

RECALIBRATION DUE DATE:

June 4, 2022

Certificate of Calibration

	Calibration Certification Information								
Cal. Date:	June 4, 202	21	Roots	meter S/N:	438320	°K			
Operator:	Jim Tisch					Pa:	750.3	mm Hg	
Calibration	Model #:	TE-5025A	Calil	brator S/N:	2456				
		Vol. Init	Vol. Final	ΔVol.	ΔTime	ΔP	ΔН		
	Run	(m3)	(m3)	(m3)	(min)	(mm Hg)	(in H2O)		
	1	1	2	1	1.4450	3.2	2.00		
	2	3	4	1	1.0220	6.4	4.00		
	3	5	6	1	0.9070	8.0	5.00		
	4	7	8	1	0.8650	8.8	5.50		
	5	9	10	1	0.7130	12.8	8.00		
	Data Tabulation								
	Vstd	Qstd	$\sqrt{\Delta H \left(\frac{Pa}{Pstd}\right)}$)(<u>Tstd</u>)		Qa	$\sqrt{\Delta H(Ta/Pa)}$		
	(m3)	(x-axis)	(y-ax	is)	Va	(x-axis)	(y-axis)		
	0.9964	0.6896	1.4147		0.9957	0.6891	0.8853	1	
	0.9922	0.9708	2.0007		0.9915	0.9701	1.2519]	
	0.9900	1.0915	2.23	2.2368		1.0908	1.3997		
	0.9890	1.1433	2.340	60	0.9883	1.1425	1.4680		
	0.9836	1.3795	2.829	94	0.9829	1.3786	1.7705		
		m=	2.047	/31		m=	1.28199		
	QSID	b=	0.005	573	QA	b=	0.00358		
		r=	0.999	196		r=	0.99996	1	
				Calculatio	ns				
	Vstd=	∆Vol((Pa-∆P)	/Pstd)(Tstd/Ta	a)	Va=	∆Vol((Pa-∆I			
	Qstd=	Vstd/∆Time							
			For subsequ	ent flow ra	te calculatio	ns:			
	Qstd=	$1/m \left(\sqrt{\Delta H} \right)$	Pa Pstd / Tstd Ta		Qa=	$1/m\left(\sqrt{\Delta F}\right)$	l(Ta/Pa))-b)		
*****	Standard	Conditions							
Tstd:	298.15	°K				RECA	LIBRATION	dikinen dia dentaman behintara da	
Pstd:	760	mm Hg					1 11	4000	
	K	ley			US EPA reco	mmends ai	nnual recalibratio	on per 1998	
1H: calibrate	or manomet	er reading (i	n H2O)		40 Code	of Federal F	Regulations Part	50 to 51,	
14: rootsme	eter manome	eter reading	(mm Hg)		Appendix B to Part 50, Reference Method for the				
a: actual at	arometric pr	perature ("K)	На)		Determinat	ion of Susp	ended Particulat	e Matter in	
intercent	ai ometric pr	essure (mm	ng)		the	e Atmosphe	ere, 9.2.17, page	30	
n: slope	under open andere ander der eine der eine der			L				0-040-450 mark contract-and a land cont	
: slope		101000-0000000000000000000000000000000		l	ült timpenisen of encoded and an experim	anangangan ang mang mang mang mang mang		o manufacture and a standard	

Tisch Environmental, Inc. 145 South Miami Avenue Village of Cleves, OH 45002

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



Room 723 & 725, 7/F, Block B, Profit Industrial Building, 1-15 Kwai Fung Crescent, Kwai Fong, Hong Kong.

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

								-		
Project : Co	ntract No. HY	(/2019/01 - H	ong Kong-Z	huhai-Macad	b Brid	lge		Date of	Calibration:	13-Sep-21
Location : A	MS2							Next Calib	oration Date:	12-Dec-21
Brand:		lisch							Technician:	Ting Chan
Model:		TE-5170		S/N:	HVS	5-01				
				COND	ΙΤΙΟ	NS				
	Se	ea Level Pres	sure (hPa):	1006.7		Corre	ected Pressu	re (mm Hg):	755	
		Tempe	erature (°C):	30.9			Temp	perature (K):	304	
				CALIBRATI	ON C	ORIFICE				
		Make:		Tisch			Qstd Slope:		2.04731	
		Model:		TE-5025A		Qs	std Intercept:		0.00573	
	Calib	ration Date:		4-Jun-21			Expiry Date:		4-Jun-22	
		S/N:		2456						
				CALIB	RATI	ON				
Plata No	H2O (L)	H2O (R)	H2O	Qstd		Ι	IC		LINEAR	
FIALE NO.	(in)	(in)	(in)	(m³/min)	(chart)	(corrected)		REGRESSIC	N
18	11.00	-7.40	18.400	2.065		60.00	59.21	Slope =	26.5492	
13	8.60	-6.80	15.400	1.889		56.00	55.26	Intercept =	4.6122	
10	7.30	-5.40	12.700	1.715		50.00	49.34	Corr. coeff.=	0.9963	
7	4.60	-4.10	8.700	1.419		44.00	43.42			
5	2.80	-3.30	6.100	1.188		36.00	35.52			
Calculation	IS:									
Qstd = 1/m[Sqrt(H2O(Pa	/Pstd)(Tstd/T	a))-b]				FI (HART	
IC = I[Sqrt(F	Pa/Pstd)(Tstd	/Ta)]				70.00	1 2			
Qstd = stan	dard flow rate	9				70.00				
IC = correct	ed chart resp	onse				60.00				
I = actual ch	art response									
m = calibra	tor Qstd slop	е			Ω	50.00				
b = calibrat	or Qstd interc	cept			se (
Ta = actual	temperature	during calibra	ation (deg K)		loc	40.00				
Pa = actual	pressure dur	ing calibratio	n (mm Hg)		ses	30.00				
Tstd = 298 deg K					art F	50.00				
Pstd = 760 mm Hg					U,	20.00				
For subsequent calculation of sampler flow:					tual					
1/m((I)[Sqrt(I/m((I)[Sqrt(298/Tav)(Pav/760)]-b)									
m = sampler slope						0.00				
b = sample	b = sampler intercept							1.000 1	500 2.000	2.500
I = chart re	sponse					0		1.000 1.	2,000	2.200
Tav = daily a	average temp	perature					Stand	dard Flow Rate	e (m³/min)	
Pav = daily a	average pres	sure								

(By

Wan Ka Ho **Project Consultant**

Report Date: 13/9/2021



Room 723 & 725, 7/F, Block B, Profit Industrial Building, 1-15 Kwai Fung Crescent, Kwai Fong, Hong Kong.

