

ภาคผนวก ข-42

แผนการสอบเทียบอุปกรณ์ตรวจวัดความดันและอุณหภูมิและตรวจสอบสภาพ
สายสัญญาณตามแผนบำรุงรักษา และในช่วงหยุดซ่อมบำรุงรักษาอุปกรณ์
(Turn around)

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0035
Received Date : 11-May-2024
Calibration Date : 12-May-2024

Request No. : PN-24-0519
Issue Date : 12-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5824738
Model : PT100
Tag No. / ID. No. : TE-75016S
Resolution : 0.01 °C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %


Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	875-115	660TL18030002	SG-T-00261/67	19-Mar-2025


Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :


☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :


☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0035

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Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824738
Length of probe : 685 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.02	0.16	0.14	0.20
37.47	37.63	0.16	0.20
74.95	75.07	0.11	0.20
112.40	112.43	0.03	0.22
149.85	149.73	-0.12	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0036
Received Date : 11-May-2024
Calibration Date : 12-May-2024

Request No. : PN-24-0519
Issue Date : 12-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5824715
Model : PT100
Tag No. / ID. No. : TE-76004S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %


Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025


Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :


☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :


☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0036

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received ☒ Used Item ☐ New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824715
Length of probe : 665 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : - Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.03	0.45	0.42	0.20
49.98	50.41	0.43	0.20
99.91	100.26	0.35	0.20
149.84	150.21	0.37	0.22
199.80	200.27	0.47	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3



CALIBRATION CERTIFICATE

Tag Name : PDT-00901

Certificate No. : FLS-LAB.INS7-24-0037

Date of Received : 8-May-24

Calibration Interval : -

Date of Calibration : 8-May-24

Calibration Due Date : -

Customer : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150
Function name : Differential Pressure Transmitter
Manufacturer : YOKOGAWA
Model Name : EJA110E-JUSWC-919DB/SF2/C1/HE
Serial Number : 91WA19216 041 7

Input Range : 0 - 1500 kPa
Output Range : 4 - 20 mA
Sensor Type : -
Classification : -
Criteria : 0.25 % of span
Environment Temp./RH : 24.4 °C / 69.2 %

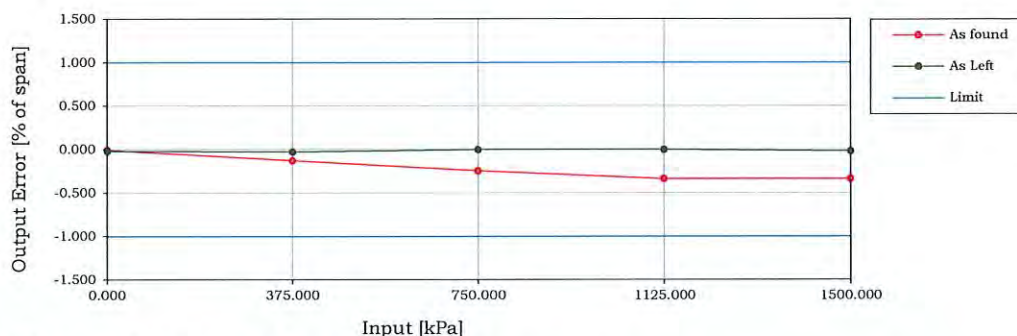
Reference Standard :

Model : Serial Number
HPC40 : 910554

Traceability
NIMT

Certificate No.
CL1-P230053

Due Date
9-Jun-24



Calibration Results : As found

Input [kPa]	Output [mA]	Error [mA]	Error [% of span]	Uncertainty [% of span]
0.000	3.999	-0.001	-0.006	3.6875
375.000	7.980	-0.020	-0.125	3.6875
750.000	11.961	-0.039	-0.244	3.6875
1125.000	15.946	-0.054	-0.338	3.6875
1500.000	19.946	-0.054	-0.337	3.6875
1125.000	15.946	-0.054	-0.338	3.6875
750.000	11.961	-0.039	-0.244	3.6875
375.000	7.980	-0.020	-0.125	3.6875
0.000	3.999	-0.001	-0.006	3.6875

Calibration Results : As Left

Input [kPa]	Output [mA]	Error [mA]	Error [% of span]	Uncertainty [% of span]
0.000	3.997	-0.003	-0.019	3.6875
375.000	7.996	-0.004	-0.025	3.6875
750.000	12.000	0.000	0.000	3.6875
1125.000	16.000	0.000	0.000	3.6875
1500.000	19.997	-0.003	-0.019	3.6875
1125.000	16.000	0.000	0.000	3.6875
750.000	12.000	0.000	0.000	3.6875
375.000	7.996	-0.004	-0.025	3.6875
0.000	3.997	-0.003	-0.019	3.6875

Calibrated by:

Thanawat Maharat

Approved by:

Siripong Kreuziripaiaboon

The uncertainty are for a confidence probability of approximately 95%

This results of measurement was found accurate as show on date as place of calibration only
which is valid exclusively for calibration as mentioned in the report.

-oOo-

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB1-24-0117 ISSUE DATE : 13-May-2024
REQUEST No. : PN-24-0519

UNIT UNDER CALIBRATION

<u>SENSOR DATA</u>		<u>CALIBRATION CONDITION</u>	
Type :	3/8" Coriolis Flow Meter	Mode :	Mass Flow Measurement
Manufacturer :	Endress + Hauser	Max. Range :	0 - 2,000 kg/h
Model :	PROMASS F 8F5B08-BDE	Flow Span :	0 - 1,000 kg/h
	BABAAFBAB2BSAABSAA2+	Test Media :	Water
Serial No. :	R409FE02000	Reference Temp :	15 Deg C
Tag No. :	FT-73012		
Connection Type :	1/2" ANSI 300		

<u>MAXIMUM PERMISSIBLE</u>			
Error :	±	0.10	%
Range of Repeatability :	±	0.05	%

<u>TRANSMITTER DATA</u>		<u>ENVIRONMENT</u>	
Manufacturer :	Endress + Hauser	Ambient Temperature :	(30 ± 5) Deg C
Model :	PROMASS 500 8F5B08-BDE	Relative Humidity :	< 80 %
	BABAAFBAB2BSAABSAA2+	Atmosphere Pressure :	900 < P < 1100 mbar
Serial No. :	R409FE02000		

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-001)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND570 Panel	B638050845	TH4008-001-032924-ACC-TH	29-Mar-2025
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler Toledo Co.,Ltd, and Thai-Korea Calibration Center.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB1-24-0117
DATE OF RECEIVED : 11-May-2024
DATE OF CALIBRATION : 13-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

Cal. Factor = 1.9957

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	14.26	142.62436	142.59023	0.024	0.002	0.027
2	52.36	523.62923	523.69591	-0.013	0.002	0.027
3	99.79	997.92359	998.02842	-0.011	0.008	0.027

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			


Reference Temp = 15 Deg C

* % Error = [(UUC flowrate - Reference Standard flowrate) / Reference Standard flowrate] x 100

Note : Maximum permissible : Error = \pm 0.10 %
Range of Repeatability = \pm 0.05 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

CALIBRATED BY :


☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB1-24-0117
Calibration Date : 13-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress + Hauser
Model : PROMASS F 8F5B08-BDE
Serial No. : BABAAFBAB2BSAAABSA A2+
Tag No. : R409FE02000
Transmitter Information
Manufacturer : Endress + Hauser
Model : PROMASS 500 8F5B08-BDE
Serial No. : BABAAFBAB2BSAAABSA A2+
Tag No. : R409FE02000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 2,000 kg/h
Flow Span : 0 - 1,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

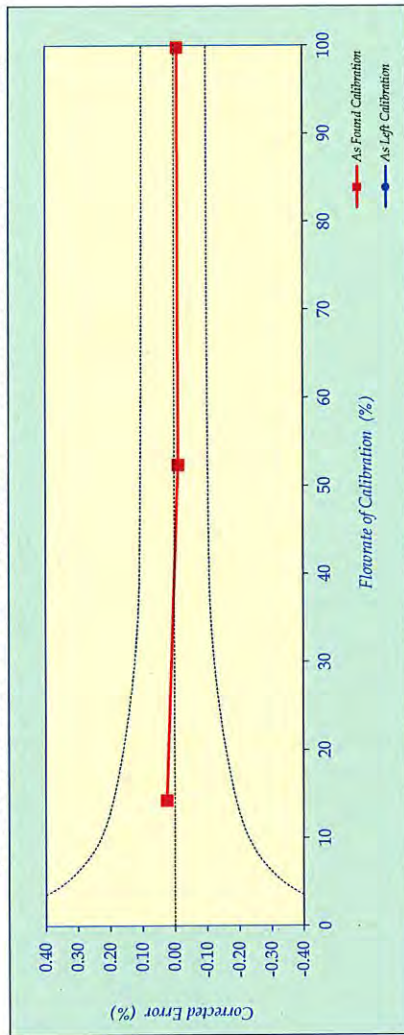
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY : 

☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

3/8" Coriolis Flow Meter Performance Curve : Meter Flow Span Setting



As Found Calibration

Flowrate of Flowrate	Error
Flow Span UUC	(%)
14.26	142.62436
52.36	523.62923
99.79	997.92359

As Left Calibration

Flowrate of Flowrate	Error
Flow Span UUC	(%)
14.26	142.62436
52.36	523.62923
99.79	997.92359

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB1-24-0117
Calibration Date : 13-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress + Hauser
Model : PROMASS F 8F5B08-BDE
Serial No. : R409FE02000
Tag No. : FT-73012
Transmitter Information
Manufacturer : Endress + Hauser
Model : PROMASS 500 8F5B08-BDE
Serial No. : R409FE02000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 2,000 kg/h
Flow Span : 0 - 1,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

