

ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือ





บริษัท เอ็นไวร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
 บริษัท เอ็นไวร์ เซอร์วิส จำกัด
 ENVIRO SERVICE CO., LTD. 42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

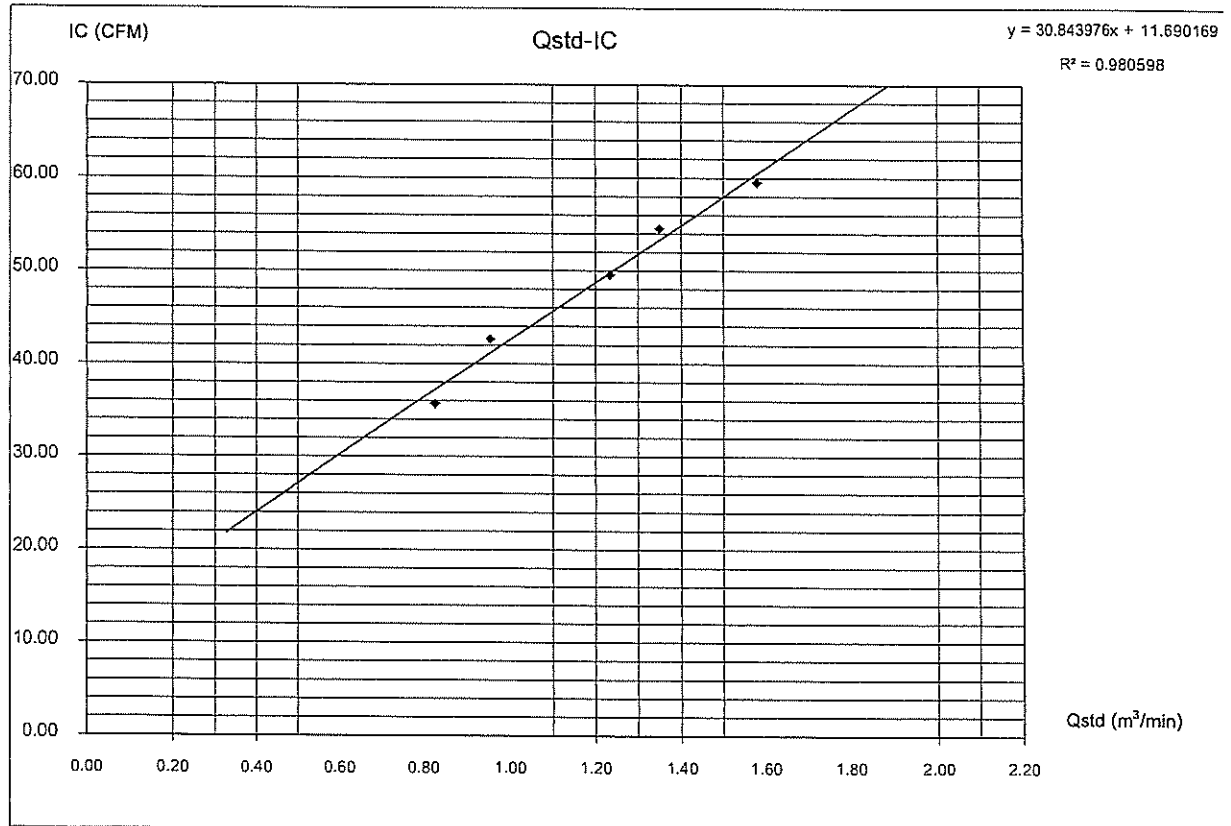
Sampler Location				Date	February 2, 2019
Project Site				Start Time	10:00 AM
Sampler Number	TSP No.A2	Transfer Standard Type	Onifice	Stop Time	10:20 AM
Motor Serial Number	1203-415	Calibrator Model	TE-5025A	Person	Mr.Pasagom Samol
Recorder Serial Number	596	Calibrator Serial Number	2915		