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

	· · · · · · · · · · · · · · · · · · ·				D.11				0.0.01
Project : Con	ntract No. HY	//2019/01 - H	ong Kong-Z	huhai-Macac	Bridge		Date of	Calibration:	9-Dec-21
Location : AN	MS2	.					Next Calib	ration Date:	8-Mar-22
Brand:		lisch						Technician:	Ting Chan
Model:		TE-5170		S/N:	HVS-01				
				COND	ITIONS				
	Se	ea Level Pres	sure (hPa):	1022.3	Cor	rected Pressu	ire (mm Hg):	767	
		Tempe	erature (°C):	20.2		Tem	perature (K):	293	
				CALIBRATI		E			
		Make:		Tisch		Qstd Slope:		2.04731	
		Model:		TE-5025A	C	std Intercept:		0.00573	
	Calib	ration Date:		4-Jun-21		Expiry Date:		4-Jun-22	
		S/N:		2456					
				CALIB	RATION	•			
Plate No	H2O (L)	H2O (R)	H2O	Qstd	I	IC		LINEAR	
1 1010 110.	(in)	(in)	(in)	(m³/min)	(chart)	(corrected)	F	REGRESSIC	N
18	6.80	-8.00	14.800	1.900	50.00	50.62	Slope =	29.7591	
13	6.00	-6.80	12.800	1.766	44.00	44.54	Intercept =	-7.0140	
10	4.90	-5.80	10.700	1.615	40.00	40.50	Corr. coeff.=	0.9954	
7	3.70	-4.60	8.300	1.422	35.00	35.43			
5	1.90	-3.80	5.700	1.178	28.00	28.35			
Calculations	S:								
Qstd = $1/m[S]$	Sqrt(H2O(Pa	/Pstd)(Tstd/T	a))-b]			FLO	OW RATE CH	HART	
IC = I[Sqrt(Pa	a/Pstd)(Tstd/	/1a)]			60.00)			
Qsta = stand	ard flow rate	;							
IC = correcte	ed chart resp	onse			50.00)			
I = actual cha	art response	_							
m = calibrate	or Usta slope	e 			<u>9</u> 40.00)			
D = Calibrato	or Usta Interc	ept: during a selibre	tion (door K)		S S				
			allon (deg K) a (mm Цa)		a 30.00)			
$Ta = a cluar \mu$ Tota = 200 d		ing calibration	n (ninn Hy)		Rec			•	
I std = 298 deg K					20.00)			
For subsequ	uent calcula	tion of sam	nler flow:						
1/m((I)[Sart()	298/Tay)(Pay	$\sqrt{760}$			ນ 10.00)			
m = sample	erslope	.,,			◄				
b = sample	r intercent				0.00)			
= chart res	. intoroopt					0.000 0.5	00 1.000	1.500	2.000
	sponse								
Tav = dailv a	sponse iverage temp	perature				01	dard Elaw Data	(100 3/100 :)	

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Wan Ka Ho **Project Consultant**

Report Date: 10/12/2021



Room 723 & 725, 7/F, Block B, Profit Industrial Building, 1-15 Kwai Fung Crescent, Kwai Fong, Hong Kong.

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Project Co	ntract No. HY	//2019/01 - H	ong Kong-7	huhai-Macar	Brid	ne		Date of	Calibration:	13-Sep-21
I ocation · A	MS3C	/2013/01 - 11	ong Kong-z		Dila	ge		Next Calib	vation Date:	12-Dec-21
Brand		Tisch						NEXT Gain		Ting Chan
Model:		TE-5170		S/NI	нла	-02			recrimician.	Ting Chan
wouer.		12-5170		0/IN.	1100	-02				
				COND	ITIO	NS				
	Se	ea Level Pres	sure (hPa):	1006.7		Corre	ected Pressu	re (mm Hg):	755	
		Tempe	erature (°C):	30.9			Temp	perature (K):	304	
				CALIBRATI	ON C	DRIFICE				
		Make:		Tisch			Qstd Slope:		2.04731	
	_	Model:		TE-5025A		Qs	std Intercept:		0.00573	
	Calib	ration Date:		4-Jun-21			Expiry Date:		4-Jun-22	
		S/N:		2456						
			1100	CALIB	RATI		10			
Plate No.	H2O (L)	H2O (R)	H2O	Qstd	,					211
- 10	(in)	(in)	(in)	(m /min)	(0	chart)	(corrected)	01	REGRESSIC	JN
18	11.00	-8.30	19.300	2.115		62.00	61.18	Siope =	27.7723	
13	8.80	-7.20	16.000	1.925		56.00	55.26	Intercept =	1./33/	
10	7.10	-6.20	13.300	1.755		50.00	49.34	Corr. coett.:	0.9978	
/ 5	4.60	-4.30	8.900	1.435		42.00	41.45			
Calculation	2.40	-3.10	5.500	1.120		34.00	33.33			
Qstd = 1/m[i s. Sort(H2O(Pa	/Pstd)(Tstd/T	a))-b]							
IC = I[Sart(F	Pa/Pstd)(Tstd	/Ta)]	()) [2]				FLO	OW RATE C	HART	
Qstd = stan	dard flow rate	;				70.00				
IC = correct	ed chart resp	onse				~~ ~~				
I = actual ch	art response					60.00				
m = calibra	tor Qstd slope	Э			0	50.00				
b = calibrate	or Qstd interc	ept			e (IC					
Ta = actual	temperature (during calibra	ation (deg K)	1	onsi	40.00		/		
Pa = actual	pressure duri	ing calibration	n (mm Hg)		esp					
Tstd = 298 deg K					2 2 2	30.00				
Pstd = 760 mm Hg				Cha	20.00					
For subsequent calculation of sampler flow:					ual (20.00				
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)						10.00				
m = sampler slope										
b = sample	b = sampler intercept							1 000 1	500 2.000	2 500
I = chart re	= chart response						.000 0.300	1.000 1.	.500 2,000	2.500
Tav = daily a	average temp	erature					Stand	dard Flow Rate	e (m³/min)	
Pav = daily a	Pav = daily average pressure									

(By

Wan Ka Ho Project Consultant

Report Date: 13/9/2021



Room 723 & 725, 7/F, Block B, Profit Industrial Building, 1-15 Kwai Fung Crescent, Kwai Fong, Hong Kong.