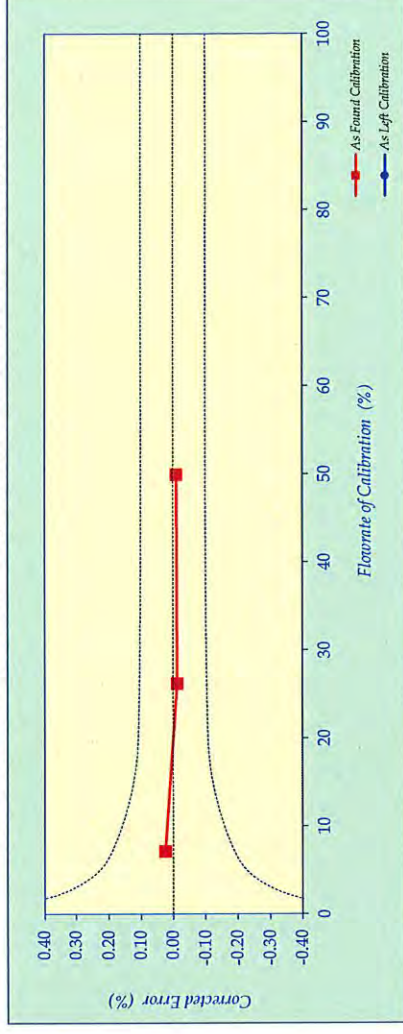
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY : 

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

3/8" Coriolis Flow Meter Performance Curve: Meter Flow Specification



As Found Calibration

Flowrate of	Flowrate	Error
Max. Range	UUC	
(%)	kg/h	(%)
7.13	142.62436	0.024
26.18	523.62923	-0.013
49.90	997.92359	-0.011

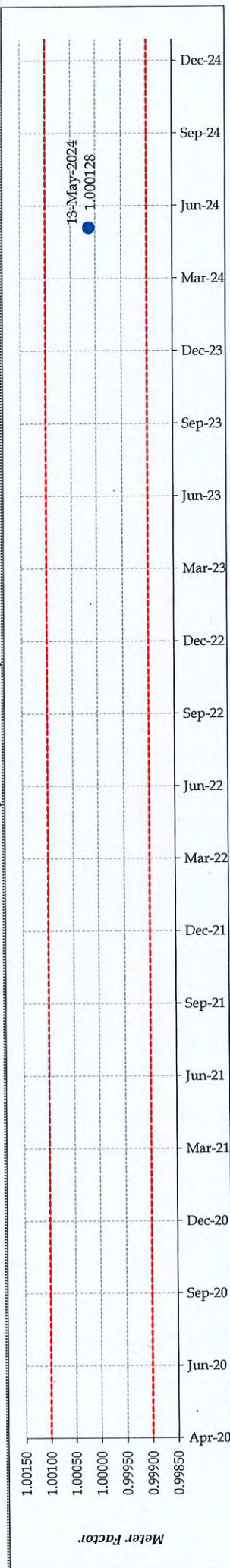
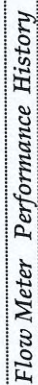
As Left Calibration

Flowrate of	Flowrate	Error
Max. Range	UUC	
(%)	kg/h	(%)

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Certificate No.	:	FLS-LAB1-24-0117
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-73012
Make	:	Endress + Hauser
Model	:	PROMASS F 85B08-BDE BABA4FBAB2BSAABSA2+
Serial No.	:	R409FE02000
Test Media	:	Water

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Traceability : The National Standard of Bureau of Weights and Measures through office of Legal Metrology of Thailand.

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB1-24-0120 ISSUE DATE : 14-May-2024
REQUEST No. : PN-24-0519

UNIT UNDER CALIBRATION

<u>SENSOR DATA</u>		<u>CALIBRATION CONDITION</u>	
Type	: 1" Coriolis Flow Meter	Mode	: Mass Flow Measurement
Manufacturer	: YOKOGAWA	Max. Range	: 0 - 1,600 kg/h
Model	: RCUP25S-15BA10-0C70	Flow Span	: 0 - 450 kg/h
	SF21-2-JA1/BG/PS/P3	Test Media	: Water
Serial No.	: D1VB01181	Reference Temp	: 15 Deg C
Tag No.	: FT-00014		
Connection Type	: 1/2" ANSI 150		

MAXIMUM PERMISSIBLE

Error	:	± 0.10	%
Range of Repeatability	:	± 0.05	%

TRANSMITTER DATA

Manufacturer : YOKOGAWA
Model : RCUP25S-15BA10-0C70
SF21-2-JA1/BG/PS/P3
Serial No. : D1VB01181

ENVIRONMENT

Ambient Temperature : (30 ± 5) Deg C
Relative Humidity : < 80 %
Atmosphere Pressure : 900 < P < 1100 mbar

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-001)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND570 Panel	B638050845	TH4008-001-032924-ACC-TH	29-Mar-2025
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler Toledo Co.,Ltd, and Thai-Korea Calibration Center.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☒ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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Page 1 of 3

FLS-F-016-REV-12

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
 11 Phangmuang Chapoh 2-1, Huai Pong,
 Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB1-24-0120
 DATE OF RECEIVED : 13-May-2024
 DATE OF CALIBRATION : 14-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
 Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

SK20 = 47.366 MHz*kg/h

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	15.77	70.98324	70.96076	0.032	0.000	0.027
2	38.34	172.52532	172.48351	0.024	0.006	0.027
3	61.62	277.31069	277.24824	0.023	0.000	0.027

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

* % Error = [(UUC flowrate - Reference Standard flowrate) / Reference Standard flowrate] x 100

Note : Maximum permissible : Error = ± 0.10 %
 Range of Repeatability = ± 0.05 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2.00 , providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB1-24-0120
Calibration Date : 14-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : YOKOGAWA
Model : RCUP25S-15BA10-0C70
Serial No. : SF21-2-JA1/BG/PS/P3
Tag No. : D1VB01181
Transmitter Information
Manufacturer : YOKOGAWA
Model : RCUP25S-15BA10-0C70
Serial No. : SF21-2-JA1/BG/PS/P3
Tag No. : D1VB01181

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 1,600 kg/h
Flow Span : 0 - 450 kg/h
Test Media : Water
Reference Temp : 15 Deg C

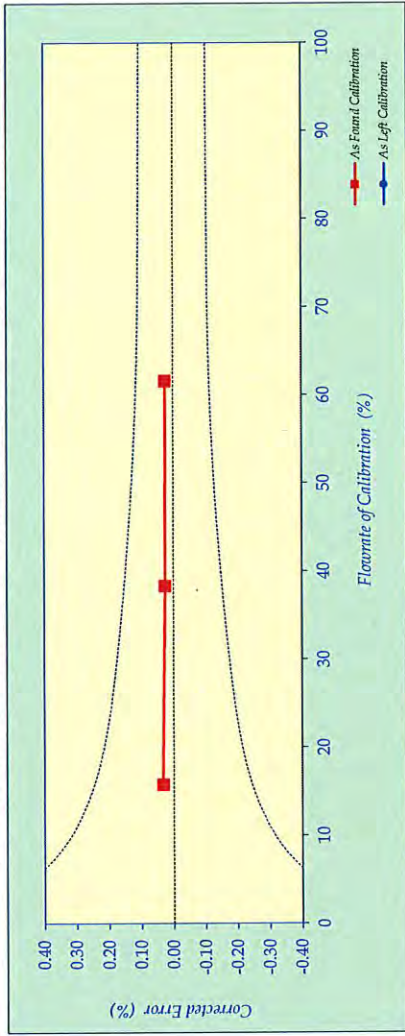
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve : Meter Flow Span Setting



As Found Calibration

Flowrate of Flowrate	Error
Flow Span UUC	
(%) kg/h	(%)
15.77 70.98324	0.032
38.34 172.52532	0.024
61.62 277.31069	0.023

As Left Calibration

Flowrate of Flowrate	Error
Flow Span UUC	
(%) kg/h	(%)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB1-24-0120
Calibration Date : 14-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : YOKOGAWA
Model : RCUP25S-15BA10-0C70
Serial No. : SF21-2-JA1/BG/PS/P3
Tag No. : DIVB01181
Transmitter Information
Manufacturer : YOKOGAWA
Model : RCUP25S-15BA10-0C70
Serial No. : SF21-2-JA1/BG/PS/P3
Tag No. : DIVB01181

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 1,600 kg/h
Flow Span : 0 - 450 kg/h
Test Media : Water
Reference Temp : 15 Deg C

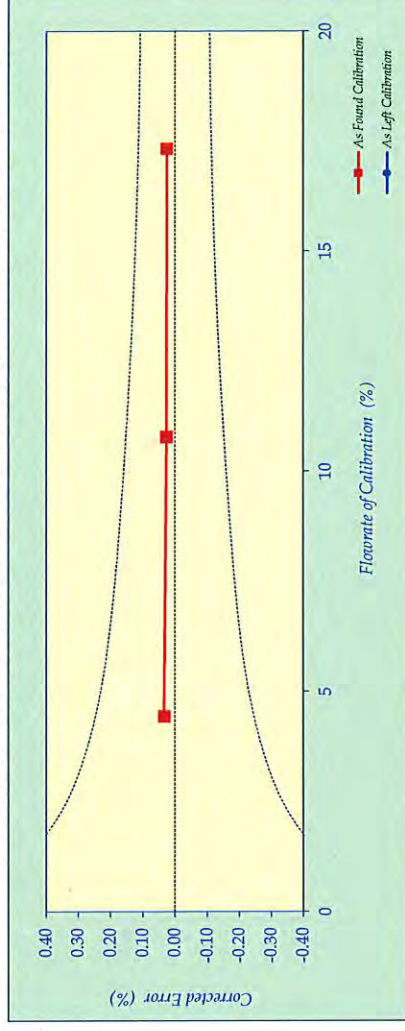
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve : Meter Flow Specification



