Next Calibration Date		11-Jan-2	0		=	m <sub>c</sub> x	$Q_{std} + b_{c}$		
	Calibration of TSP								
Calibration	Mar	nometer R	eading	C	) <sub>std</sub>	Contin	uous Flow	IC	
Point	H (inches of water)		(m <sup>3</sup>	/ min.)	Recorder, W		(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.3		
	(up)	(down)	(difference)	X-	axis	(	CFM)	Y-axis	
1	1.5	1.5	3.0	0.	8595		21	20.7199	
2	2.4	2.4	4.8	1.	0860		30	29.5999	
3	3.5	3.5	7.0	1.	3106		42	41.4398	
4	4.5	4.5	9.0	1.	4854		46	45.3864	
5	5.4	5.4	10.8	1.	6268		54	53.2797	
By Linear Regression of	Y on X								
	Slope, m	=	41.8	891	Int	ercept, b =	-18	5.2670	
Correlation Co	pefficient*	=	0.99	953					
Calibration	Accepted	=	Yes/ł	No**					

\* if Correlation Coefficient < 0.990, check and recalibration again.

Remarks :					
Calibrated by	:	Henry Lau	Checked by	:	Dean Chan
Date	:	16-Aug-19	– Date	:	16-Aug-19



## Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA1b	Calbration Date	:	18-Oct-19
Equipment no.	:	HVS001	Calbration Due Date	:	18-Dec-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition									
Temperature, T <sub>a</sub>		300		Kelvin <b>Pressure, P</b> a			1	I017 mmHg	
	Orifice Transfer Standard Information								
Equipment No.		0005		Slope, m <sub>c</sub>	1.998	61	Intercept, bc	-0.00882	
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10	13.3 x 298 /	T <sub>a</sub> ) <sup>1/2</sup>	
Next Calibration Date		11-Jan-2	0		=	m <sub>c</sub> >	$Q_{std} + b_{c}$		
Calibration of TSP									
Calibration	Manometer Reading			c	) <sub>std</sub>	Contin	uous Flow	IC	
Point	H (inches of water)		(m <sup>3</sup>	/ min.)	Rec	order, W	(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31)		
	(up)	(down)	(difference)	X-	axis	(	CFM)	Y-axis	
1	1.4	1.4	2.8	0.8	8404		27	26.9589	
2	1.9	1.9	3.8	0.9	9783		31	30.9529	
3	2.5	2.5	5.0	1.1	1215		36	35.9452	
4	4.1	4.1	8.2	1.4	4350		42	41.9361	
5	4.8	4.8	9.6	1.5	5523		47	46.9285	
By Linear Regression of	Y on X								
	Slope, m	=	26.6	137	Int	ercept, b =	=4.	9937	
Correlation Coefficient* = 0.9936									
Calibration Accepted = Yes/ <del>No**</del>									

\* if Correlation Coefficient < 0.990, check and recalibration again.

**	Delete	as	appropriate.
----	--------	----	--------------

Remarks : \_\_\_\_\_

:

:

Calibrated	by
------------	----

Date

Laurance Yung 18-Oct-19 Checked by Date James Chu

:

•

18-Oct-19



## Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA2a	Calbration Date	:	16-Aug-19
Equipment no.	:	HVS002	Calbration Due Date	:	16-Oct-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition									
Temperature, T <sub>a</sub>		303		Kelvin <b>Pressure, P</b> a			1	1003 mmHg	
	Orifice Transfer Standard Information								
Equipment No.		0005		Slope, m <sub>c</sub>	1.998	61	Intercept, bc	-0.00882	
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10	)13.3 x 298 /	$(T_a)^{1/2}$	
Next Calibration Date		11-Jan-2	0		=	m <sub>c</sub>	x Q <sub>std</sub> + b <sub>c</sub>		
	Calibration of TSP								
Calibration	Manometer Reading			C	t std	Conti	nuous Flow	IC	
Point	H (inches of water)		(m <sup>3</sup>	/ min.)	Recorder, W		(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31)		
	(up)	(down)	(difference)	X-	axis		(CFM)	Y-axis	
1	1.5	1.5	3.0	0.8	8595		22	21.7066	
2	2.4	2.4	4.8	1.(	0860		34	33.5465	
3	3.4	3.4	6.8	1.2	2918		41	40.4531	
4	4.0	4.0	8.0	1.4	4007		48	47.3598	
5	5.2	5.2	10.4	1.5	5965		56	55.2531	
By Linear Regression of	Y on X								
	Slope, m	=	45.1	129	Int	ercept, b	= -16	6.5869	
Correlation Co	pefficient*	=	0.99	972					
Calibration	Accepted	=	Yes/ł	No**					

\* if Correlation Coefficient < 0.990, check and recalibration again.