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Project · Con	tract No. HY	//2019/01 - H	ona Kona-Z	huhai-Macac	Bridge			Date of	Calibration:	9-Dec-21
	1930	/2013/01 - 11	ong Kong-z		Dhuge			Nevt Calib	ration Date:	8-Mar-22
Brand	1000	Tisch						Next Calib		Ting Chan
Model:		TE-5170		€/Nŀ	<u>цус</u> 0	r			rechnician.	Ting Chan
Model.				5/N.	1103-0	2				
				COND	ITIONS	;				
	Se	ea Level Pres	sure (hPa):	1022.3		Corre	ected Pressu	re (mm Hg):	767	
		Tempe	erature (°C):	20.2			Temp	perature (K):	293	
		·					·	()		
				CALIBRATI	ON OR	IFICE				
		Make:		Tisch			Qstd Slope:		2.04731	
		Model:		TE-5025A		Qs	td Intercept:		0.00573	
	Calib	ration Date:		4-Jun-21			Expiry Date:		4-Jun-22	
		S/N:		2456						
				CALIB	RATIO	N .				
Plate No	H2O (L)	H2O (R)	H2O	Qstd			IC		LINEAR	
Thate Her	(in)	(in)	(in)	(m³/min)	(ch	art)	(corrected)		REGRESSIC	ON
18	6.20	-8.00	14.200	1.861	5	0.00	50.62	Slope =	37.4548	
13	5.80	-6.50	12.300	1.731	4	6.00	46.57	Intercept =	-18.1567	
10	4.50	-5.60	10.100	1.569	4	2.00	42.52	Corr. coeff.=	0.9947	
7	3.60	-4.00	7.600	1.360	3	2.00	32.40			
5	2.20	-3.20	5.400	1.146	2	4.00	24.30			
Calculations	6:									
Qstd = $1/m[S]$	Sqrt(H2O(Pa	/Pstd)(Tstd/T	a))-b]				FLC	OW RATE CI	HART	
IC = I[Sqrt(Pa	a/Pstd)(Tstd	/1a)]			e e	50.00				
Qstd = stand	lard flow rate)								
IC = correcte	d chart resp	onse				50.00				
I = actual cha	art response								1	
m = calibrate	or Qstd slope	e 			jê ,	10 00			/	
D = Calibrato	or Usta Interc	ept during colibre	tion (dog K)		Ise					
Ta = actual to		uuring calibratio	allon (deg K) a (mm Lla)		bor	30.00				
$Pa = actual \mu$		ing calibration	n (mm ¤g)		Rec					
1 Sid = 298 deg K					art	20.00				
For subsequent calculation of sampler flow:					U C C					
1/m(())[Sort(298/Tay)(Pay/760)]_b)						LO.00				
m = sample	m = sampler slope									
h – sampler intercent						0.00				
= chart reg	- chart response						.000 0.50	00 1.000	1.500	2.000
Tay = daily a	verage temr	erature					•			
Pav = dailv a	verage pres	sure					Stand	ard Flow Rate	(m³/min)	

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Wan Ka Ho **Project Consultant**