As Found Calibration

Flowrate of	Flowrate	Error
Max. Range	UUC	
(%)	kg/h	(%)
4.44	70.98324	0.032
10.78	172.52532	0.024
17.33	277.31069	0.023

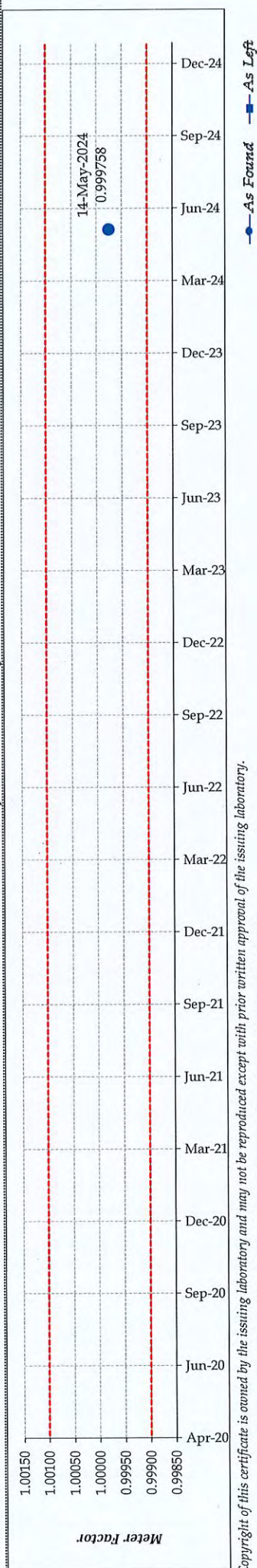
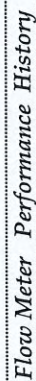
As Left Calibration

Flowrate of	Flowrate	Error
Max. Range	UUC	
(%)	kg/h	(%)

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Certificate No.	:	FLS-LAB1-24-0120
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-00014
Make	:	YOKOGAWA
Model	:	RCUP25S-15BA10-0C70 SF21-2-JA1/BG/PS/P3
Serial No.	:	D1VB01181
Test Media	:	Water

[illegible]

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Tracability : The National Standard of Bureau of Weights and Measures through office of Legal Metrology of Thailand.

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB1-24-0121 ISSUE DATE : 14-May-2024
REQUEST No. : PN-24-0519

UNIT UNDER CALIBRATION

<u>SENSOR DATA</u>		<u>CALIBRATION CONDITION</u>	
Type :	1" Coriolis Flow Meter	Mode :	Mass Flow Measurement
Manufacturer :	YOKOGAWA	Max. Range :	0 - 1,600 kg/h
Model :	RCUP25S-15BA10-0C70	Flow Span :	0 - 450 kg/h
	SF21-2-JA1/BG/PS/P3	Test Media :	Water
Serial No. :	D1VB01277	Reference Temp :	15 Deg C
Tag No. :	FT-00016		
Connection Type :	1/2" ANSI 150		

MAXIMUM PERMISSIBLE

Error :	± 0.10	%
Range of Repeatability :	± 0.05	%

TRANSMITTER DATA

Manufacturer : YOKOGAWA
Model : RCUP25S-15BA10-0C70
SF21-2-JA1/BG/PS/P3
Serial No. : D1VB01277

ENVIRONMENT

Ambient Temperature : (30 ± 5) Deg C
Relative Humidity : < 80 %
Atmosphere Pressure : 900 < P < 1100 mbar

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-001)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND570 Panel	B638050845	TH4008-001-032924-ACC-TH	29-Mar-2025
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler Toledo Co.,Ltd, and Thai-Korea Calibration Center.

CALIBRATED BY:

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY:

- ☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☒ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-016-REV-12

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
 11 Phangmuang Chapoh 2-1, Huai Pong,
 Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB1-24-0121
 DATE OF RECEIVED : 13-May-2024
 DATE OF CALIBRATION : 14-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
 Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION SK20 = 47.431 MHz*kg/h

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	18.40	82.80684	82.85826	-0.062	0.002	0.027
2	49.51	222.78281	222.89142	-0.049	0.010	0.027
3	80.81	363.65308	363.77893	-0.035	0.003	0.027

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

* % Error = [(UUC flowrate - Reference Standard flowrate) / Reference Standard flowrate] x 100

Note : Maximum permissible : Error = \pm 0.10 %
 Range of Repeatability = \pm 0.05 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2.00 , providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB1-24-0121
Calibration Date : 14-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangnuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : YOKOGAWA
Model : RCUP25S-15BA10-0C70
Serial No. : SF21-2-JA1/BG/PS/P3
Tag No. : D1VB01277
Transmitter Information
Manufacturer : YOKOGAWA
Model : RCUP25S-15BA10-0C70
Serial No. : SF21-2-JA1/BG/PS/P3
Tag No. : D1VB01277

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 1,600 kg/h
Flow Span : 0 - 450 kg/h
Test Media : Water
Reference Temp : 15 Deg C

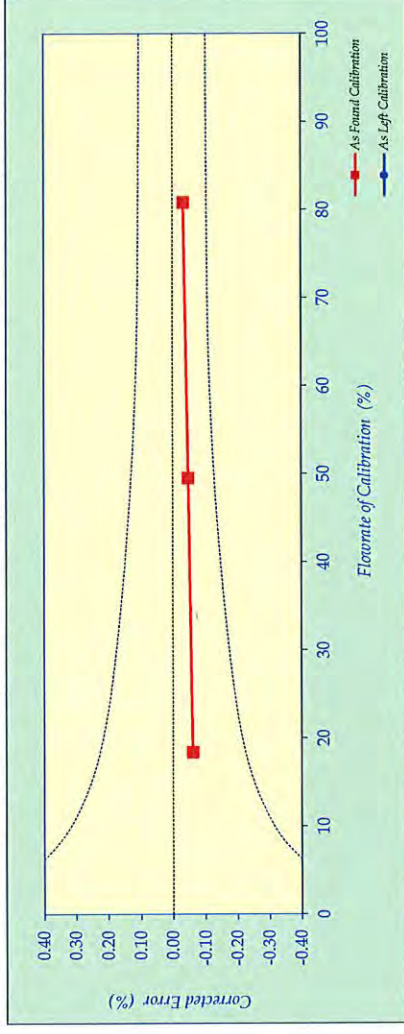
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve : Meter Flow Span Setting



As Found Calibration

Flowrate of	Flowrate	Error
Flow Span	UUC	
(%)	kg/h	(%)
18.40	82.80684	-0.062
49.51	222.78281	-0.049
80.81	363.65308	-0.035

As Left Calibration

Flowrate of	Flowrate	Error
Flow Span	UUC	
(%)	kg/h	(%)

CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB1-24-0121
 Calibration Date : 14-May-2024
 Customer : Kuraray GC Advanced Materials Co., Ltd.
 : 11 Phangmuang Chapoh 2-1, Huai Pong,
 : Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
 Manufacturer : YOKOGAWA
 Model : RCUP25S-15BA10-0C70
 Serial No. : SF21-2-JA1/BG/PS/P3
 Tag No. : D1VB01277
 FT-00016
 Transmitter Information
 Manufacturer : YOKOGAWA
 Model : RCUP25S-15BA10-0C70
 Serial No. : SF21-2-JA1/BG/PS/P3
 D1VB01277

CALIBRATION CONDITION

Mode : Mass Flow Measurement
 Max. Range : 0 - 1,600 kg/h
 Flow Span : 0 - 450 kg/h
 Test Media : Water
 Reference Temp : 15 Deg C

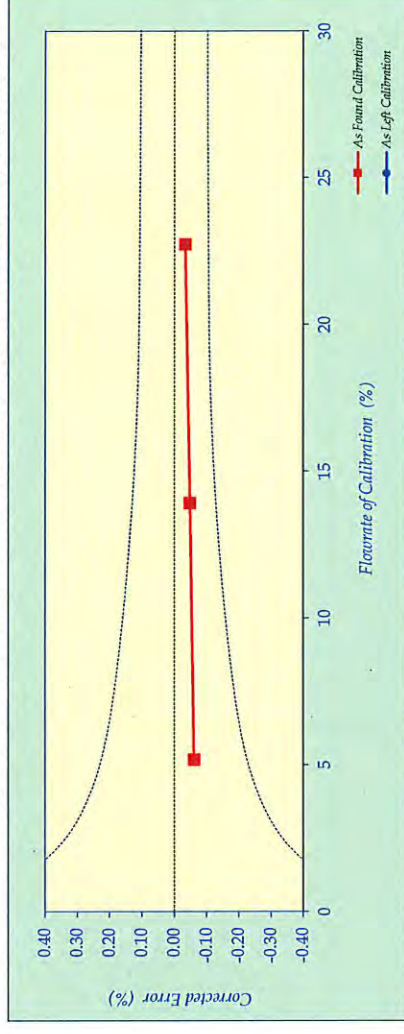
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
 Range of Repeatability : \pm 0.05 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve : Meter Flow Specification



As Found Calibration

Flowrate of Max. Range (%)	Flowrate UUC kg/h	Error (%)
5.18	82.80684	-0.062
13.92	222.78281	-0.049
22.73	363.65308	-0.035