Plate No.	(Delta H)			(A)	(X)	(I)	(Y)	Temperature (*K = *C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter	
	Positive	Negative	ΔH_{H_2O}	$[\Delta H_{H_2O}(Pa/P_{std})(T_{std}/T_a)]^{1/2}$	$Q_{std} = (1/m)[(A-b)]$ (m ³ /min)	Sample Flow Rate Indication (ft ³ /min)	$IC = I[(Pa/P_{std})(T_{std}/T_a)]^{1/2}$					
5	1.5	1.4	2.9	1.68883	0.82713	36.0	35.70	303.0	760.0			
7	2.0	1.9	3.9	1.95848	0.95547	43.0	42.64	303.0	760.0			
10	3.4	3.2	6.6	2.54776	1.23594	50.0	49.59	303.0	760.0			
13	4.0	3.9	7.9	2.78741	1.34999	55.0	54.54	303.0	760.0			
18	5.5	5.4	10.9	3.27416	1.58166	60.0	59.50	303.0	760.0			
Linear Regression: Y ON X: Y= mX + b								Average	303.0	760.0		

1	Slope (m)	2.10109	Linear Equation		r^2	0.999555	Pstd(mmHg)	760.0
2	Intercept (b)	-0.04905	Set Point Flow Rate (X) (m ³ /min)		r	0.999775	T _{NTP}	298.0
3	Correlation Coefficient (r)	0.99996	Final Set Flow Rate = (I)				$(Pa/P_{std})(T_{std}/T_a)$	0.98349835
Result							$C=(Pa/P_{std})(T_{std}/T_a)^{0.5}$	0.991714853

COMMENT

Andersen Instruments, Inc.



Calibrated By Mr. Pasagorn Samol
 Technician



JIRANATEE ASSOCIATES CO.,LTD

บริษัท จิรณที แอสโซซิเอตส์ จำกัด (สำนักงานใหญ่)
JIRANATEE ASSOCIATES CO.,LTD (Head office)



63/1-15,67/35-36 ซอยเพชรเกษม7,7/1 ถนนเพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร: (66) 02-8680812-13 แฟกซ์: (66) 02-868086
63/14-15,67/35-36 Soi Petchkasem7,7/1, Petchkasem Rd, Watthapra, Bangkokkyai, Bangkok 10600 Thailand Tel. : (66) 02-8680812-13 Fax. : (66) 02-868086

Company : บริษัท ทีเอ็นพี เอ็นไวรอนเมนท์ จำกัด	
Site Location : บริษัท จิรณที แอสโซซิเอตส์ จำกัด	
Date : 21 January 2019	(1) Barometric pressure, Pa mm Hg 755
Calibrated by : Attachai	(2) Temperature. Ta 33 °C
Sampler No : PM ₁₀	Serial No. 1015
Transfer std. Type : Tisch TE 5025A	Serial No. 1758

Condition : Pstd = 760 mm Hg : Average barometric pressure : Pa = 755 : Seasonal average temperature : Ta = 33
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No.	H Pressure drop Across orifice	$\sqrt{H \left(\frac{Pa}{P_{std}} \right) \left(\frac{298}{Ta} \right)}$	(X) 3 Qstd From orifice Std. m ³ /min	I Sampler flow rate Indication (arbitrary)
1	18.50	3.35	62.50	65.5
2	14.78	2.88	56.50	57.5
3	10.49	2.65	49.40	50.0
4	9.50	2.85	42.14	40.5
5	6.78	2.11	32.98	33.0

Calculation

$$\text{Calibrator Flow (Qa)} = 1/\text{Slope} * (\text{SQRT}(H2O * (Ta/Pa)) - \text{Intercept})$$

$$\text{Pressure Ratio (Po/Pa)} = 1 - Pf/Pa$$

CALIBRATION BY : <i>พิชญ์ อังคาร</i>	DATE : 21/1/62	
APPROVED BY : <i>พิชญ์ อังคาร</i>	DATE : 21/1/62	
ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : สันติ มีมานะ 086-303-3140		
เลขที่ 63/14-15 ถนนเพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กทม. 10600 โทร. 02-868-0812-13 โทรสาร. 02-868-1889		



บริษัท เอ็นวิร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แขวง 9 เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นวิร์ เซอร์วิส จำกัด ENVIR SERVICE CO., LTD. 42 Ramintra 14 yeak 9, Tha Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Instruments Information

Analyzer Type: CO Analyzer Model: 48C	Manufacturer Thermo Environmental S/N: 48CHL-67713-358
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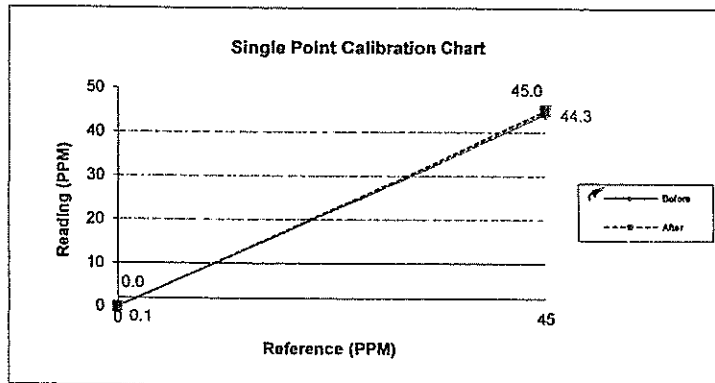
Calibration System