Report Date: 13/9/2021



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Topics of the set of collaboration of coll and the set of collaboration collaboration of collaboraticolaboration of collaboration of collaboration	Project · Cou	ntract No. HY	//2019/01 - H	long Kong-7	huhai-Macar		0e		Date of	Calibration:	5-0ct-21
Execution : Numbrie Tisch Technician: Ting Chan Brand: Tisch Technician: Ting Chan Model: TE-5170 S/N: HVS-03 CONDITIONS Sea Level Pressure (hPa): 1011.4 Corrected Pressure (nm Hg): 759 Temperature (°C): 30.1 Temperature (K): 303 CALIBRATION ORIFICE Make: Tisch Qstd Slope: 2.04731 Model: TE-5025A Qstd Intercept: 0.00573 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 Expiry Date: 4-Jun-22 S/N: 2456 Intercept: 0.00573 Plate No. (in) (in) (in) (in) REGRESSION 18 10.80 6.70 15.300 1.481 38.00 37.46 Slope = 29.1849 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.= 0.9974 7 2.20 <	Location · A	MS7C	/2015/01-11			Dhu	ge		Nevt Calib	vation Date:	4- lan-22
Diand. Technical: Tree formulation of sampler flow: Model: TE-5170 S/N: HVS-03 CONDITIONS Sea Level Pressure (hPa): 1011.4 Corrected Pressure (mm Hg): 759 Temperature (°C): 30.1 Temperature (K): 303 CALIBRATION ORIFICE Model: TE-5025A Qstd Slope: 2.04731 Model: TE-5025A Qstd Intercept: 0.00573 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 CALIBRATION REGRESSION Plate No. H2O (L) H2O R) Qstd Intercept: 0.00573 18 10.80 -8.20 19.000 2.106 58.00 57.46 Slope = 29.1849 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.481 30.00 29.72 Calulations: Calculations: Calculations: Calculationst	Brand		Tisch						Next Call		Ting Chan
Induce: Induce: CONDITIONS Sea Level Pressure (hPa): 1011.4 Corrected Pressure (mm Hg): 759 Temperature (°C): 30.1 Temperature (K): 303 CALIBRATION ORIFICE Model: TE-5025A Qstd Slope: 2.04731 Model: TE-5025A Qstd Slope: 2.04731 CALIBRATION Plate No. (I) H2O (R) H2O (R) H2O (R) H2O (R) H2O (R) H2O (R) LINEAR TO ALIBRATION CALIBRATION CALIBRATION CALIBRATION TO Colspan="2">LINEAR (In) H2O (R) H2O (R) H2O (R) LINEAR TO Colspan="2">LINEAR Corrected Nat REGRESSION TE actual chart response <td>Modol:</td> <td></td> <td>TE-5170</td> <td></td> <td>€/Nŀ</td> <td>цус</td> <td>-03</td> <td></td> <td></td> <td>rechnician.</td> <td>Ting Chan</td>	Modol:		TE-5170		€/Nŀ	цус	-03			rechnician.	Ting Chan
CONDITIONS Sea Level Pressure (hPa): 1011.4 Corrected Pressure (mm Hg): 759 Temperature (°C): 30.1 Temperature (K): 303 CALIBRATION ORIFICE Make: Tisch Qstd Slope: 2.04731 Model: TE-5025A Qstd Intercept: 0.00573 CALIBRATION CALIBRATION Plate No. H2O (L) H2O (R) H2O (R) H2O (R) H2O (L) H2O (R) LINEAR F1200 (R) H2O (R) H2O (R) CALIBRATION TEGESISION 2	wouer.		12-3170		3/N.	1103	-03				
Sea Level Pressure (hPa): 1011.4 Corrected Pressure (mm Hg): 759 Temperature (°C): 30.1 Temperature (K): 303 CALIBRATION ORIFICE Make: Tisch Qstd Slope: 2.04731 Model: TE-5025A Qstd Intercept: 0.00573 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 CALBRATION Plate No. H2O (L) H2O (R) H2O (M) Qstd I IC LINEAR 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.163 30.00 29.72					COND	ΙΤΙΟΙ	NS				
Temperature (°C): 30.1 Temperature (K): 303 CALIBRATION ORIFICE Make: Tisch Qstd Slope: 2.04731 Model: TE-5025A Qstd Intercept: 0.00573 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: Calibration Calibration (m ³ /min) (chart) (corrected) REGRESSION 18 10.80 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff:: 0.9974 Calculations:		Se	ea Level Pres	ssure (hPa):	1011.4		Corre	ected Pressu	re (mm Hg):	759	
CALIBRATION ORIFICEMake:TischQstd Slope:2.04731Model:TE-5025AQstd Intercept:0.00573Calibration Date:4-Jun-21Expiry Date:4-Jun-22S/N:24562456CALIBRATIONPlate No.H2O (L)H2O (R)H2OQstdIICLINEARPlate No.(in)(in)(in)(in)(in)REGRESSION1810.80-8.2019.0002.10658.0057.46Slope =29.1849138.60-6.7015.3001.89050.0049.53Intercept =-4.9340107.00-5.0012.0001.67344.0043.59Corr. coeff.:0.997475.20-4.209.4001.48138.0037.6450.997452.60-3.205.8001.16330.0029.72Caluations:Qstd = 1/m[Sqrt(H2C)(Pa/Pstd)(Tstd/Ta))-b]ICICICFLOW RATE CHART(C = corrected chart responseIactual temperature during calibration (deg K)90.0040.00Pa = actual pressure during calibration (mm Hg)50.0040.0040.0090.00940.00930.0090.0090.0090.00940.0090.0090.0090.0090.00990.0090.0090.0090.0090.009990.0090.0090.0090.00 <t< td=""><td></td><td></td><td>Tempe</td><td>erature (°C):</td><td>30.1</td><td></td><td></td><td>Temp</td><td>perature (K):</td><td>303</td><td></td></t<>			Tempe	erature (°C):	30.1			Temp	perature (K):	303	
CALIBRATION ORIFICE Make: Tisch Qstd Slope: 2.04731 Model: TE-5025A Qstd Intercept: 0.00573 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 2456 CALIBRATION Plate No. H2O (L) H2O (R) H2O (C) Qstd I IC LINEAR 18 10.80 -8.20 19.000 2.106 58.00 57.46 Slope = 29.1849 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7 5.20 -4.20 9.400 1.481 38.00 37.64 5 2.60 -3.20 5.800 1.163 30.00 29.72 Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] IC IC IC/Grt/Pa/Std)(Tstd/Ta))-b] IC			•	()				•			
Make: Tisch Qstd Slope: 2.04731 Model: TE-5025A Qstd Intercept: 0.00573 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 CALIBRATION Plate No. H2O (L) H2O (R) H2O Qstd I IC LINEAR Plate No. H2O (L) H2O (R) H2O Qstd I IC (corrected) REGRESSION 18 10.80 -8.20 19.000 2.106 58.00 57.46 Slope = 29.1849 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.: 0.9974 7 5.20 -4.20 9.400 1.481 38.00 37.64 0 0.972 Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] IC = [[Sqrt(Pa/Pstd)(Tstd/Ta)] 0.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00					CALIBRATI	ON C	ORIFICE				
Model: TE-5025A Qstd Intercept: 0.00573 Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 Calibration Calibration Calibration Plate No. H2O (L) H2O (R) H2O (Qstd) I IC LINEAR Plate No. H2O (L) H2O (R) H2O (Qstd) (chart) (corrected) REGRESSION 18 10.80 -8.20 19.000 2.106 58.00 57.46 Slope = 29.1849 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.: 0.9974 7 5.20 -3.20 5.800 1.163 30.00 29.72 Corr. coeff.: 0.9974 Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] 50.00 -50.00 20.00 -50.00 20.00 -60.00 20.00 -60.00 20.00 -60.00 -20.00 -20.00 -20.00 -20.00 -20.00 -20			Make:		Tisch			Qstd Slope:		2.04731	
Calibration Date: 4-Jun-21 Expiry Date: 4-Jun-22 S/N: 2456 CALIBRATION CALIBRATION Plate No. H2O (L) (in) (in) (in) (m ³ /min) (chart) (corrected) (corrected) REGRESSION 18 10.80 -8.20 19.000 2.106 58.00 57.46 Slope = 29.1849 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.: 0.9974 Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)] Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta)] Qstd = standard flow rate 0.00 50.00 0.00 50.00 IC = corrected chart response 9 30.00 90.00 50.00 0.00 50.00 0.00 50.00 0.00 50.00 0.00 0.00 50.00 0.00 50.00 0.00 50.00 </td <td></td> <td></td> <td>Model:</td> <td></td> <td>TE-5025A</td> <td></td> <td>Qs</td> <td>td Intercept:</td> <td></td> <td>0.00573</td> <td></td>			Model:		TE-5025A		Qs	td Intercept:		0.00573	
S/N: 2456 CALIBRATION Plate No. H2O (L) (in) H2O (R) (in) H2O (R) (m ³ /min) IC LINEAR 18 10.80 -8.20 19.000 2.106 58.00 57.46 Slope = 29.1849 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.: 0.9974 7 5.20 -4.20 9.400 1.163 30.00 29.72 Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)] FLOW RATE CHART 0 0.00 -3.20 5.800 1.163 30.00 29.72 Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta)])-b] FLOW RATE CHART 70.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 60.00 <td< td=""><td></td><td>Calib</td><td>ration Date:</td><td></td><td>4-Jun-21</td><td></td><td></td><td>Expiry Date:</td><td></td><td>4-Jun-22</td><td></td></td<>		Calib	ration Date:		4-Jun-21			Expiry Date:		4-Jun-22	
CALIBRATION Plate No. H2O (L) (in) H2O (R) (in) Line Certed) REGRESSION 18 10.80 -8.20 19.000 2.106 58.00 57.46 Slope = 29.1849 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.: 0.9974 7 5.20 -4.20 9.400 1.481 38.00 37.64 5 2.60 -3.20 5.800 1.163 30.00 29.72 Calculations: Qstd = standard flow rate IC Corrected chart response 60.00 50.00 0 0 0 0 0 0 </td <td></td> <td></td> <td>S/N:</td> <td></td> <td>2456</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			S/N:		2456						