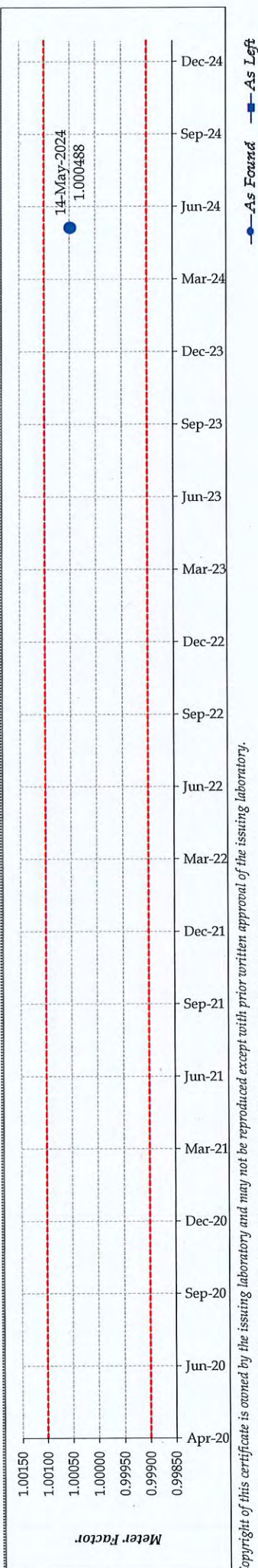
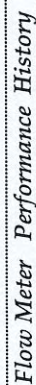
As Left Calibration

Flowrate of Max. Range (%)	Flowrate UUC kg/h	Error (%)

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Certificate No.	:	FLS-LAB1-24-0121
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-00016
Make	:	YOKOGAWA
Model	:	RCUP25S-15BA10-0C70
		SF21-2-JA1/BG/PS/P3
Serial No.	:	D1VB01277
Test Media	:	Water

[illegible]

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Traceability : The National Standard of Bureau of Weights and Measures through office of Legal Metrology of Thailand.

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB1-24-0122
REQUEST No. : PN-24-0519

ISSUE DATE : 14-May-2024

UNIT UNDER CALIBRATION

SENSOR DATA		CALIBRATION CONDITION	
Type	: 1" Coriolis Flow Meter	Mode	: Mass Flow Measurement
Manufacturer	: YOKOGAWA	Max. Range	: 0 - 1,600 kg/h
Model	: RCUP25S-15BA20-0C70	Flow Span	: 0 - 800 kg/h
	SF21-2-JA1/BG/PS/P3	Test Media	: Water
Serial No.	: D1VB01016	Reference Temp	: 15 Deg C
Tag No.	: FT-00020		
Connection Type	: 1/2" ANSI 300		

MAXIMUM PERMISSIBLE

Error	: ± 0.10 %
Range of Repeatability	: ± 0.05 %

TRANSMITTER DATA

Manufacturer : YOKOGAWA
Model : RCUP25S-15BA20-0C70
SF21-2-JA1/BG/PS/P3
Serial No. : D1VB01016

ENVIRONMENT

Ambient Temperature : (30 ± 5) Deg C
Relative Humidity : < 80 %
Atmosphere Pressure : 900 < P < 1100 mbar

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-001)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND570 Panel	B638050845	TH4008-001-032924-ACC-TH	29-Mar-2025
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler Toledo Co.,Ltd, and Thai-Korea Calibration Center.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☒ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
 11 Phangmuang Chapoh 2-1, Huai Pong,
 Mueang Rayong District, Rayong 21150

 CERTIFICATE No. : FLS-LAB1-24-0122
 DATE OF RECEIVED : 13-May-2024
 DATE OF CALIBRATION : 14-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
 Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION SK20 = 47.636 MHz*kg/h

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	19.37	154.93746	154.83137	0.069	0.010	0.027
2	47.05	376.37198	376.20945	0.043	0.002	0.027
3	75.33	602.67916	602.44832	0.038	0.001	0.027

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

$$* \% \text{ Error} = [(\text{UUC flowrate} - \text{Reference Standard flowrate}) / \text{Reference Standard flowrate}] \times 100$$

Note : Maximum permissible : Error = ± 0.10 %
 Range of Repeatability = ± 0.05 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB1-24-0122
Calibration Date : 14-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : YOKOGAWA
Model : RCUP25S-15BA20-0C70
Serial No. : SF21-2-JA1/BG/PS/P3
Tag No. : D1VB01016
Transmitter Information
Manufacturer : YOKOGAWA
Model : RCUP25S-15BA20-0C70
Serial No. : SF21-2-JA1/BG/PS/P3
Tag No. : D1VB01016

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 1,600 kg/h
Flow Span : 0 - 800 kg/h
Test Media : Water
Reference Temp : 15 Deg C

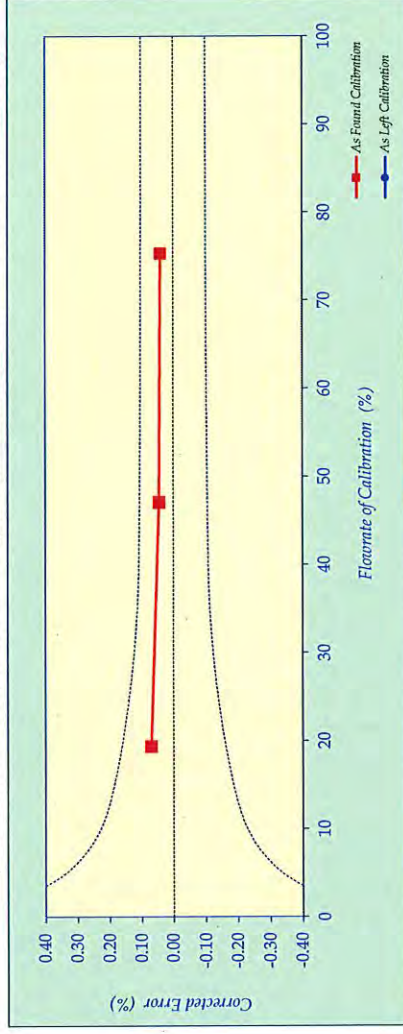
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SEIOWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve : Meter Flow Span Setting



As Found Calibration

Flowrate of Flowrate	Error
Flow Span UUC	
(%) kg/h	(%)
19.37 154.93746	0.069
47.05 376.37198	0.043
75.33 602.67916	0.038

As Left Calibration

Flowrate of Flowrate	Error
Flow Span UUC	
(%) kg/h	(%)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB1-24-0122
 Calibration Date : 14-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
 : 11 Phangmuang Chapoh 2-1, Huai Pong,
 : Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
 Manufacturer : YOKOGAWA
 Model : RCUP25S-15BA20-0C70
 Serial No. : SF21-2-JA1/BG/PS/P3
 Tag No. : D1VB01016
 FT-00020

Transmitter Information
 Manufacturer : YOKOGAWA
 Model : RCUP25S-15BA20-0C70
 Serial No. : SF21-2-JA1/BG/PS/P3
 D1VB01016

CALIBRATION CONDITION

Mode : Mass Flow Measurement
 Max. Range : 0 - 1,600 kg/h
 Flow Span : 0 - 800 kg/h
 Test Media : Water
 Reference Temp : 15 Deg C

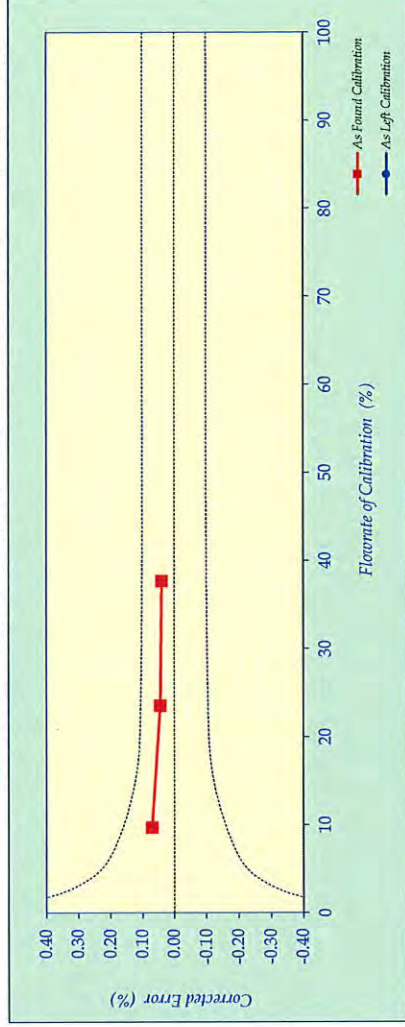
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
 Range of Repeatability : \pm 0.05 %

CALIBRATED BY : *Porn P.S.*

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve : Meter Flow Specification



As Found Calibration

Flowrate of Max. Range (%)	Flowrate UUC kg/h	Error (%)
9.68	154.93746	0.069
23.52	376.37198	0.043
37.67	602.67916	0.038

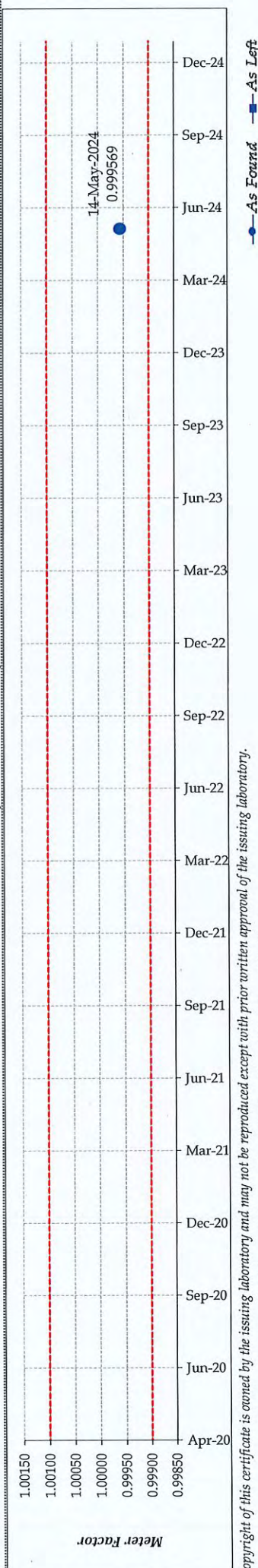
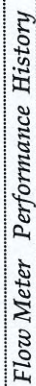
As Left Calibration

Flowrate of Max. Range (%)	Flowrate UUC kg/h	Error (%)

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METER CONTROL CHART PERFORMANCE HISTORY

[illegible]

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Traceability : The National Standard of Bureau of Weights and Measures through office of Legal Metrology of Thailand.