Calibrator Unit Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	Standard Gas NO Conc 46.05 PPM SO2 Conc 46.01 PPM CO Conc 4.487 PPM Expire Date: 19 Sep. 2020
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Environment: Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	Drift%
Before	0.0	0.1	0.1	45.0	44.3	-1.6
After	0.0	0.0	0.0	45.0	45.0	0.0



Calibrate By: *Mr. Pasagorn Samol*
Mr. PASAGORN SAMOL





บริษัท เอ็นไวร์ เซอร์วิส จำกัด

42 रामलिंगरा 14 ब्लॉक 9, थारंग, बंगकhen, बांगकhen 10230 टेलीफोन 02-9435814-5 फाक्स 02-9438201
 บริษัท เอ็นไวร์ เซอร์วิส จำกัด
 ENVIR SERVICE CO., LTD. 42 Ramlinhra 14 yeak 9, Tha Rang, Bangkhen, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 24 December 2018

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 0413406269
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API Model 701 S/N: 1924	NO Conc 46.05 PPM SO2 Conc 46.01 PPM CO Conc 4,487 PPM Cylinder number CC507080 Expire Date: 19 Sep. 2020

Environment: Temperature 25.5 °C

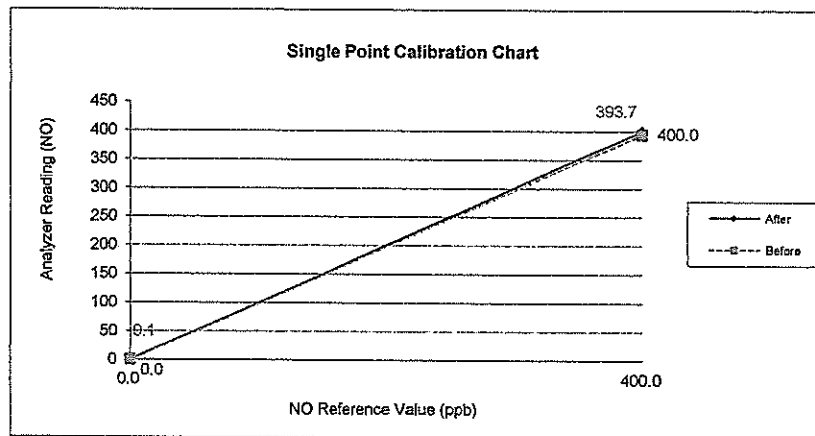
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	393.7	400.0	-1.6
NOx	0.1	0.0	0.1	400.0	400.0	0.0

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.0	0.0	0.0	400.0	400.0	0.0
NOx	0.0	0.0	0.0	400.0	400.0	0.0



Signature

Calibrate By : Mr. Pasagorn Samol



บริษัท เอ็นไวร์ เซอร์วิส จำกัด

42 รามอินทรา 14 ซอย 9 แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
 บริษัท เอ็นไวร์ เซอร์วิส จำกัด
 ENVIR SERVICE CO., LTD. 42 Ramintra 14 yoa 9, His Rang, Bangkok, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 24 December 2018

Instruments Information

Analyzer Type: SO2 Analyzer Model: 43C	Manufacturer Thermo Environmental SIN: 0327402325
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Calibration System