Plate No. H2O (L) (in) H2O (R) (in) Iter C (corrected) Iter C (corrected) Iter C REGRESSION 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.: 0.9974 7 5.20 -4.20 9.400 1.481 38.00 37.64 Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta)] 0.00 - - - 0.9974 Qstd = standard flow rate IC = corrected chart response - - - - - - - - - - - - - - - - </td <td></td> <td></td> <td></td> <td></td> <td>CALIB</td> <td>RATI</td> <td>ON</td> <td></td> <td></td> <td></td> <td></td>					CALIB	RATI	ON				
Interview (in) (in) (in) (in) (m³/min) (chart) (corrected) REGRESSION 18 10.80 -8.20 19.000 2.106 58.00 57.46 Slope = 29.1849 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.: 0.9974 7 5.20 -4.20 9.400 1.481 38.00 37.64 Corr. coeff.: 0.9974 7 5.20 -4.20 9.400 1.481 38.00 37.64 Corr. coeff.: 0.9974 Calculations: Rescret colspan="4">REGRESSION Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] IC = corrected chart response I = actual chart response 60.00 60.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Plate No	H2O (L)	H2O (R)	H2O	Qstd		I	IC		LINEAR	
18 10.80 -8.20 19.000 2.106 58.00 57.46 Slope = 29.1849 13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.: 0.9974 7 5.20 -4.20 9.400 1.481 38.00 37.64 Does 10.00 29.72 Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)] 0.00		(in)	(in)	(in)	(m³/min)	(0	chart)	(corrected)		REGRESSIC	N
13 8.60 -6.70 15.300 1.890 50.00 49.53 Intercept = -4.9340 10 7.00 -5.00 12.000 1.673 44.00 43.59 Corr. coeff.: 0.9974 7 5.20 -4.20 9.400 1.481 38.00 37.64 5 2.60 -3.20 5.800 1.163 30.00 29.72 Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)] FLOW RATE CHART IC = corrected chart response 70.00 60.00 60.00 60.00 I = actual chart response 50.00 50.00 50.00 60.00 I = actual chart response 50.00 50.00 50.00 60.00 60.00 Ta = actual temperature during calibration (deg K) 90.00 50.00 90.00 90.00 90.00 Tstd = 298 deg K Pstd = 760 mm Hg 20.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 90.00 <	18	10.80	-8.20	19.000	2.106		58.00	57.46	Slope =	29.1849	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	13	8.60	-6.70	15.300	1.890		50.00	49.53	Intercept =	-4.9340	
7 5.20 -4.20 9.400 1.481 38.00 37.64 5 2.60 -3.20 5.800 1.163 30.00 29.72 Calculations:Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta)]IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]IC = corrected chart responseIC = corrected chart response 60.00 I = actual chart response 60.00 I = actual chart response 60.00 b = calibrator Qstd slope 60.00 b = calibrator Qstd slope 60.00 b = calibrator Qstd intercept 60.00 Ta = actual temperature during calibration (deg K)Pa = actual pressure during calibration (mm Hg)Tstd = 298 deg KPstd = 760 mm HgFor subsequent calculation of sampler flow: $1/m(U)[Sgrt(298/Tay)(Pay/760)]/b)$	10	7.00	-5.00	12.000	1.673		44.00	43.59	Corr. coeff.=	0.9974	
52.60-3.205.8001.16330.0029.72Calculations:Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]Qstd = standard flow rateIC = corrected chart responseI = actual chart responsem = calibrator Qstd slopeb = calibrator Qstd interceptTa = actual temperature during calibration (deg K)Pa = actual pressure during calibration (mm Hg)Tstd = 298 deg KPstd = 760 mm HgFor subsequent calculation of sampler flow:1/m(/ll)Scrt(298/Tav)(Pav/760)l-b)	7	5.20	-4.20	9.400	1.481		38.00	37.64			
Calculations: Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)] Qstd = standard flow rate IC = corrected chart response I = actual chart response m = calibrator Qstd slope b = calibrator Qstd intercept Ta = actual temperature during calibration (deg K) Pa = actual pressure during calibration (mm Hg) Tstd = 298 deg K Pstd = 760 mm Hg For subsequent calculation of sampler flow: 1/m(U)Sgrt(228/Tay)(Pay/760)I-b)	5	2.60	-3.20	5.800	1.163		30.00	29.72			
Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b] IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)] Qstd = standard flow rate IC = corrected chart response I = actual chart response m = calibrator Qstd slope b = calibrator Qstd slope b = calibrator Qstd slope b = calibrator Qstd intercept Ta = actual pressure during calibration (deg K) Pa = actual pressure during calibration (mm Hg) Tstd = 298 deg K Pstd = 760 mm Hg For subsequent calculation of sampler flow: 1/m(/l)[Sgrt(298/Tay)/(Pay/760)]-b)	Calculation	S:									
IC = I[Sqrt(Pa/Pstd)(1std/1a)] Qstd = standard flow rate IC = corrected chart response I = actual chart response m = calibrator Qstd slope b = calibrator Qstd intercept Ta = actual temperature during calibration (deg K) Pa = actual pressure during calibration (mm Hg) Tstd = 298 deg K Pstd = 760 mm Hg For subsequent calculation of sampler flow: 1/m((I)[Sqrt(298/Tay)(Pay/760]]rb)	Qstd = $1/m[$	Sqrt(H2O(Pa	/Pstd)(Tstd/T	⁻ a))-b]				FLC	OW RATE C	HART	
Qstd = standard flow rate IC = corrected chart response IC = corrected chart response 60.00 I = actual chart response 60.00 m = calibrator Qstd slope 50.00 b = calibrator Qstd intercept 50.00 Ta = actual temperature during calibration (deg K) 40.00 Pa = actual pressure during calibration (mm Hg) 30.00 Tstd = 298 deg K 20.00 Pstd = 760 mm Hg 20.00 For subsequent calculation of sampler flow: 10.00	IC = I[Sqrt(P)]	'a/Pstd)(Tstd	/Ia)]				70.00				
IC = corrected chart response I = actual chart response m = calibrator Qstd slope b = calibrator Qstd intercept Ta = actual temperature during calibration (deg K) Pa = actual pressure during calibration (mm Hg) Tstd = 298 deg K Pstd = 760 mm Hg For subsequent calculation of sampler flow: 1/m((I)[Sqrt(298/Tay)(Pay/760)]b)	Qstd = stand	dard flow rate	9				, 0100				
I = actual chart response m = calibrator Qstd slope b = calibrator Qstd intercept Ta = actual temperature during calibration (deg K) Pa = actual pressure during calibration (mm Hg) Tstd = 298 deg K Pstd = 760 mm Hg For subsequent calculation of sampler flow: 1/m((I))[Sqrt(298/Tay)(Pay/760)]b)	IC = correcte	ed chart resp	onse				60.00				
m = calibrator Qstd slope b = calibrator Qstd intercept Ta = actual temperature during calibration (deg K) Pa = actual pressure during calibration (mm Hg) Tstd = 298 deg K Pstd = 760 mm Hg For subsequent calculation of sampler flow: 1/m((I)[Sqrt(298/Tay)(Pay/760)]b)	i = actual ch	art response	_								
b = calibrator Qstd Intercept Ta = actual temperature during calibration (deg K) Pa = actual pressure during calibration (mm Hg) Tstd = 298 deg K Pstd = 760 mm Hg For subsequent calculation of sampler flow: 1/m((I)[Sqrt(298/Tay)(Pay/760)]b)	m = calibrat	tor Qstd slop	e			Q	50.00				
Ta = actual temperature during calibration (deg K) 5 40.00 Pa = actual pressure during calibration (mm Hg) 30.00 Tstd = 298 deg K 20.00 Post = 760 mm Hg 20.00 For subsequent calculation of sampler flow: 1/m((1)[Sqrt(298/Tay)(Pay/760)]b)	D = calibrato	or Qsta Intera	cept during a colibra	ations (de s. K)		Ise (40.00				
Pa = actual pressure during calibration (mm Hg) 30.00 Tstd = 298 deg K 20.00 Pstd = 760 mm Hg 20.00 For subsequent calculation of sampler flow: 1/m((1)[Sqrt(298/Tay)(Pay/760)]rb)			ouring calibration	allon (deg K) n (mm Lla)		por	40.00				
Pstd = 760 mm Hg For subsequent calculation of sampler flow: 1/m((I)[Sqrt(298/Tay)(Pay/760)]b)	Pa = actual	pressure dun log K	ing calibratio	n (mm ¤g)		Res	30.00				
Find = 700 mining 5 20.00 For subsequent calculation of sampler flow: Image: Comparison of the sampler flow: 1/m((I)[Sort(298/Tay)(Pay/760)]-b) 5 10.00	1 St0 = 298 deg K					art					
$1/m((1)[Sart(298/Tay)(Pay/760)]_b)$	For subsequent calculation of sampler flow:					C	20.00				
	for subsequent calculation of sampler now: 1/m(/I)[Sort/298/Tay)(Pay/760)]-b)						10.00				
m = sampler slope	m = sample	$n = \operatorname{sampler slope}$									
h – sampler intercent 0.00	h = sample	= sampler intercent									
0.000 0.500 1.000 1.500 2.000 2.500	I = chart re	- chart response						.000 0.500	1.000 1.	500 2.000	2.500
Tay = daily average temperature	Tay = daily a	overage tem	perature					_	· · _ · _		
Pay = daily average pressure Standard Flow Rate (m ³ /min)	Pav = daily a	average pres	sure					Stand	dard Flow Rate	e (m³/min)	