Remarks :					
Calibrated by	:	Henry Lau	Checked by	:	Dean Chan
Date	:	16-Aug-19	– Date	:	16-Aug-19



## Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA2a	Calbration Date	:	18-Oct-19
Equipment no.	:	HVS002	Calbration Due Date	:	18-Dec-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

				Ambient C	Condition			
Temperature, T <sub>a</sub>		300		Kelvin	Pressure, P	a	1	017 mmHg
Orifice Transfer Standard Information								
Equipment No.		0005		Slope, m <sub>c</sub>	1.998	61	Intercept, bc	-0.00882
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10	)13.3 x 298 /	T <sub>a</sub> ) <sup>1/2</sup>
Next Calibration Date		11-Jan-2	0		=	m <sub>c</sub>	x Q <sub>std</sub> + b <sub>c</sub>	
	Calibration of TSP							
Calibration	Manometer Reading			C	std	Conti	nuous Flow	IC
Point	Н (	inches of	water)	(m <sup>3</sup>	/ min.)	Recorder, W		(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31)
	(up)	(down)	(difference)	X-	axis		(CFM)	Y-axis
1	2.1	2.1	4.2	1.(	0283		23	22.9650
2	2.6	2.6	5.2	1.1	1436		29	28.9559
3	3.2	3.2	6.4	1.:	2683		36	35.9452
4	3.8	3.8	7.6	1.3	3817		42	41.9361
5	4.1	4.1	8.2	1.4	4350		48	47.9270
By Linear Regression of	Y on X							
	Slope, m	=	58.9	997	Int	ercept, b	= -38	3.2849
Correlation Coefficient* = 0.9			0.99	)39				
Calibration Accepted = Yes/			<del>\o</del> **					

\* if Correlation Coefficient < 0.990, check and recalibration again.

Remarks :					
Calibrated by	:	Laurance Yung	Checked by	:	James Chu
Date	:	18-Oct-19	Date	:	18-Oct-19



## Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA3a	Calbration Date	:	16-Aug-19
Equipment no.	:	HVS012	Calbration Due Date	: _	16-Oct-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

	Ambient Condition								
Temperature, T <sub>a</sub>		303		Kelvin	Pressure, P	a	1	003 mmHg	
Orifice Transfer Standard Information									
Equipment No.		0005			1.998	61	Intercept, bc	-0.00882	
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10	13.3 x 298 /	T <sub>a</sub> ) <sup>1/2</sup>	
Next Calibration Date		11-Jan-2	0		=	m <sub>c</sub> x	$Q_{std} + b_{c}$		
Calibration of TSP									
Calibration	Manometer Reading			C	) <sub>std</sub>	Contin	uous Flow	IC	
Point	Н (	inches of	water)	(m <sup>3</sup>	/ min.)	Recorder, W		(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31	
	(up)	(down)	(difference)	X-	axis	(	CFM)	Y-axis	
1	1.3	1.3	2.6	0.	8004		20	19.7332	
2	2.5	2.5	5.0	1.	1083		30	29.5999	
3	3.5	3.5	7.0	1.	3106		40	39.4665	
4	4.4	4.4	8.8	1.	4689		48	47.3598	
5	5.5	5.5	11.0	1.	6417		51	50.3197	
By Linear Regression of	Y on X								
	Slope, m	=	38.5	547	Int	ercept, b =	-11	1.5139	
Correlation Coefficient* = 0.9			0.99	921					
Calibration Accepted = Yes/			No**						

\* if Correlation Coefficient < 0.990, check and recalibration again.

Remarks :					
Calibrated by	:	Henry Lau	Checked by	:	Dean Chan
Date	:	16-Aug-19	– Date	:	16-Aug-19



## Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA3a	Calbration Date	:	18-Oct-19
Equipment no.	:	HVS012	Calbration Due Date	:	18-Dec-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition								
Temperature, T <sub>a</sub>		300		Kelvin	Pressure, P	a	1	017 mmHg
Orifice Transfer Standard Information								
Equipment No.		0005			1.998	61	Intercept, bc	-0.00882
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10	13.3 x 298 /	T <sub>a</sub> ) <sup>1/2</sup>
Next Calibration Date		11-Jan-2	0		=	m <sub>c</sub> :	κQ <sub>std</sub> +b <sub>c</sub>	
Calibration of TSP								
Calibration	Manometer Reading			c	) <sub>std</sub>	Conti	nuous Flow	IC
Point	H (inches of water)			(m <sup>3</sup>	/ min.)	Recorder, W		(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31)
	(up)	(down)	(difference)	X-	axis		(CFM)	Y-axis
1	1.8	1.8	3.6	0.9	9523		29	28.9559
2	2.3	2.3	4.6	1.0	0759		34	33.9483
3	2.7	2.7	5.4	1.	1653		38	37.9422
4	3.3	3.3	6.6	1.:	2879		44	43.9331
5	3.7	3.7	7.4	1.3	3634		49	48.9255
By Linear Regression of	Y on X							
	Slope, m = 48.0			324	Int	ercept, b	= -17	7.4077
Correlation Coefficient* = 0.99			0.99	963				
Calibration Accepted = Yes/			<del>\o</del> **					

\* if Correlation Coefficient < 0.990, check and recalibration again.

Remarks :					
Calibrated by	:	Laurance Yung	Checked by	:	James Chu
Date	:	18-Oct-19	Date	:	18-Oct-19



## Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA4a	Calbration Date	:	16-Aug-19
Equipment no.	: _	HVS004	Calbration Due Date	:	16-Oct-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

	Ambient Condition								
Temperature, T <sub>a</sub>		303		Kelvin <b>Pressure, P</b> a			1	003 mmHg	
			Orifice T	ransfer Sta	Indard Inform	nation			
Equipment No.		0005		Slope, m <sub>c</sub>	1.998	61	Intercept, bc	-0.00882	
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10 <sup>4</sup>	13.3 x 298 /	T <sub>a</sub> ) <sup>1/2</sup>	
Next Calibration Date		11-Jan-2	0		=	m <sub>c</sub> x	$Q_{std} + b_{c}$		
Calibration of TSP									
Calibration	Manometer Reading			G	) <sub>std</sub>	Contin	uous Flow	IC	
Point	H (inches of water)			(m <sup>3</sup>	/ min.)	Recorder, W		(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31)	
	(up)	(down)	(difference)	X-	axis	(0	CFM)	Y-axis	
1	1.5	1.5	3.0	0.8	8595		32	31.5732	
2	2.4	2.4	4.8	1.0	0860		40	39.4665	
3	3.5	3.5	7.0	1.3	3106		50	49.3331	
4	4.5	4.5	9.0	1.4	4854		56	55.2531	
5	5.8	5.8	11.6	1.0	6858		60	59.1997	
By Linear Regression of	Y on X								
	Slope, m	=	34.7	449	Int	ercept, b =	2.	3021	
Correlation Coefficient* = 0.99			927						
Calibration Accepted = Yes/			<del>\o</del> **						

\* if Correlation Coefficient < 0.990, check and recalibration again.

Remarks :					
Calibrated by	:	Henry Lau	Checked by	<b>/</b> :	Dean Chan
Date	:	16-Aug-19	– Date	:	16-Aug-19



### Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA4a	Calbration Date	:	18-Oct-19
Equipment no.	:	HVS004	Calbration Due Date	:	18-Dec-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

				Ambient C	Condition			
Temperature, T <sub>a</sub>		300	1	Kelvin	Pressure, P	a	1	1017 mmHg
			Orifice Tr	ransfer Sta	andard Inforr	nation		
Equipment No.		0005		Slope, m <sub>c</sub>	1.9986	61	Intercept, bc	-0.00882
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10	)13.3 x 298 /	T <sub>a</sub> ) <sup>1/2</sup>
Next Calibration Date		11-Jan-20			=	m <sub>c</sub>	x Q <sub>std</sub> + b <sub>c</sub>	
				Calibratio	on of TSP			
Calibration	Mar	Manometer Reading			Q <sub>std</sub>	Conti	nuous Flow	IC
Point	Н (і	H (inches of water)		(m <sup>3</sup>	/ min.)	Recorder, W		(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31)
	(up)	(down)	(difference)	X-	-axis		(CFM)	Y-axis
1	1.3	1.3	2.6	0./	8100		26	25.9605
2	1.8	1.8	3.6	0.9	9523		31	30.9529
3	2.6	2.6	5.2	1.	1436		36	35.9452
4	3.2	3.2	6.4	1.:	2683		39	38.9407
5	4.1	4.1	8.2	1./	4350		42	41.9361
By Linear Regression of `	Y on X					_		
	Slope, m	=	25.5	089	Inte	ercept, b	=6.	1300
Correlation Co	cefficient*	=	0.99	<del>)</del> 31				
Calibration	Accepted	=	Yes/ <del>I</del>	No**				