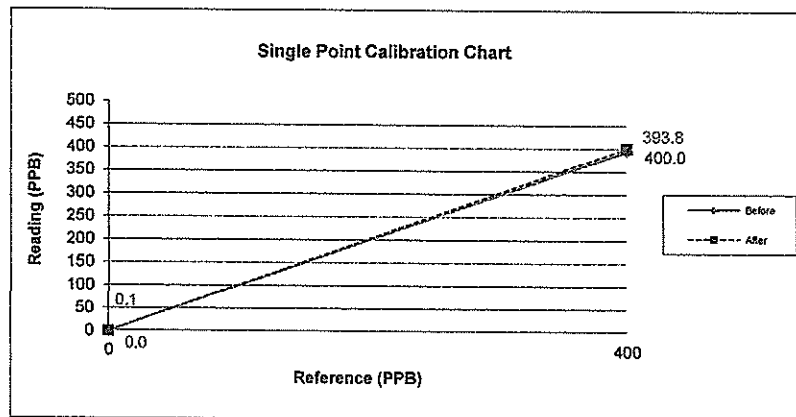
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705	NO Conc 46.05 PPM SO2 Conc 46.01 PPM
ZERO AIR Generator API MODEL 701 S/N: 1924	CO Conc 4.487 PPM Cylinder number CC507080 Expire Date: 19 Sep. 2020

Environment: Temperature 25.5 °C

Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	393.8	-1.6
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :

Mr.PASAGORN SAMOL

Certificate Report

Customer Name : TNP ENVIRONMENT CO.,LTD.

Customer Address : 55/28 Moo,3 Tha It, Pak Kret, Nonthaburi 11120

Instrument Calibrated

Description : Sound Level Meter
Manufacturer : Aco
Model : 6226
Serial No. : 72871

Ambient Environment

Temperature : (24±3)°C
Relative Humidity : (55±15)%
Ambient Pressure : (1008±5)hPa

Standards Used

- Sound Level Calibrator Delta ohm HD 2020
- Digital Multi meter Fluke 289/FVF S/N 67845
- Computer and Software Dell Vostro 5460 S/N 9CWD1Y1

Measurement Result

Method	Standard Reference (dB)	Reading (dB)	Error (dB)	After Adjustment ± (dB)
Sound level Calibrator HD-2020	94.0	94.0	0	94.0
	114.0	114.0	0	114.0



CALIBRATION BY :	<i>ชัชวาลย์ อภิชาติ</i>	JIRANATEE ASSOCIATES CO., LTD.	DATE :	9/1/62
APPROVED BY :	<i>วิภาณี สว่าง</i>		DATE :	9/1/62
ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณสันติ มีมานะ 086-303-3140				
63/14-15,67/35-36 Petkasem 7,7/1 Rd., Thapra, Bangkokyai, Bangkok 10600 Thailand Tel: (66) 0-28680812 Fax:(66) 0-2868-1889				

Certificate Report

Customer Name : TNP ENVIRONMENT CO.,LTD.

Customer Address : 55/28 Moo,3 Tha It, Pak Kret, Nonthaburi 11120

Instrument Calibrated

Ambient Enviroment

Description : Sound Level Meter

Temperature : (24±3)°C

Manufacturer : Aco

Relative Humidity : (55±15)%

Model : 6226

Ambient Pressure : (1008±5)hPa

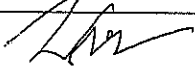

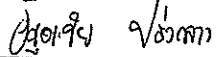
Serial No. : 180142

Standards Used

- Sound Level Calibrator Delta ohm HD 2020
- Digital Multi meter Fluke 289/FVF S/N 67845
- Computer and Software Dell Vostro 5460 S/N 9CWD1Y1

Measurement Result

Method	Standard Reference (dB)	Reading (dB)	Error (dB)	After Adjustment ± (dB)
Sound level Calibrator HD-2020	94.0	94.0	0	94.0
	114.0	114.0	0	114.0

CALIBRATION BY : 	DATE : 4/2/62	 JIRANATEE ASSOCIATES CO., LTD
APPROVED BY : 	DATE : 4/2/62	
ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณสันติ มีมานะ 086-303-3140		
63/14-15,67/35-36 Petkasem 7,7/1 Rd., Thapra, Bangkokyai, Bangkok 10600 Thailand Tel: (66) 0-28680812 Fax:(66) 0-2868-1889		

Calibration Certificate

Part Number: 721A2601
Description: Micromate with DIN Geophone
Serial Number: UM15019
Calibration Date: APR 03 2019
Calibration Reference Equipment: 714J7402

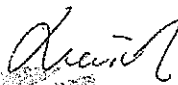
Instantel certifies that the above product was calibrated in accordance with the applicable Instantel procedures. These procedures are part of a quality system that is designed to assure that the product listed above meets or exceeds Instantel specifications.

Instantel further certifies that the measurement instruments used during the calibration of this product are traceable to the National Institute of Standards and Technology; or National Research Council of Canada. Evidence of traceability is on file at Instantel and is available upon request.