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Wan Ka Ho **Project Consultant**

Report Date: 6/10/2020



TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Project : Cor	ntract No. HY	//2019/01 - H	ong Kong-Z	huhai-Macac	Bric	lge		Date of	Calibration:	9-Dec-22
Location : Al	MS7C		0 0			0		Next Calib	ration Date:	8-Mar-22
Brand:		Tisch							Technician:	Ting Cha
Model:		TE-5170		S/N:	HVS	S-03				-
				COND	ΙΤΙΟ	NS				
	Se	ea Level Pres	sure (hPa):	1022.3		Corre	ected Pressu	re (mm Hg):	767	
		Tempe	erature (°C):	20.2			Temp	perature (K):	293	
				CALIBRATI	ON (ORIFICE				
		Make:		Tisch			Qstd Slope:		2.04731	
		Model:		TE-5025A		Qs	std Intercept:		0.00573	
	Calib	ration Date:		4-Jun-21			Expiry Date:		4-Jun-22	
		S/N:		2456						
				CALIB	RAT	ION				
Plate No.	H2O (L)	H2O (R)	H2O	Qstd		I	IC		LINEAR	
	(in)	(in)	(in)	(m˘/min)	(chart)	(corrected)	I	REGRESSI	ON
18	6.80	-7.90	14.700	1.894		50.00	50.63	Slope =	29.9386	
13	5.80	-5.80	11.600	1.682		46.00	46.58	Intercept =	-5.1209	
10	4.80	-4.80	9.600	1.530		40.00	40.51	Corr. coeff.=	0.9954	
7	3.20	-3.50	6.700	1.277	33.00 33.42					
5	2.50	-2.80	5.300	1.136		28.00	28.35			
	S: Sart/U20/Da	/Dotd)/Totd/T	-o)) b]]
$Q_{SIU} = 1/11[C$	Syn(⊓20(Fa 22/Petd)/Tetd	/FSiu)(TSiu/T /Ta)1	a))-0]				FLO	OW RATE CI	HART	
Ostd – stand	dard flow rate	/ i a)]				60.00				
IC = correcte	ad chart resp	, onse								
II – actual ch	art response	01130				50.00				
m – calibrat	tor Ostd slop	۵							/	
h = calibrate	or Ostd interc	ent.			9	40.00				
Ta = actual t	temperature (during calibra	ation (dea K)		nse					
Pa = actual i	pressure duri	ing calibratio	n (mm Ha)		spo	30.00				
Tstd = $298 \mathrm{c}$	lea K	ing calleratio	. (Re				, 	
Pstd = 760 mm Hg					hart	20.00				
For subsequent calculation of sampler flow:										
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)						10.00				
m = sampler slope										
b = sampler intercept						0.00				
I = chart re	sponse					0	.000 0.50	00 1.000	1.500	2.000
Tav = daily a	average temp	perature					Stan	dard Flow Rate	(m ³ /min)	
Pav = daily a	average pres	sure					oran			

Tory

Wan Ka Ho **Project Consultant**

Report Date: 6/10/2020



CALIBRATION REPORT OF WIND METER

Project: Contract No. HY/2019/01 - Hong Kong-Zhuhai-Macao Bridge Date of Calibration: 30-Jun-2021 Location: AMS3C Next Calibration Date: 29-Dec-2021 Technician: Ting Chan **Global Water** Brand: GL500-7-2 Model: Anemometer Brand: Smart Sensor Serial No: H0423689 Model: AR816 Procedures: 1. Wind Still Test: The wind speed sensor was held by hand until stabilized. 2. Wind Speed Test: The wind meter was calibrated in-situ and compared with the Anemometer. 3. Wind Direction Test: The wind meter was calibrated in-situ and compared with a marine compass from four directions.

Wind Still Test:

Wind Speed (m/s)	
0.00	

Wind Speed Test:

Global Water (m/s)	Anemometer (m/s)				
0.7	0.9				
2.3	2.4				
3.2	3.1				

Wind Direction Test:

	Marine Compass (o)
1	360
70	71
242	242
310	312

Cory

Report Date: 1/7/2021

Wan Ka Ho Project Consultant



CALIBRATION REPORT OF WIND METER

Project: Contract No. HY/2019/01 - Hong Kong-Zhuhai-Macao Bridge Date of Calibration: 28-Dec-2021 Location: AMS3C Next Calibration Date: 27-Jun-2022 Technician: Ting Chan **Global Water** Brand: GL500-7-2 Model: Anemometer Brand: Smart Sensor Serial No: H0423689 Model: AR816 Procedures: 1. Wind Still Test: The wind speed sensor was held by hand until stabilized. 2. Wind Speed Test: The wind meter was calibrated in-situ and compared with the Anemometer. 3. Wind Direction Test: The wind meter was calibrated in-situ and compared with a marine compass from four directions.

Wind Still Test:

Wind Speed (m/s)	
0.00	

Wind Speed Test:

Global Water (m/s)	Anemometer (m/s)				
1.8	1.8				
2.6	2.5				
4.2	4.3				

Wind Direction Test:

	Marine Compass (o)
0	0
113	112
254	254
286	285

TORY

Report Date: 29/12/2021

Wan Ka Ho Project Consultant



Fugro Development Centre 5 Lok Yi Street, Tai Lam Tuen Mun, NT Hong Kong

Report no.: 940891CA211483

Page 1 of 1

CALIBRATION CERTIFICATE OF DUST METER

Client : Fugro Technical Services Limited

Project : Calibration Services

Client Supplied Information

Details of Unit Under Test, UUT

Description	: Laser dust monitor
Manufacturer	: SIBATA
Model No.	: LD-5R
Serial No.	: 892186
Specification Limit	: NA
Next Calibration Date	: 02-Jun-2022

Laboratory Information

Description	: 1. Balance	2. TSP high volume air sampler
Equipment ID. / Seria	al no. : 1. C-065-9	2. 4350
Date of Calibration	: 03-Jun-2021	Ambient Temperature : 25 ± 10 °C
Calibration Location	: General Chemical L	aboratory of FTS and Ma Wan A1 Site Boundary
Method Used	: By direct comparison	n the weight of dust particle trapped in a filter paper using high
	volume sampler (TS	P method) for a certain period, with the reading of the UUT. They
	should be placed at	the same location and powered on and off at the same time.

Calibration Results :

Reference concentration (mg/m ³)	Total count for 1 hour	CPM (Count per minute)
0.0569	2147	35.78
0.0675	2299	38.32
0.1122	2675	44.58

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.

- 2. The interpolation equation : Concentration $(mg/m^3) = K \times [UUT reading (CPM)]$, where K = 0.001994
- 3. Correlation coefficient (r): 0.9948

Checked by :	Date : 23-6-2021 Certified by : 07 Jun Date : 30-6-2021
CA-R-297 (22/07/2009)	Leung Kwok Tai (Assistant Manager)
	** End of Report **

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T +852 2450 8233 | F +852 2450 6138 | E matlab@fugro.com | W fugro.com



Report no.: 940891CA211924(2)A

Page 1 of 1

Hong Kong

CALIBRATION CERTIFICATE OF DUST METER

Client : Fugro Technical Services Limited

Project : Calibration Services

Client Supplied Information

Details of Unit Under Test, UUT

Description	: Laser dust monitor
Manufacturer	: SIBATA
Model No.	: LD-5R
Serial No.	: 892187
Specification Limit	: NA
Next Calibration Date	: 11-Jul-2022

Laboratory Information

Description	: 1. Balance	2. TSP high volume air sampler
Equipment ID. / Serial	no. : 1. C-065-9	2. 4350
Date of Calibration :	12-Jul-2021 A	Ambient Temperature : 25 ± 10 °C
Calibration Location :	General Chemical Lab	oratory of FTS and Ma Wan A1 Site Boundary
Method Used :	By direct comparison t	he weight of dust particle trapped in a filter paper using high
	volume sampler (TSP	method) for a certain period, with the reading of the UUT. They
	should be placed at the	e same location and powered on and off at the same time.