\* if Correlation Coefficient < 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks :

Date

Calibrated by

: Laurance Yung

:

18-Oct-19

Checked by

Date

James Chu

:

•

18-Oct-19



## Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA5b	Calbration Date	:	19-Aug-19
Equipment no.	:	HVS010	Calbration Due Date	:	19-Oct-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

				Ambient C	Condition			
Temperature, T <sub>a</sub>		303	5	Kelvin	Pressure, P	а	1	009 mmHg
			Orifice T	ransfer Sta	Indard Inform	mation		
Equipment No.		0005		Slope, m <sub>c</sub>	1.998	61	Intercept, bc	-0.00882
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10	13.3 x 298 /	T <sub>a</sub> ) <sup>1/2</sup>
Next Calibration Date		11-Jan-2	0		=	m <sub>c</sub> >	$Q_{std} + b_{c}$	
				Calibratio	n of TSP			
Calibration	Manometer Reading			C	l <sub>std</sub>	Contir	uous Flow	IC
Point	Н (	H (inches of water)		(m <sup>3</sup>	/ min.)	Rec	order, W	(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.
	(up)	(down)	(difference)	X-	axis	(	CFM)	Y-axis
1	1.4	1.4	2.8	0.8	3330		31	30.6779
2	2.1	2.1	4.2	1.(	0192		37	36.6155
3	3.5	3.5	7.0	1.3	3145		49	48.4908
4	4.0	4.0	8.0	1.4	4049		52	51.4596
5	4.8	4.8	9.6	1.5	5386		56	55.4181
By Linear Regression of	Y on X							
	Slope, m	=	36.0	750	Int	ercept, b =	= 0.	4484
Correlation Co	pefficient*	=	0.99	987				
Calibration	Accepted	=	Yes/	No**				

\* if Correlation Coefficient < 0.990, check and recalibration again.

Remarks :						
Calibrated by	:	Henry Lau		Checked by	:	Dean Chan
Date	:	19-Aug-19	-	Date	:	19-Aug-19



# Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	СМА5ь	Calbration Date	:	18-Oct-19
Equipment no.	:	HVS010	Calbration Due Date	:	18-Dec-19

### CALIBRATION OF CONTINUOUS FLOW RECORDER

				Ambient C	Condition			
Temperature, T <sub>a</sub>		300	1	Kelvin	Pressure, P	a	1	1017 mmHg
			Orifice Tr	ransfer Sta	andard Inforr	mation		
Equipment No.		0005		Slope, m <sub>c</sub>	1.9986	61	Intercept, bc	-0.00882
Last Calibration Date		11-Jan-1	9		( H x	P <sub>a</sub> / 10	)13.3 x 298 /	T <sub>a</sub> ) <sup>1/2</sup>
Next Calibration Date	11-Jan-20				=	m <sub>c</sub>	x Q <sub>std</sub> + b <sub>c</sub>	
				Calibratio	on of TSP			
Calibration	Mar	Manometer Reading			Q <sub>std</sub>	Conti	nuous Flow	IC
Point	Н (і	H (inches of water)		(m <sup>3</sup>	/ min.)	Recorder, W		(W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31)
	(up)	(down)	(difference)	X-	-axis		(CFM)	Y-axis
1	1.6	1.6	3.2	0./	8981		22	21.9665
2	2.2	2.2	4.4	1./	0524		26	25.9605
3	2.7	2.7	5.4	1.	1653		30	29.9544
4	3.4	3.4	6.8	1.:	3072		36	35.9452
5	4.3	4.3	8.6	1./	4695		41	40.9376
By Linear Regression of `	Y on X							
	Slope, m	=	34.24	476	Inte	ercept, b	=	.4077
Correlation Co	cefficient*	=	0.99	<del>)</del> 68				
Calibration	Accepted	=	Yes/ <del>I</del>	No**				

\* if Correlation Coefficient < 0.990, check and recalibration again.