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB1-24-0123 ISSUE DATE : 15-May-2024
REQUEST No. : PN-24-0519

UNIT UNDER CALIBRATION

<p>SENSOR DATA</p> <p>Type : 1/2" Vortex Flow Meter Manufacturer : YOKOGAWA Model : DY015-JBLBA1-4D/SF2/A Serial No. : S5W100323 003 7 Tag No. : FT-00019 Connection Type : 1/2" ANSI 600</p>	<p>CALIBRATION CONDITION</p> <p>Mode : Volumetric Flow Measurement Flow range : 0 - 6,000 l/h Test Media : Water Reference Temp. : 15 Deg C</p>
--	--

<p>TRANSMITTER DATA</p> <p>Manufacturer : - Model : - Serial No. : -</p>	<p>MAXIMUM PERMISSIBLE</p> <p>Error : ± 0.75 % Range of Repeatability : ± 0.20 %</p>
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<p>ENVIRONMENT</p> <p>Ambient Temperature : (30 ± 5) Deg C Relative Humidity : < 80 % Atmosphere Pressure : $900 < P < 1100$ mbar</p>
--

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-002)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND570 Panel	B638050845	TH4008-001-032924-ACC-TH	29-Mar-2025
	Electronic Weight Scale	IND780 Panel	B638047084	S2403022S	1-Mar-2025
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024
	Counter/Timer	L81007FR	090616-152	231120CA18	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler-Toledo (Thailand) Limited, Thai Calibration Services Co.,Ltd., and Thai-Korea Calibration Center.

CALIBRATED BY: 

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY: 

- ☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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Page 1 of 3

FLS-F-095-REV-15

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB1-24-0123
DATE OF RECEIVED : 13-May-2024
DATE OF CALIBRATION : 15-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

K-Factor = 371.8 Pulse/Litre

Calibration @ point	% Flowrate of Calibration	Flowrate : l/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	4.48	268.89837	267.10122	0.673	0.012	0.038
2	16.16	969.39897	968.48426	0.094	0.037	0.052
3	28.29	1,697.31611	1,697.74260	-0.025	0.001	0.052

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Calibration	Flowrate : l/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

* % Error = [(UUC flowrate - Reference Standard flowrate) / Reference Standard flowrate] x 100

Note : Maximum permissible : Error = ± 0.75 %
Range of Repeatability = ± 0.20 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

CALIBRATED BY : 

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Co., Ltd.

CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB1-24-0123
Calibration Date : 15-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : YOKOGAWA
Model : DY015-JBLBA1-4D/SF2/A
Serial No. : S5W100323 003 7
Tag No. : FT-00019
Transmitter Information
Manufacturer : -
Model : -
Serial No. : -

CALIBRATION CONDITION

Mode : Volumetric Flow Measurement
Flow range : 0 - 6,000 l/h
Test Media : Water
Reference Temp. : 15 Deg C

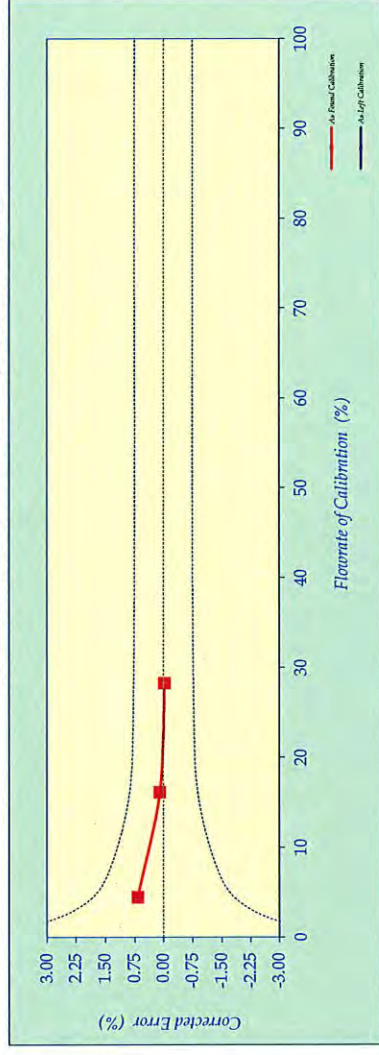
MAXIMUM PERMISSIBLE

Error : \pm 0.75 %
Range of Repeatability : \pm 0.20 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1/2" Vortex Flow Meter Performance Curve



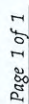
As Found Calibration

Flowrate of Calibration (%)	Flowrate UUC l/h	Error (%)
4.48	268.89837	0.673
16.16	969.39897	0.094
28.29	1,697.31611	-0.025

As Left Calibration

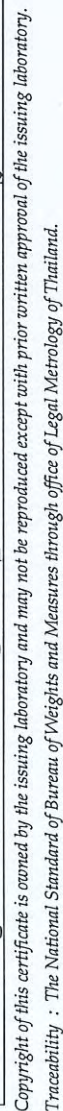
Flowrate of Calibration (%)	Flowrate UUC l/h	Error (%)

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Certificate No.	:	FLS-LAB1-24-0123
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-00019
Make	:	YOKOGAWA
Model	:	DY015-JBLBA1-4D/SF2/A
Serial No.	:	S5W100323 003 7
Test Media	:	Water

Flow Meter Performance History



CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB3-24-0374
REQUEST No. : PN-24-0519

ISSUE DATE : 11-May-2024

UNIT UNDER CALIBRATION

<u>SENSOR DATA</u>		<u>CALIBRATION CONDITION</u>	
Type	: 1" Coriolis Flow Meter	Mode	: Mass Flow Measurement
Manufacturer	: Endress+Hauser	Max. Range	: 0 - 18,000 kg/h
Model	: PROMASS F 8F5B25-BDEB	Flow Span	: 0 - 3,000 kg/h
	: AAAAFBAB2BSAAASAA2+	Test Media	: Water
Serial No.	: R409CA02000	Reference Temp	: 15 Deg C
Tag No.	: FT-74013		
Connection Type	: 1" ANSI 150		

<u>MAXIMUM PERMISSIBLE</u>			
Error	:	± 0.10	%
Range of Repeatability	:	± 0.05	%

<u>TRANSMITTER DATA</u>		<u>ENVIRONMENT</u>	
Manufacturer	: Endress+Hauser	Ambient Temperature	: (30 ± 5) Deg C
Model	: PROMASS 500 8F5B25-BDEB	Relative Humidity	: < 80 %
	: AAAAFBAB2BSAAASAA2+	Atmosphere Pressure	: 900 < P < 1100 mbar
Serial No.	: R409CA02000		

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-014)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND560	B446253843	TH3065-039-072123-ACC-TH	20-Jul-2024
2	Counter/Timer	L81002FR	111914-152	240424CA26	26-Apr-2025

TRACEABILITY : This certificate is traceable to SI unit through Mettler Toledo Co.,Ltd, and Thai-Korea Calibration Center.

CALIBRATED BY :

- ☒ THANAWAT MAHARAT (Technician)
☐ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Co., Ltd.

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
 11 Phangmuang Chapoh 2-1, Huai Pong,
 Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB3-24-0374
DATE OF RECEIVED : 11-May-2024
DATE OF CALIBRATION : 11-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
 Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

Calibration Factor = 2.0512

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	16.99	509.73568	509.40425	0.065	0.011	0.049
2	33.36	1,000.66862	1,000.11569	0.055	0.031	0.049
3	50.05	1,501.55633	1,500.91036	0.043	0.024	0.049

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

$$* \% \text{ Error} = [(\text{UUC flowrate} - \text{Reference Standard flowrate}) / \text{Reference Standard flowrate}] \times 100$$

Note : Maximum permissible : Error = ± 0.10 %
 Range of Repeatability = ± 0.05 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

CALIBRATED BY : Thanawat M.
☒ THANAWAT MAHARAT (Technician)
☐ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Co., Ltd.

CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0374
Calibration Date : 11-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Muang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress+Hauser
Model : PROMASS F 8F5B25-BDEB
Serial No. : R409CA02000
Tag No. : FT-74013
Transmitter Information
Manufacturer : Endress+Hauser
Model : PROMASS 500 8F5B25-BDEB
Serial No. : R409CA02000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 18,000 kg/h
Flow Span : 0 - 3,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

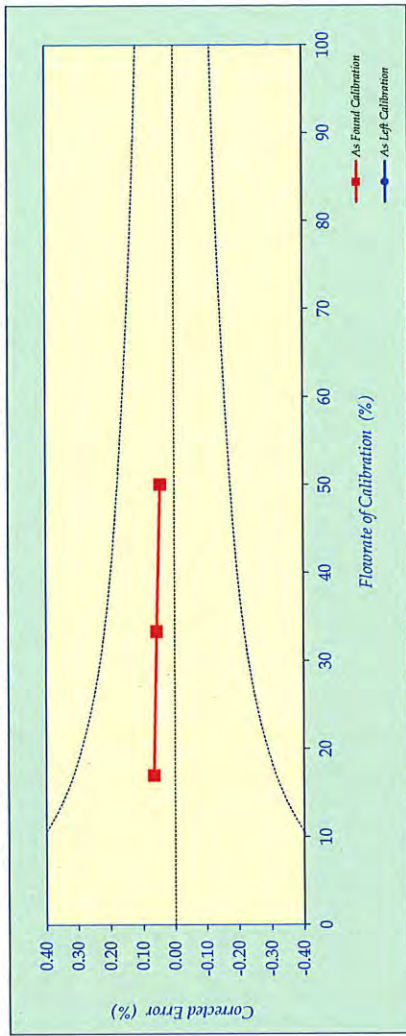
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY : *Thanawat M.*

- ☒ THANAWAT MAHARAT (Technician)
☐ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve: Meter Flow Span Setting



As Found Calibration			
Flowrate of Flow Span (%)	Flowrate (kg/h)	Error (%)	
16.99	509.73568	0.065	
33.36	1,000.66862	0.055	
50.05	1,501.55633	0.043	

As Left Calibration			
Flowrate of Flow Span (%)	Flowrate (kg/h)	Error (%)	

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Company Limited.

CALIBRATION CERTIFICATE

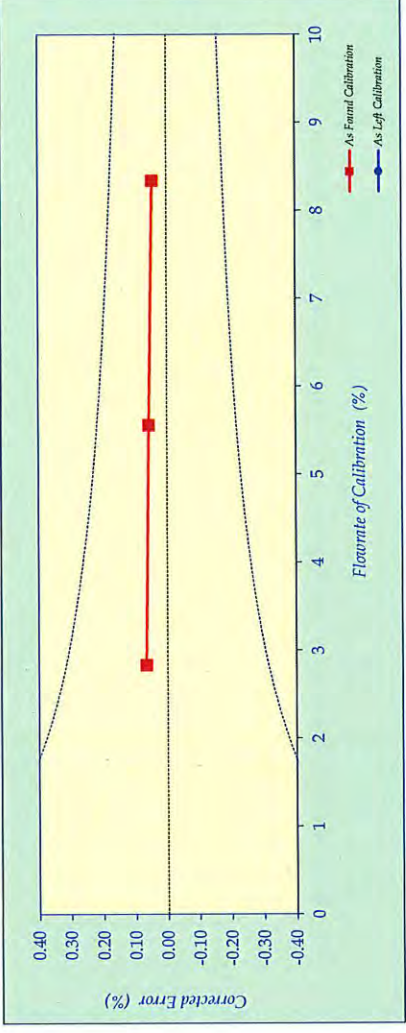
1" Coriolis Flow Meter Performance Curve : Meter Flow Specification

Certificate No. : FLS-LAB3-24-0374
 Calibration Date : 11-May-2024
 Customer : Kuraray GC Advanced Materials Co., Ltd.
 : 11 Phangmuang Chapoh 2-1, Huai Pong,
 : Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
 Manufacturer : Endress+Hauser
 Model : PROMASS F 8F5B25-BDEB
 : AAAAFBAB2BSAAASAA2+
 Serial No. : R409CA02000
 Tag No. : FT-74013

Transmitter Information
 Manufacturer : Endress+Hauser
 Model : PROMASS 500 8F5B25-BDEB
 : AAAAFBAB2BSAAASAA2+
 Serial No. : R409CA02000



As Found Calibration		
Flowrate of	Flowrate	Error
Max. Range	Max. Range	Max. Range
(%)	(%)	(%)
2.83	509.73568	0.065
5.56	1,000.66862	0.055
8.34	1,501.55633	0.043

As Left Calibration		
Flowrate of	Flowrate	Error
Max. Range	Max. Range	Max. Range
(%)	(%)	(%)


CALIBRATION CONDITION

Mode : Mass Flow Measurement
 Max. Range : 0 - 18,000 kg/h
 Flow Span : 0 - 3,000 kg/h
 Test Media : Water
 Reference Temp : 15 Deg C

MAXIMUM PERMISSIBLE

Error : ± 0.10 %
 Range of Repeatability : ± 0.05 %

CALIBRATED BY :


☒ THANAWAT MAHARAT (Technician)
☐ PORNPHAITHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

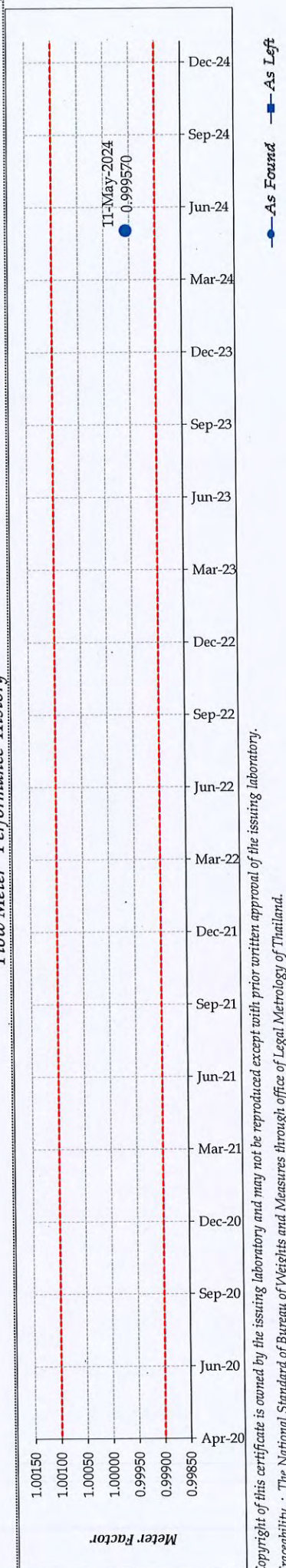
This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Company Limited.



Certificate No.	:	FLS-LAB3-24-0374
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-74013
Make	:	Endress+Hauser
Model	:	PROMASS F 85B25-BDEB AAAAFBA2BSAAASAA2+
Serial No.	:	R409CA02000
Test Media	:	Water

[illegible]

Flow Meter Performance History



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CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB3-24-0375
REQUEST No. : PN-24-0519

ISSUE DATE : 11-May-2024

UNIT UNDER CALIBRATION

SENSOR DATA

Type : 1" Coriolis Flow Meter
Manufacturer : Endress+Hauser
Model : PROMASS F 8F5B25-BDEB
AAAAFBAB2BSAAASAA2+
Serial No. : R411EB02000
Tag No. : FT-75025
Connection Type : 1" ANSI 150

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 18,000 kg/h
Flow Span : 0 - 2,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

MAXIMUM PERMISSIBLE

Error : ± 0.10 %
Range of Repeatability : ± 0.05 %

TRANSMITTER DATA

Manufacturer : Endress+Hauser
Model : PROMASS 500 8F5B25-BDEB
AAAAFBAB2BSAAASAA2+
Serial No. : R411EB02000

ENVIRONMENT

Ambient Temperature : (30 ± 5) Deg C
Relative Humidity : < 80 %
Atmosphere Pressure : $900 < P < 1100$ mbar

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-014)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND560	B446253843	TH3065-039-072123-ACC-TH	20-Jul-2024
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler-Toledo (Thailand) Limited and Professional Calibration & Services Co.,Ltd

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Co., Ltd.

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
 11 Phangmuang Chapoh 2-1, Huai Pong,
 Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB3-24-0375
 DATE OF RECEIVED : 11-May-2024
 DATE OF CALIBRATION : 11-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
 Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

Calibration Factor = 2.0811

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	20.22	404.35941	404.56307	-0.050	0.042	0.049
2	32.57	651.32279	651.70362	-0.058	0.005	0.049
3	45.26	905.23500	905.26367	-0.003	0.019	0.049

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

* % Error = [(UUC flowrate - Reference Standard flowrate) / Reference Standard flowrate] x 100

Note : Maximum permissible : Error = ± 0.10 %
 Range of Repeatability = ± 0.05 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Co., Ltd.