Calibration Results :

Reference concentration (mg/m ³)	Total count for 1 hour	CPM (Count per minute)
0.0424	1512	25.20
0.0194	1041	17.35
0.0230	1090	18.17

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.

- 2. The interpolation equation : Concentration $(mg/m^3) = K \times [UUT reading (CPM)]$, where K = 0.001398
- 3. Correlation coefficient (r): 0.9987
- 4. This is to supersede the previous report no. 940891CA211924(2).

Checked by :	_Date :	<u>3-9-2021</u> Certified by: <u>k J. Journal</u> Date: <u>6-9-7071</u>
CA-R-297 (22/07/2009)		Leung Kwok Tai (Assistant Manager)
		** End of Report **

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Fugro Development Centre 5 Lok Yi Street, Tai Lam Tuen Mun, NT Hong Kong

Report no.: 940891CA211924(3)A

Page 1 of 1

CALIBRATION CERTIFICATE OF DUST METER

Client : Fugro Technical Services Limited

Project : Calibration Services

Client Supplied Information

Details of Unit Under Test, UUT

Description	: Laser dust monitor
Manufacturer	: SIBATA
Model No.	: LD-5R
Serial No.	: 892189
Specification Limit	: NA
Next Calibration Date	: 11-Jul-2022

Laboratory Information

Description	: 1. Balance	2. TSP high volume air sampler
Equipment ID. / Seria	l no. : 1. C-065-9	2. 4350
Date of Calibration	: 12-Jul-2021	Ambient Temperature : 25 ± 10 °C
Calibration Location	: General Chemical La	aboratory of FTS and Ma Wan A1 Site Boundary
Method Used	: By direct comparison	the weight of dust particle trapped in a filter paper using high
	volume sampler (TSI	P method) for a certain period, with the reading of the UUT. They
	should be placed at t	he same location and powered on and off at the same time.

Calibration Results :

Reference concentration (mg/m ³)	Total count for 1 hour	CPM (Count per minute)
0.0424	1498	24.97
0.0194	1052	17.53
0.0230	1088	18.13

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.

2. The interpolation equation : Concentration $(mg/m^3) = K \times [UUT reading (CPM)]$, where K = 0.001400

3. Correlation coefficient (r): 0.9973

4. This is to supersede the previous report no. 940891CA211924(3).

Checked by :	_ Date :_	3-9-2021	Certified by :_	KJ. Jourily	_ Date :	6-9-201
CA-R-297 (22/07/2009)			Leung	Kwok Tai (Assist	tant Manager)

** End of Report **



20±2 °C

<80% R.H.

:

Fugro Development Centre 5 Lok Yi Street, Tai Lam Tuen Mun, NT Hong Kong

Page 1 of 1

Report no.: 212769CA211755(1)

CALIBRATION CERTIFICATE OF SOUND LEVEL METER

Client Supplied Information

Client : Fugro Technical Services Ltd.

Address : Room 723 & 725, 7/F., Block B Profit Industrial Building, 1-15 Kwai Fung Crescent, Kwai Chung, N.T. **Project : Calibration Services**

Details of Unit Under Test, UUT

Description

: Sound Level Meter

Manufacturer	•	Casella					
		Meter	Microphone	Preamplifier			
Model No.		CEL-63X	CE-251	CEL-495	1		
Serial No.	:	1488302	02795	003538	1		
Equipment ID	0 0	N-30					
Next Calibration Date	:	25-Jul-2022					
Specification Limit	:	EN 61672-1: 2003 Class 1					

Laboratory Information

Details of Reference Equipment -

Description		B & K Acoustic Multifunction Calibrator 4226 (Traditional free field setting)
Equipment ID.	;	R-108-1

Date of Calibration	:	26-Jul-2021		
Calibration Location	:	Calibration Laboratory of FTS	Ambient Temperature	:
Method Used	:	By direct comparison	Relative Humidity	:

Calibration Results :

Parame	ters	Mean Value (dB) Specificat			ation Limit(dB)		
	4000Hz	1.2	2.6	to	-0.6		
	2000Hz	1.3	2.8	to	-0.4		
A woigthing	1000Hz	0.0	1.1	to	-1.1		
frequency	500Hz	-3.3	-1.8	to	-4.6		
response	250Hz	-8.7	-7.2	to	-10.0		
response	125Hz	-16.1	-14.6	to	-17.6		
	63Hz	-26.2	-24.7	to	-27.7		
l	31.5Hz	-39.2	-37.4	to	-41.4		
Differential level	94dB-104dB	0.3		± 0.6	3		
linearity	104dB-114dB	-0.3		± 0.6	3		

Remarks:

- 1. The equipment used in this calibration is traceable to recognized National Standards.
- 2. The mean value is the average of four measurements.
- 3. The expanded uncertainty is 0.3 dB with a coverage factor of 2 at a confidence level of 95%.
- 4. For calibration: Reference SPL are 94, 104 & 114dB, range setting is 20-140dB & time weighting is fast
- 5. The UUT does comply with EN 61672-1: 2003 Class 1 sound level meter for the above measurement.
- 6. The values given in this Calibration Certificate only relate to unit under test and the values measured at the time of the test. Any uncertainties will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during tranportation, overloading, mis-handling or the capability of any other laboratory to repeat the measurement.

Checked by : Date :	<u>30-7-2021</u> Certified by : Kit Kenne Date : 30-7-2021
CA-R-297 (22/07/2009)	Leung Kwok Tai (Assistant Manager)
	** End of Report **

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20±2 °C <80% R.H.

Fugro Development Centre 5 Lok Yi Street, Tai Lam Tuen Mun, NT Hong Kong

Page 1 of 1

Report no.: 212769CA212069

CALIBRATION CERTIFICATE OF SOUND LEVEL METER

Client Supplied Information

Client : Fugro Technical Services Ltd.