**	Delete	as	appropriate.
----	--------	----	--------------

Remarks :					
Calibrated by	:	Laurance Yung	Checked by	:	James Chu
Date	:	18-Oct-19	Date	:	18-Oct-19



### 综合試驗有限公司 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 Website: www.cigismec.com

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



## **CERTIFICATE OF CALIBRATION**

Sound Level Mete	r (Type 1)	Microphone	Preamp	
B & K		B & K	B & K	
2250		4950	ZC0032	
2701778		2755097	19223	
-		-	-	
Lam Geotechnics	Limited.			
-				
-				
22-Feb-2019				
25-Feb-2019				
used in the calib	ration			
Model:	Serial No.	Expiry Date:	Traceabl	e to:
B&K 4226	2288444	23-Aug-2019	CIGISMEC	)
DS 360	33873	24-Apr-2019	CEPREI	
DS 360	61227	26-Dec-2019	CEPREI	
21 ± 1 °C				
55 ± 10 %				
	B & K 2250 2701778 - Lam Geotechnics - 22-Feb-2019 25-Feb-2019 25-Feb-2019 <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> 25-Feb-2019 25-Feb-2019 25-Feb-2019 25-Feb-2019 21 ± 1 °C	2250 2701778 - Lam Geotechnics Limited. - 22-Feb-2019 25-Feb-2019 25-Feb-2019 25-Feb-2019 25-Feb-2019 25-Feb-2019 25-Feb-2019 25-Feb-2019 25-Feb-2019 25-Feb-2019 21 ± 1 °C	B & K 2250 2701778 - Lam Geotechnics Limited. - 22-Feb-2019 25-Feb-2019 25-Feb-2019 <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25-Feb-2019</b> <b>25</b>	B & K B & K B & K B & K   2250 4950 ZC0032   2701778 2755097 19223   - - -   22-Feb-2019 - -   25-Feb-2019 - -   21 ± 1 °C - -

- 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.
- 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 <u>+</u>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 documenter on worksheets.

**Approved Signatory:** Fen Junqi

26-Feb-2019 Company Chop:



**Comments:** The results reported in his 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:

© Soils & Materials Engineering Co., Ltd.

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



#### 综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑道 37號利達中心 12樓

香港寅竹坑姐37號利莲中心12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

Page



2

### CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No..

19CA0222 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	А	Pass	0.3	
Self-generated holse	c	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leg	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
Emeanly range for Log	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	
5 5	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 <sup>3</sup> at 4kHz	Pass	0.3	
0 0	1 ms burst duty factor 1/10 <sup>4</sup> 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.

		- E	nd -	1	
Calibrated by:	El		Checked by:	$1 \sim \gamma$	
	Fong Chun Wai			Fung Chi Yip	
Date:	25-Feb-2019		Date:	26-Feb-2019	
				1	

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.

© Soils & Materials Engineering Co., Ltd.

Form No.CARP152-2/Issue 1/Rev.C/01/02/2007



### 線合試験有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港賞竹坑道37號利進中で12種

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

Certificate No.:	19CA0329.02		Page	1 of 2
Item tested				
Description:	Sound Level Mete	r (Type 1)	Microphone	Preamp
Manufacturer:	B&K		B&K	B & K
Type/Model No.:	2250-1.		4950	ZC0032
Serial/Equipment No.:	2722310		2698702	13318
Adaptors used	1.5		100 million (100 m	
Item submitted by				
Customer Name:	Lam Geotechnics	Ltd.		
Address of Customer:	2			
Request No.:	45-000 Million			
Date of receipt:	29-Mar-2019			
Date of test:	02-Apr-2019			
Reference equipment	used in the calib	ration		
Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2019	CIGISMEC
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Signal generator	DS 360	61227	26-Dec-2019	CEPREI
Ambient conditions				
Temperature:	21 ± 1 °C			
Relative humidity:	55 ± 10 %			
Air pressure:	1005 ± 5 hPa			
975767972778	ngabenner all			
Test specifications				

- 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.
- 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: Jung

Date: 02-Apr-2019



Comments: The results reported b 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.

© Sols & Materials Engineering Co., Util

Form No: CARP 152: Maaile 1/Rev C/01/00/2007

Company Chop:



### 综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港黄竹坑垣37號科達中心12樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong, E-mail: smecificigismec.com Website: www.cigismec.com Tel: (852) 2873 6860 Fax: (852) 2555 7533

Page



### CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

19CA0329 02

2 of 2

#### 1, Electrical Tests

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

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leg.	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	
20 M W W	C	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 <sup>3</sup> at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 <sup>4</sup> 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	
	Log	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.

	12	- End -	1
Calibrated by:	EL	Checked by:	1~1
Date:	Fong Chun Wai 02-Apr-2019	Date:	Fung Chi Yib 02-Apr-2019

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.

© Solis & Malenals Engineering Co. Util

Form No CARP152-21ssue t/Rev C/01/02/2007



#### 综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 新港黄竹坑道37號利量中心12樓 12F, Leader Gestre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.