The environment in which this product was calibrated is maintained within the operating specifications of the instrument.

Please note that the sensor check function is intended to check that the sensors are connected to the unit, installed in the proper orientation and sufficiently level to operate properly. This function should not be confused with a formal calibration, which requires the sensors be checked against a reference that is traceable to a known standard. Instantel recommends that products be returned to Instantel or an authorized service and calibration facility for annual calibration.

Calibrated By: _____

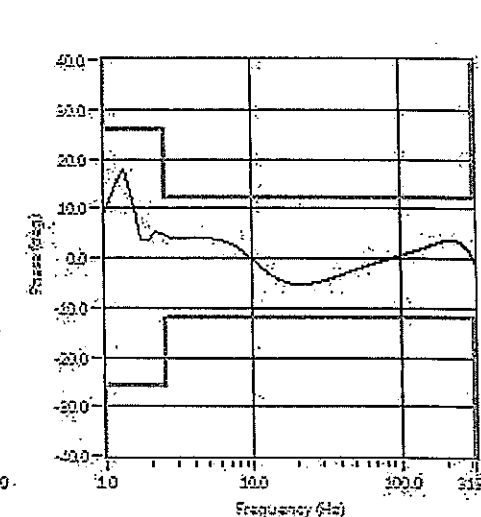
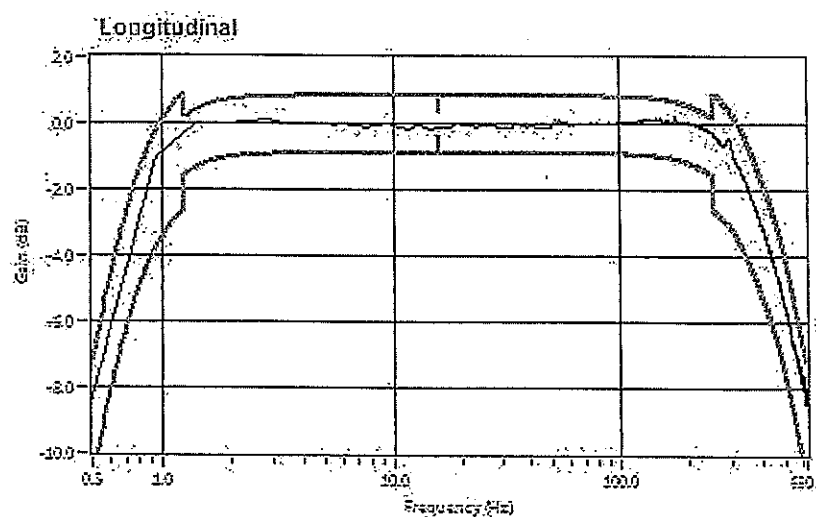
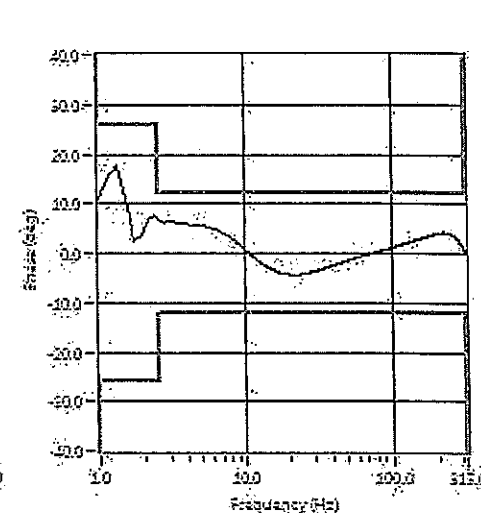
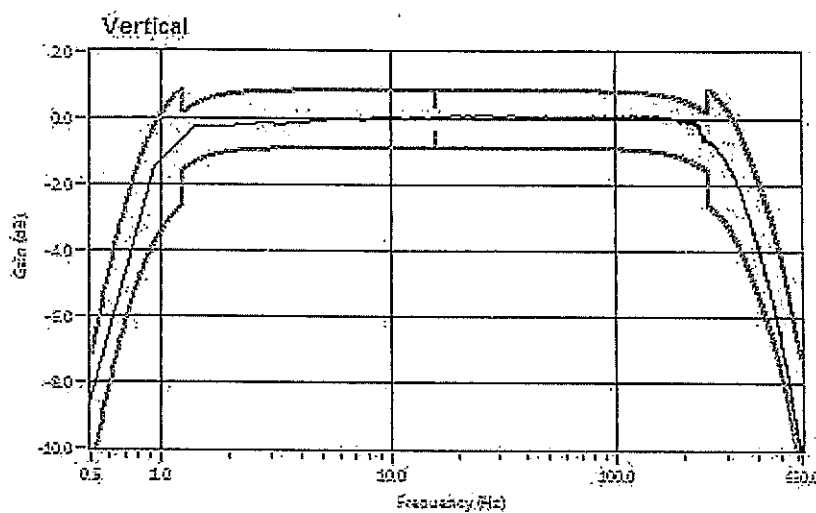
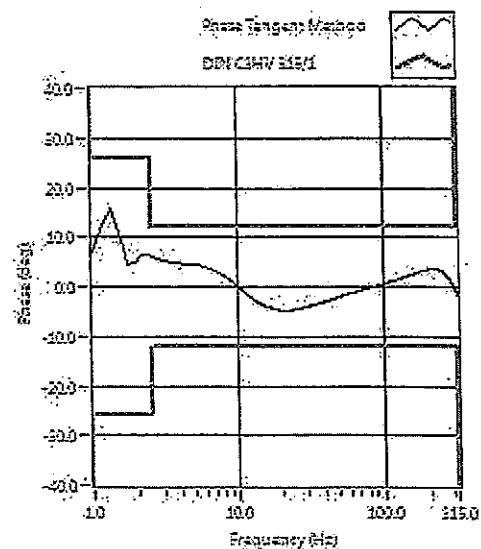
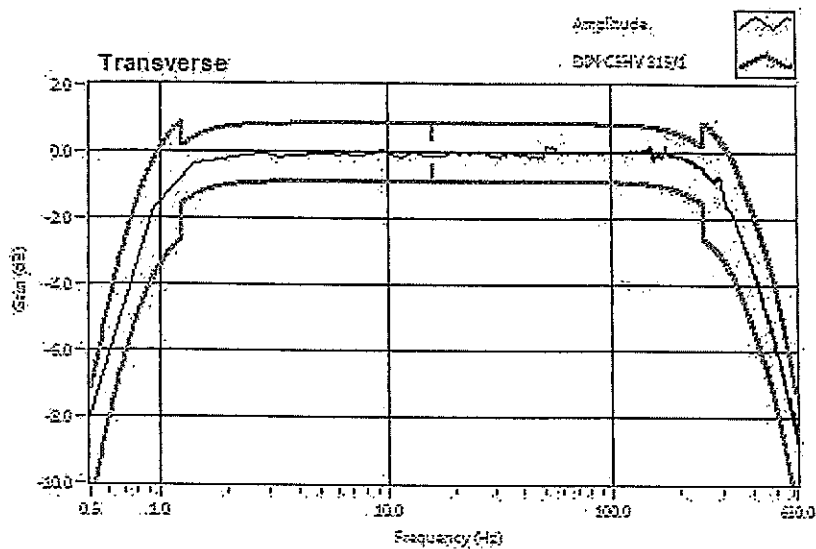