Address : Room 723 & 725, 7/F., Block B Profit Industrial Building, 1-15 Kwai Fung Crescent, Kwai Chung, N.T. Project : Calibration Services

Details of Unit Under Test, UUT

Description

: Sound Level Meter

Manufacturer	:	Casella				
		Meter	Microphone	Preamplifier		
Model No.		CEL-63X	CE-251	CEL-495		
Serial No.	:	1488303	02849	0043415		
Equipment ID	:	N/A				
Next Calibration Date	:	25-Aug-2022				
Specification Limit	:	EN 61672-1: 2003 Class 1				

Laboratory Information

Details of Reference Equipment -

Description	:	B & K Acoustic Multifunction Calibrator 4226 (Traditional free field se	etting)
Equipment ID.	;	R-108-1	

Date of Calibration	:	26-Aug-2021			
Calibration Location	÷	Calibration Laboratory of FTS	An	nbient Temperature	
Method Used	:	By direct comparison	Re	elative Humidity	

Calibration Results :

Parame	ers Mean Value (dB)		Specification Limit(dB)			
	4000Hz	1.4	2.6	to	-0.6	
	2000Hz	1.3	2.8	to	-0.4	
A woigthing	1000Hz	0.0	1.1	to	-1.1	
froquonov	500Hz	-3.4	-1.8	to	-4.6	
response	250Hz	-8.8	-7.2	to	-10.0	
response	125Hz	-16.2	-14.6	to	-17.6	
	63Hz	-26.3	-24.7	to	-27.7	
	31.5Hz	-39.0	-37.4	to	-41.4	
Differential level	94dB-104dB	0.3		± 0.6	5	
linearity	104dB-114dB	-0.3		± 0.6	5	

Remarks:

- 1. The equipment used in this calibration is traceable to recognized National Standards.
- 2. The mean value is the average of four measurements.
- 3. The expanded uncertainty is 0.3 dB with a coverage factor of 2 at a confidence level of 95%.
- 4. For calibration: Reference SPL are 94, 104 & 114dB, range setting is 20-140dB & time weighting is fast
- 5. The UUT does comply with EN 61672-1: 2003 Class 1 sound level meter for the above measurement.
- 6. The values given in this Calibration Certificate only relate to unit under test and the values measured at the time of the test. Any uncertainties will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling or the capability of any other laboratory to repeat the measurement.

Checked by :	Date : <u>27-8 -2021</u> Certified by : <u>KT. Termen</u> Date : <u>27-8-</u>	-2021
CA-R-297 (22/07/2009)	Leung Kwok Tai (Assistant Manager)	
	** End of Report **	



Page 1 of 1

Fugro Development Centre 5 Lok Yi Street, Tai Lam Tuen Mun, NT Hong Kong

Report no.: 212769CA211664

CALIBRATION CERTIFICATE OF SOUND CALIBRATOR

Client : Fugro Technical Services Ltd. Project : Calibration Services

Client Supplied Information

Details of Unit Under Test, UUT

Description		:	Sound Calibrator
Manufacturer		:	Casella (Model CEL-120/1)
Serial No.		:	5230758
Equipment ID		:	N/A
Next Calibration Date	:	15	-Jul-2022
Specification Limit		ΕN	l 60942: 2003 Class 1

Laboratory Information

Details of Calibration Equipment

Description :	Reference Sound level meter					
Equipment ID. :	R-119-2					
Date of Calibration :	16-Jul-2021					
Calibration Location :	Calibration Laboratory of FTS	Ambient Temperature : 20±2 °C				
Method Used :	By direct comparison	Relative Humidity : <80% R.H.				

Calibration Results :

Parameters (Setting of UUT)	Mean Value (error of measurement)	Specification Limit(dB)
94dB	-0.2 dB	+0 4dP
114dB	-0.2 dB	±0.40B

Remarks :

- 1. The equipment used in this calibration is traceable to recognized National Standards.
- 2. The mean value is the average of four measurements.
- 3. The expanded uncertainty is 0.3 dB with a coverage factor of 2 at a confidence level of 95%.
- 4. The unit under test complies with the specification limit.
- 5. The values given in this Calibration Certificate only relate to the unit-under-test and the values measured at the time of the test. Any uncertainties quoted will not include allowances for the environmental changes, variation and shock during transportation, or the capability of any other laboratory to repeat the measurement.

Checked by :	Cong	_ Date :_	20-7-202	Certified by :_	K.T. Lung	Date : 20-7-7	2021
CA-R-297 (22/07/2	009)		,	Leun	g Kwok Tai (Assis	tant Manager)	

** End of Report **



Fugro Development Centre 5 Lok Yi Street, Tai Lam Tuen Mun, NT Hong Kong

Report no.: 212769CA211553(1)

CALIBRATION CERTIFICATE OF SOUND CALIBRATOR

Page 1 of 1

Client : Fugro Technical Services Ltd.

Project : Calibration Services

Client Supplied Information

Details of Unit Under Test, UUT

Description		: Sound Calibrator	
Manufacturer		: Casella (Model CEL-120/	1)
Serial No.		: 5230950	
Equipment ID		: N/A	
Next Calibration Date	:	05-Jul-2022	
Specification Limit	ł	EN 60942: 2003 Class 1	

Laboratory Information

Details of Calibration Equipment

Description :		Reference Sound level meter	
Equipment ID. :		R-119-2	
Date of Calibration :		06-Jul-2021	
Calibration Location :		Calibration Laboratory of FTS	
Method Used :		By direct comparison	

Ambient Temperature : 20±2 °C Relative Humidity : <80% R.H.

Calibration Results :

Parameters (Setting of UUT)	Mean Value (error of measurement)	Specification Limit(dB)
94dB	-0.4 dB	+0.4dB
114dB	-0.3 dB	±0.40D

Remarks:

- 1. The equipment used in this calibration is traceable to recognized National Standards.
- 2. The mean value is the average of four measurements.
- 3. The unit under test complies with the specification limit.
- 4. The values given in this Calibration Certificate only relate to the unit-under-test and the values measured at the time of the test. Any uncertainties quoted will not include allowances for the environmental changes, variation and shock during transportation, or the capability of any other laboratory to repeat the measurement.

Checked by :	Lilliam Date: 7-7-2021 Certified by: KT. Jeung Date: 7-7-2071	
CA-R-297 (22/07/2009)	Leung Kwok Tai (Assistant Manager)	
	** End of Report **	

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Report No. : 212769CA211337

Page 1 of 1

CALIBRATION CERTIFICATE OF ANEMOMETER

Client Supplied Information

Client : Fugro Technical Services Ltd.

Project : Calibration Services

Details of Unit Under Test, UUT

	Description	:	Anemometer
	Manufacturer	:	Smart Sensor
	Model No.	:	AR816
	Serial No.	:	H0423689
	Equipment ID	:	WS-03
Next C	alibration Date	:	15-Jun-2022

Laboratory Information

Details of Reference Equipment –							
Ε	Description	:	Reference Anemometer				
E	Equipment ID.	:	R-101-4				
Date of 0	Calibration	:	16-Jun-2021	Ambient Temperature	:	22 °C	
Calibration Location. : Calibration Laboratory of FTS							
Method Used : R-C-279							

Calibration Results :

Reference Reading	UUT Reading	Error	
(m/s)	(m/s)	(m/s)	
1.99	2.0	0.0	
4.00	4.0	0.0	
6.00	5.9	-0.1	
8.00	7.5	-0.5	
10.01	9.0	-1.0	

Remark :

1. The equipment being used in this calibration is traceable to recognized National Standards.

2. The reported readings in this calibration are an average from 10 trials.

Checked by :	Lilliam	Date :	22-6-2021	Certified by : _	& J. Loung Date : 22-6-2021
CA-R-297 (22/07/200	9)			Leur	ng Kwok Tai (Ass ⁱ istant Manager)

** End of Report **