E-mail: smet@cigismec.com

連中心12機 Tel: (852) 2873 6860 Hang Road, Aberdeen, Hong Kong. Fax: (852) 2555 7533 Website: www.cigismec.com



### CERTIFICATE OF CALIBRATION

Certificate No.:	19CA0425 02		Page	1 of 2
Item tested				
Description:	Sound Level Mete	r (Type 1)	Microphone	Preamp
Manufacturer	B&K		B&K	B&K
Type/Model No.:	2250-L		4950	ZC0032
Serial/Equipment No.:	2722311		2698703	13321
Adaptors used:	2		-	10021
Item submitted by				
Customer Name:	100000000000000000000000000000000000000	142		
e e e e e e e e e e e e e e e e e e e	Lam Geotechnics	110.		
Address of Customer:	1			
Request No.				
Date of receipt	25-Apr-2019			
Date of test:	02-May-2019			
Reference equipment	used in the calib	ration		
Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2019	CIGISMEC
Signal generator	DS 360	61227	26-Dec-2019	CEPREI
Ambient conditions				
Temperature:	22 ± 1 °C			
Relative humidity:	55 ± 10 %			
	1005 ± 5 hPa			
Air pressure:	1005±5 nPa			
Test specifications				
t, The Sound Level Me	ter has been calibrat	ed in accordance with	the requirements as spe	cified in BS 7580: Part 1: 1997
and the lab calibratio				
				one which was removed and
		thin a tolerance of ±20		
				ons was applied for the differen
bahavan the free field	d and pressure respo	insess of the Sound Le	evel Meter.	
between the tree net				
Test results	8 A 50 A 51 B 21 A 6 A 6 A 6 A			
Test results This is to certify that the Sou	nd Level Meter confo	erms to BS 7580: Part	1: 1997 for the conditions	a under which the test
Test results This is to certify that the Sou vas performed.				a under which the test
Test results This is to certify that the Sou was performed. Details of the performed mea Actual Measurement data an	asurements are prese	ented on page 2 of this		s under which the test
Test results This is to certify that the Sou vas performed. Details of the performed mea	asurements are prese	ented on page 2 of this		s under which the test
Test results This is to certify that the Sou vas performed. Details of the performed mea	asurements are prese	ented on page 2 of this		s under which the test

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.

Feng Junqi

E Solis & Meterials Engineering Co., Ltd.

Furm No CARP152-Manuel URev Citl U02/2007

09 18 10



### 综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香港 黃竹 坑 镀 3 7 號 利 達 中 心 1 2 樓 12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdesn, Hong Kong, E-mail: smec@cigismec.com Website: www.clgismec.com

19CA0425 02

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



2

### CERTIFICATE OF CALIBRATION

(Continuation Page)

Page 2 of

#### 1. Electrical Tests

Certificate No.:

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	A	Pass	0.3	
odit Tourisianan using	c	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leg	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	
1.01.71.7.697.0997.01.9799.	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
2000 - 100 E. 100 T. 10	Single Burst Slow	Pass	0.3	
Peak response	Single 100us 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	
NAMES SERVICE STREET	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 <sup>3</sup> at 4kHz	Pass	0.3	
2010	1 ms burst duty factor 1/10 <sup>4</sup> 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	
	Leg	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.

End Calibrated by: Checked by ung Chi Yip Shek Rwong Tal 2-May-2019 Date: Date: 03-May-2019

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.

© Sola & Materials Engineering Co. Ltd.

Forn No CARP152-21anuar 1/Rev Ci01/02/2007



#### 综合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港貴竹筑道37號利進中心12葉 12F. 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

Certificate No.:	19CA0116 02		Page	1	of	2
Item tested						
Description:	Sound Level Mete	r (Type 1)	Microphone		Preamp	
Manufacturer:	B&K	5. V. 47 30 F	B&K		B&K	
Type/Model No.:	2250L		4950		ZC0032	
Serial/Equipment No.:	3002695		2940839		18582	
Adaptors used:	- 20100 States		50 ( ) ( ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )		10,000,000 30	
Item submitted by						
Customer Name:	Lam Geotechnics	Ltd.				
Address of Customer:		1777.34				
Request No.:	Same					
Date of receipt:	16-Jan-2019					
Date of test:	17-Jan-2019					
Reference equipment	used in the calib	ration				
Description:	Model:	Serial No.	Expiry Date:		Traceab	e to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2019		CIGISME	5
Signal generator	DS 360.	33873	24-Apr-2019		CEPREI	
Signal generator	DS 360	61227	26-Dec-2019		CEPREI	
Ambient conditions						
Temperature:	21 ± 1 *C					
Relative humidity:	50 ± 10 %					
Air pressure:	1005 ± 5 hPa					
Test specifications	2 AM 000 120000000					

- 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.
- 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.