Xiaoming Yang



309 Legget Drive, Ottawa, Ontario, K2K 3A3, (613) 592-4642

Frequency Response of UM15019



Calibration Certificate

Part Number: 721A2601

Description: Micromate DIN Base Unit

Serial Number: UM14102

Calibration Date: AUG 02 2018

Calibration Equipment: 714J7402

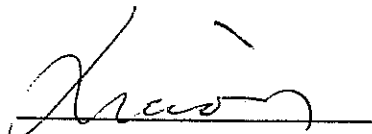
Instantel certifies that the above product was calibrated in accordance with the applicable Instantel procedures. These procedures are part of a quality system that is designed to assure that the product listed above meets or exceeds Instantel specifications.

Instantel further certifies that the measurement instruments used during the calibration of this product are traceable to the National Institute of Standards and Technology; or National Research Council of Canada. Evidence of traceability is on file at Instantel and is available upon request.

The environment in which this product was calibrated is maintained within the operating specifications of the instrument.

Please note that the sensor check function is intended to check that the sensors are connected to the unit, installed in the proper orientation and sufficiently level to operate properly. This function should not be confused with a formal calibration, which requires the sensors be checked against a reference that is traceable to a known standard. Instantel recommends that products be returned to Instantel or an authorized service and calibration facility for annual calibration.

Calibrated By:


Xiaoming Yang

 **Instantel®**

Frequency Response of UM14102