Æ Fend Jungi

19-Jan-2019 Company Chop:



Comments: The results reported in the 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:

© Soits & Materials Engineering Co., Ltd.

Approved Signatory:

Form No. CARP152- Ulssue URay C/01/02/2007



### 綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香播黃竹就道37號利 建中心12 糖 12元, Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. E-mail: smec@cigismec.com Website: www.cigismec.com

19CA0116 02

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



### CERTIFICATE OF CALIBRATION

(Continuation Page)

Page 2 of 2

### 1. Electrical Tests

Certificate No.:

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	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leg	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	
M. 1929 M. 12	C	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 <sup>3</sup> at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 <sup>4</sup> 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	
	Leg	Pass	0.4	

#### 2, Acoustic tests

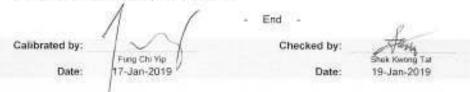
The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

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	
	Heighting A at 2000 Hz	P 455	0.0	

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.



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.

© Sofa & Materials Engineering Co., LM

Form No CARP152 2/Issue 1/Rev C/01/02/2007



### 綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD. 香港黄竹坑道37號利進中心12種 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

Certificate No.:	19CA0314 01		Page	1	of	2
Item tested						
Description: Manufacturer: Type/Model No.: Serial/Equipment No.: Adaptors used:	Sound Level Mete Larson Davis LxT1 0003737		Microphone PCB 377802 171529			
Item submitted by						
Customer Name: Address of Customer: Request No.: Date of receipt:	Lam Geotechnics - 14-Mar-2019	Ltd.				
Date of test:	18-Mar-2019					
Reference equipment	used in the calib	ration				
Description: Multi function sound calibrator Signal generator	Model: B&K 4226 DS 360	Serial No. 2258444 61227	Expiry Date: 23-Aug-2019 26-Dec-2019		Traceab CIGISME CEPREI	
Ambient conditions						
Temperature: Relative humidity: Air pressure:	21 ± 1 °C 55 ± 10 % 1005 ± 5 hPa					

The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580; Part 1; 1997 1, 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:

Feng Jung

19-Mar-2019 Company Chop:



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

Date:

O Soits & Materials Engineering Co., Ltd.

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



### 綜合試驗有限公司 SOILS & MATERIALS ENGINEERING CO., LTD.

香 進 黃 竹 坑 垣 3 7 號 利 遽 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

Page



### CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

1.

19CA0314 01

z 68

**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	A	Pass	0.3	
	c	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
Linearity range for Leg	At reference range , Step 5 dB at 4 kHz	Pass	0.3	0.22
	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	
	C	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 <sup>3</sup> at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 <sup>4</sup> 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	
	Leg	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	

#### з, 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.

		- End -	1 1
Calibrated by:	Ela	Checked by:	1~1
Date:	Fong Chun Wai 18-Mar-2019	Date:	Fung CN Ya 19-Mar-2019

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.

@ Solis & Materials Engineering Co., Ltd.

Form No CARP152-2/Islue 1/Rev C/01/02/2007

# Calibration Certificate

Certificate Number 2018010851

1

**Customer:** LAM Environmental Services Ltd 11/F Centre Point 181-185 Gloucester Road Wanchai, , Hong Kong

Model Number Serial Number Test Results	CAL200 13098 <b>Pass</b>	)	Procedure Number Technician Calibration Date Calibration Due	Scott	1.8386 Montgo t 2018	mery
Initial Condition Description	Inoperal Larson I	ble Davis CAL200 Acoustic Calibrator	Cambration Due Temperature Humidity Static Pressure	23 34 101.2	°C %RH kPa	± 0.3 °C ± 3 %RH ± 1 kPa
Evaluation Metho	od	The data is aquired by the insert voltage circuit sensitivity. Data reported in dB re 2		ne refere	nce mic	crophone's open
Compliance Stan	dards	Compliant to Manufacturer Specifications	s per D0001.8190 and the	following	g standa	ards:

ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. Test points marked with a **‡** in the uncertainties column do not fall within this laboratory's scope of accreditation.

IEC 60942:2017

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

This report may not be reproduced, except in full, unless permission for the publication of an approved abstract is obtained in writing from the organization issuing this report.

Standards Used						
Description	Cal Date	Cal Due	Cal Standard			
Agilent 34401A DMM	09/06/2018	09/06/2019	001021			
Larson Davis Model 2900 Real Time Analyzer	04/10/2018	04/10/2019	001051			
Microphone Calibration System	03/07/2018	03/07/2019	005446			
1/2" Preamplifier	09/20/2018	09/20/2019	006506			
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/07/2018	08/07/2019	006507			
1/2 inch Microphone - RI - 200V	05/10/2018	05/10/2019	006510			
Pressure Transducer	07/18/2018	07/18/2019	007368			

Larson Davis, a division of PCB Piezotronics, Inc 1681 West 820 North Provo, UT 84601, United States 716-684-0001





### Certificate Number 2018010851

### **Output Level**

Nominal Level [dB]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
114	101.2	114.01	113.80	114.20	0.14	Pass
94	101.2	94.01	93.80	94.20	0.15	Pass

-- End of measurement results--

### Frequency

Nominal Level	Pressure	Test Result	Lower limit	Upper limit	Expanded Uncertainty	Result
(dB)	[kPa]	[Hz]	[Hz]	[Hz]	[Hz]	Result
114	101.2	1,000.09	990.00	1,010.00	0.20	Pass
94	101.2	1,000.09	990.00	1,010.00	0.20	Pass

-- End of measurement results--

### Total Harmonic Distortion + Noise (THD+N)

Nominal Level [dB]	Pressure [kPa]	Test Result	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
114	101.2	0.31	0.00	2.00	0.25	Pass
94	101.2	0.35	0.00	2.00	0.25	Pass

-- End of measurement results--

### Level Change Over Pressure

### Tested at: 114 dB, 24 °C, 34 %RH

Nominal Pressure	Pressure	Test Result	Lower limit	Upper limit	Expanded Uncertainty	Damit
[kPa]	[kPa]	[dB]	[dB]	[dB]	[dB]	Result
108.0	108.0	-0.05	-0.30	0.30	0.04 ‡	Pass
101.3	101.3	0.00	-0.30	0.30	0.04 ‡	Pass
92.0	92.0	0.06	-0.30	0.30	0.04 ‡	Pass
83.0	82.9	0.09	-0.30	0.30	0.04 ‡	Pass
74.0	74.1	0.06	-0.30	0.30	0.04 ‡	Pass
65.0	65.1	-0.04	-0.30	0.30	0.04 ±	Pass

-- End of measurement results--

### **Frequency Change Over Pressure**

Nominal Pressure	Pressure	Test Result	Lower limit	Upper limit	<b>Expanded Uncertainty</b>	Result
kPaj	[kPa]	[Mz]	[117]	[11z]	[112]	Result
08.0	108.0	0.02	-10.00	10.00	0.20 ‡	Pass
01.3	101.3	0.00	-10.00	10.00	0.20 ‡	Pass
02.0	92.0	0.00	-10.00	10.00	0.20 ‡	Pass
3.0	82.9	0.01	-10.00	10.00	0.20 ‡	Pass
74.0	74.1	0.01	-10.00	10.00	0.20‡	Pass
5.0	65.1	0.01	-10.00	10.00	0.20 ±	Pass

-- End of measurement results--

Larson Davis, a division of PCB Piezotronics, Inc 1681 West 820 North Provo, UT 84601, United States 716-684-0001





10/29/2018 1:43:01PM

### Certificate Number 2018010851 Total Harmonic Distortion + Noise (THD+N) Over Pressure

#### Tested at: 114 dB, 24 °C, 34 %RH

Nominal Pressure	Pressure	Test Result	Lower limit	Upper limit	<b>Expanded Uncertainty</b>	Basult
[kPa]	[kPa]	[%]	[%]	1%	[%]	Result
08.0	108.0	0.30	0.00	2.00	0.25 ‡	Pass
01.3	101.3	0.31	0.00	2.00	0.25 ‡	Pass
92.0	92.0	0.33	0.00	2.00	0.25 ‡	Pass
3.0	82.9	0.35	0.00	2.00	0.25 ‡	Pass
4.0	74.1	0.37	0.00	2.00	0.25 ‡	Pass
5.0	65.1	0.40	0.00	2.00	0.25 ‡	Pass
			End of measuremen	nt results		

Signatory: \_Scott Montgomery

Larson Davis, a division of PCB Piezotronics, Inc 1681 West 820 North Provo, UT 84601, United States 716-684-0001





10/29/2018 1:43:01PM

Page 3 of 3

D0001.8410 Rev A