CALIBRATION CERTIFICATE

1" Coriolis Flow Meter Performance Curve : Meter Flow Span Setting

Certificate No. : FLS-LAB3-24-0375
Calibration Date : 11-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress+Hauser
Model : PROMASS F 8F5B25-BDEB
Serial No. : R411EB02000
Tag No. : FT-75025
Transmitter Information
Manufacturer : Endress+Hauser
Model : PROMASS 500 8F5B25-BDEB
Serial No. : R411EB02000

CALIBRATION CONDITION

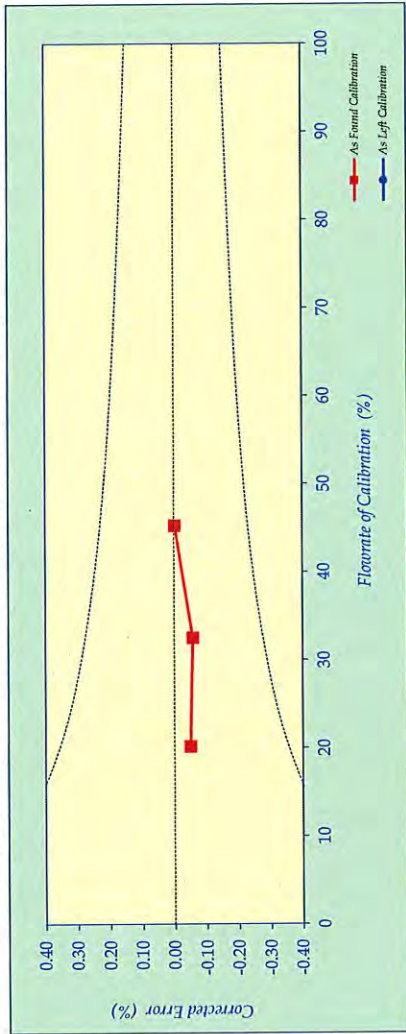
Mode : Mass Flow Measurement
Max. Range : 0 - 18,000 kg/h
Flow Span : 0 - 2,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY : 

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)



As Found Calibration

Flowrate of Flowrate	Error
Flow Span (%)	kg/h (%)
20.22	404.35941 -0.050
32.57	651.32279 -0.058
45.26	905.23500 -0.003

As Left Calibration

Flowrate of Flowrate	Error
Flow Span (%)	kg/h (%)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Company Limited.

CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0375
 Calibration Date : 11-May-2024
 Customer : Kuraray GC Advanced Materials Co., Ltd.
 : 11 Phangmuang Chapoh 2-1, Huai Pong,
 : Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
 Manufacturer : Endress+Hauser
 Model : PROMASS F 8F5B25-BDEB
 : AAAAFBAB2BSAAASAA2+
 Serial No. : R411EB02000
 Tag No. : FT-75025
 Transmitter Information
 Manufacturer : Endress+Hauser
 Model : PROMASS 500 8F5B25-BDEB
 : AAAAFBAB2BSAAASAA2+
 Serial No. : R411EB02000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
 Max. Range : 0 - 18,000 kg/h
 Flow Span : 0 - 2,000 kg/h
 Test Media : Water
 Reference Temp : 15 Deg C

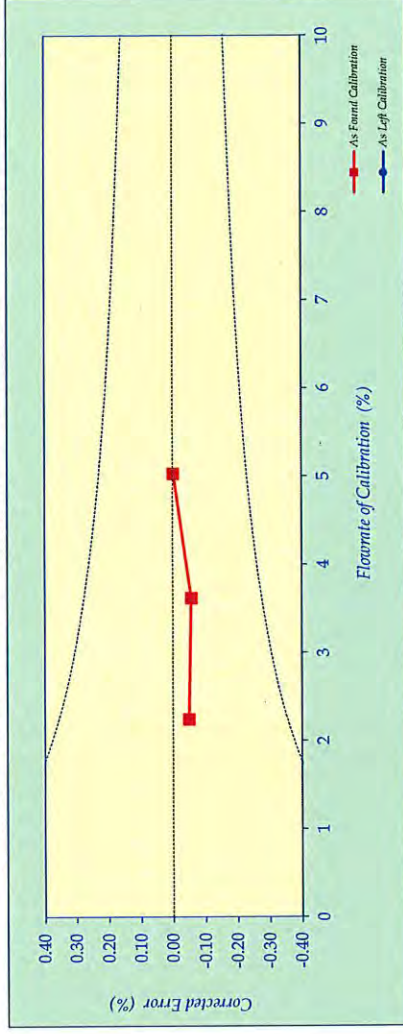
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
 Range of Repeatability : \pm 0.05 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve: Meter Flow Specification



As Found Calibration

Flowrate of	Flowrate	Error
Max. Range	kg/h	(%)
2.25	404.35941	-0.050
3.62	651.32279	-0.058
5.03	905.23500	-0.003

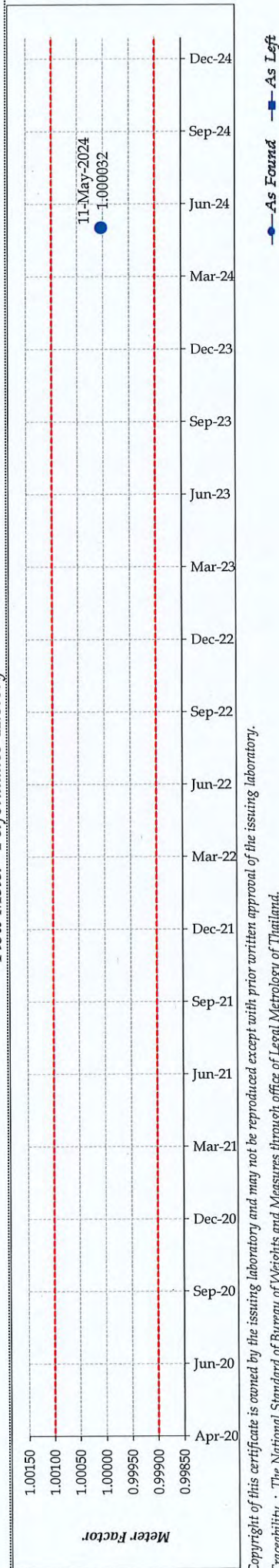
As Left Calibration

Flowrate of	Flowrate	Error
Max. Range	kg/h	(%)

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[illegible]

Flow Meter Performance History



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CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB3-24-0376 ISSUE DATE : 11-May-2024
REQUEST No. : PN-24-0519

UNIT UNDER CALIBRATION

<u>SENSOR DATA</u>		<u>CALIBRATION CONDITION</u>	
Type :	1" Coriolis Flow Meter	Mode :	Mass Flow Measurement
Manufacturer :	Endress+Hauser	Max. Range :	0 - 6,500 kg/h
Model :	PROMASS F 8F5B15-BDEB	Flow Span :	0 - 4,000 kg/h
	AAAAFBAB2BSAABSAA2+	Test Media :	Water
Serial No. :	R411E702000	Reference Temp :	15 Deg C
Tag No. :	FT-17005		
Connection Type :	1/2" ANSI 300		

<u>MAXIMUM PERMISSIBLE</u>	
Error :	± 0.10 %
Range of Repeatability :	± 0.05 %

<u>TRANSMITTER DATA</u>		<u>ENVIRONMENT</u>	
Manufacturer :	Endress+Hauser	Ambient Temperature :	(30 ± 5) Deg C
Model :	PROMASS 500 8F5B15-BDEB	Relative Humidity :	< 80 %
	AAAAFBAB2BSAABSAA2+	Atmosphere Pressure :	900 < P < 1100 mbar
Serial No. :	R411E702000		

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-014)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND560	B446253843	TH3065-039-072123-ACC-TH	20-Jul-2024
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler-Toledo (Thailand) Limited and Professional Calibration & Services Co.,Ltd

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☒ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
 11 Phangmuang Chapoh 2-1, Huai Pong,
 Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB3-24-0376
 DATE OF RECEIVED : 11-May-2024
 DATE OF CALIBRATION : 11-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
 Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

Calibration Factor = 1.8195

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	12.71	508.21674	508.50392	-0.056	0.025	0.049
2	31.30	1,251.99725	1,252.20979	-0.017	0.004	0.049
3	49.95	1,998.09132	1,997.75672	0.017	0.016	0.049

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

* % Error = [(UUC flowrate - Reference Standard flowrate) / Reference Standard flowrate] x 100

Note : Maximum permissible : Error = ± 0.10 %
 Range of Repeatability = ± 0.05 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2.00 , providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0376
Calibration Date : 11-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress+Hauser
Model : PROMASS F 8F5B15-BDEB
Serial No. : R411E702000
Tag No. : FT-17005
Transmitter Information
Manufacturer : Endress+Hauser
Model : PROMASS 500 8F5B15-BDEB
Serial No. : R411E702000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 6,500 kg/h
Flow Span : 0 - 4,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

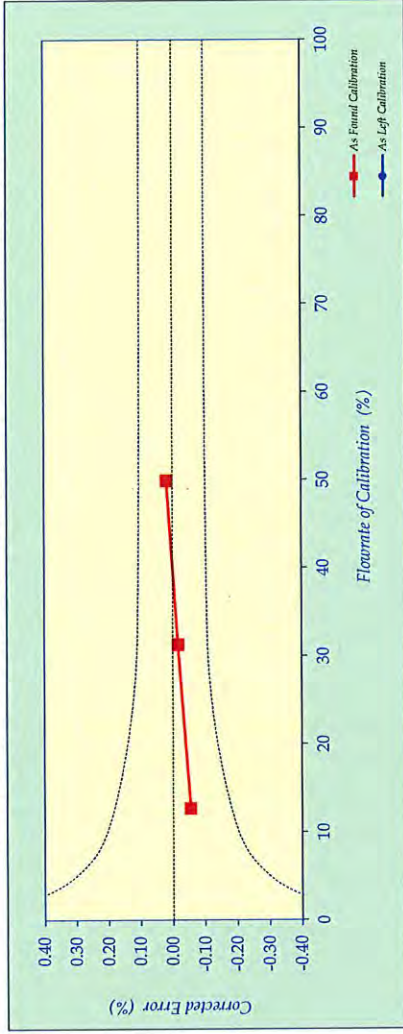
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY : *[Signature]*

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve : Meter Flow Span Setting



As Found Calibration

Flowrate of Flow Span (%)	Flowrate (kg/h)	Error (%)
12.71	508.21674	-0.056
31.30	1,251.99725	-0.017
49.95	1,998.09132	0.017

As Left Calibration

Flowrate of Flow Span (%)	Flowrate (kg/h)	Error (%)

This certification may not be reproduced other than in full, except with prior written approval of the issuing Laboratory of Flowlab & Service Company Limited.



CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0376
Calibration Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress+Hauser
Model : PROMASS F 8F5B15-BDEB
Serial No. : AAAAFBAB2BSAABSAA2+
Tag No. : R411E702000
Transmitter Information
Manufacturer : Endress+Hauser
Model : PROMASS 500 8F5B15-BDEB
Serial No. : AAAAFBAB2BSAABSAA2+
Tag No. : R411E702000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 6,500 kg/h
Flow Span : 0 - 4,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

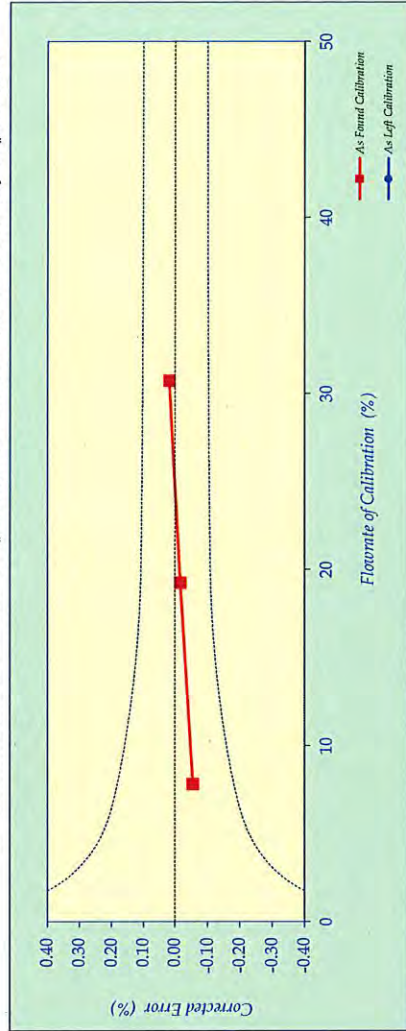
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Cortolis Flow Meter Performance Curve : Meter Flow Specification



As Found Calibration

Flowrate of	Flowrate	Error
Max. Range	(%)	kg/h
7.82	508.21674	-0.056
19.26	1,251.99725	-0.017
30.74	1,998.09132	0.017

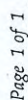
As Left Calibration

Flowrate of	Flowrate	Error
Max. Range	(%)	kg/h
		(%)

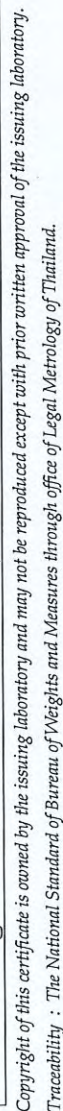
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Page 1 of 1

FLS-F-016-REV-12



Certificate No.	:	FLS-LAB3-24-0376
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-17005
Make	:	Endress+Hauser
Model	:	PROMASS F 85FB15-BDEB AAAAFBAB2BSAABSA2+
Serial No.	:	R411E702000
Test Media	:	Water

Flow Meter Performance History

—●— As Found —■— As Left

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB3-24-0376 ISSUE DATE : 11-May-2024
REQUEST No. : PN-24-0519

UNIT UNDER CALIBRATION

<u>SENSOR DATA</u>		<u>CALIBRATION CONDITION</u>	
Type :	1" Coriolis Flow Meter	Mode :	Mass Flow Measurement
Manufacturer :	Endress+Hauser	Max. Range :	0 - 6,500 kg/h
Model :	PROMASS F 8F5B15-BDEB	Flow Span :	0 - 4,000 kg/h
	AAAAFBAB2BSAABSAA2+	Test Media :	Water
Serial No. :	R411E702000	Reference Temp :	15 Deg C
Tag No. :	FT-17005		
Connection Type :	1/2" ANSI 300		

<u>MAXIMUM PERMISSIBLE</u>	
Error :	± 0.10 %
Range of Repeatability :	± 0.05 %

<u>TRANSMITTER DATA</u>		<u>ENVIRONMENT</u>	
Manufacturer :	Endress+Hauser	Ambient Temperature :	(30 ± 5) Deg C
Model :	PROMASS 500 8F5B15-BDEB	Relative Humidity :	< 80 %
	AAAAFBAB2BSAABSAA2+	Atmosphere Pressure :	900 < P < 1100 mbar
Serial No. :	R411E702000		

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-014)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND560	B446253843	TH3065-039-072123-ACC-TH	20-Jul-2024
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler-Toledo (Thailand) Limited and Professional Calibration & Services Co.,Ltd

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☒ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Co., Ltd.

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
 11 Phangmuang Chapoh 2-1, Huai Pong,
 Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB3-24-0376
 DATE OF RECEIVED : 11-May-2024
 DATE OF CALIBRATION : 11-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
 Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

Calibration Factor = 1.8195

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	12.71	508.21674	508.50392	-0.056	0.025	0.049
2	31.30	1,251.99725	1,252.20979	-0.017	0.004	0.049
3	49.95	1,998.09132	1,997.75672	0.017	0.016	0.049

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

* % Error = [(UUC flowrate - Reference Standard flowrate) / Reference Standard flowrate] x 100

Note : Maximum permissible : Error = ± 0.10 %
 Range of Repeatability = ± 0.05 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2.00 , providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Co., Ltd.

CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0376
Calibration Date : 11-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress+Hauser
Model : PROMASS F 8F5B15-BDEB
Serial No. : R411E702000
Tag No. : FT-17005
Transmitter Information
Manufacturer : Endress+Hauser
Model : PROMASS 500 8F5B15-BDEB
Serial No. : R411E702000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 6,500 kg/h
Flow Span : 0 - 4,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

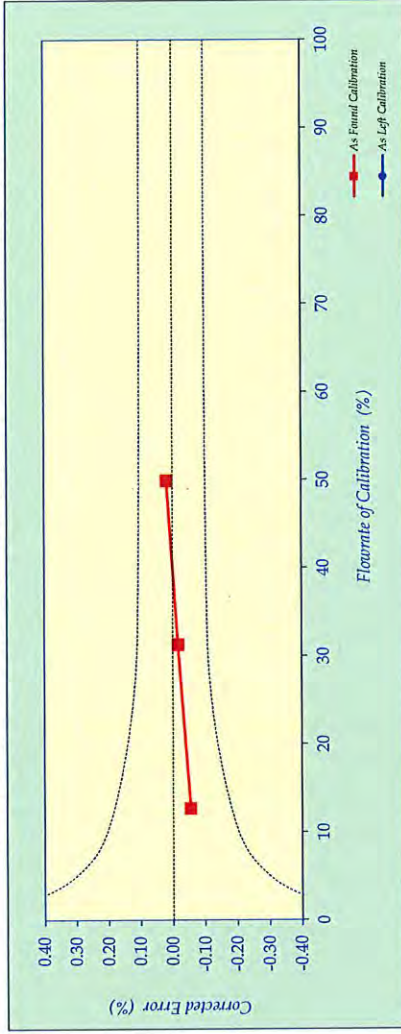
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY : *[Signature]*

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve : Meter Flow Span Setting



As Found Calibration

Flowrate of Flow Span (%)	Flowrate kg/h	Error (%)
12.71	508.21674	-0.056
31.30	1,251.99725	-0.017
49.95	1,998.09132	0.017

As Left Calibration

Flowrate of Flow Span (%)	Flowrate kg/h	Error (%)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0376
Calibration Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress+Hauser
Model : PROMASS F 8F5B15-BDEB
Serial No. : AAAAFBAB2BSAABSAA2+
Tag No. : R411E702000
Transmitter Information
Manufacturer : Endress+Hauser
Model : PROMASS 500 8F5B15-BDEB
Serial No. : AAAAFBAB2BSAABSAA2+
Tag No. : R411E702000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 6,500 kg/h
Flow Span : 0 - 4,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

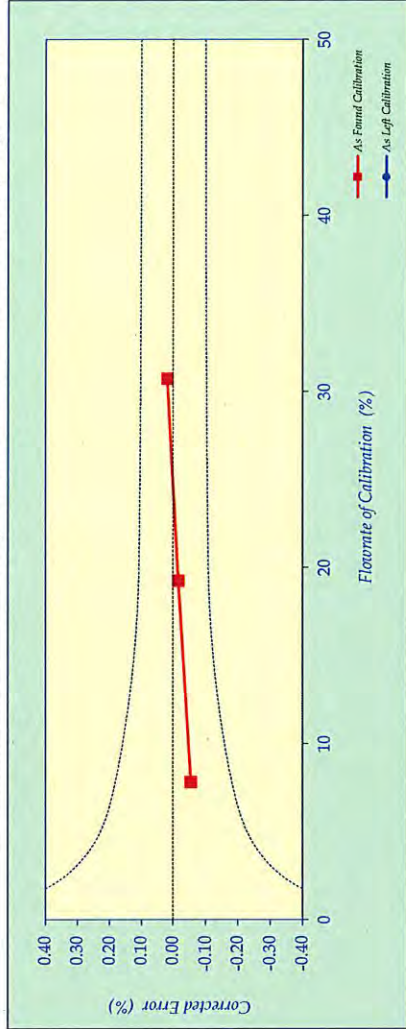
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Cortolis Flow Meter Performance Curve : Meter Flow Specification



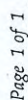
As Found Calibration

Flowrate of	Flowrate	Error
Max. Range	(%)	kg/h
7.82	508.21674	-0.056
19.26	1,251.99725	-0.017
30.74	1,998.09132	0.017

As Left Calibration

Flowrate of	Flowrate	Error
Max. Range	(%)	kg/h
		(%)

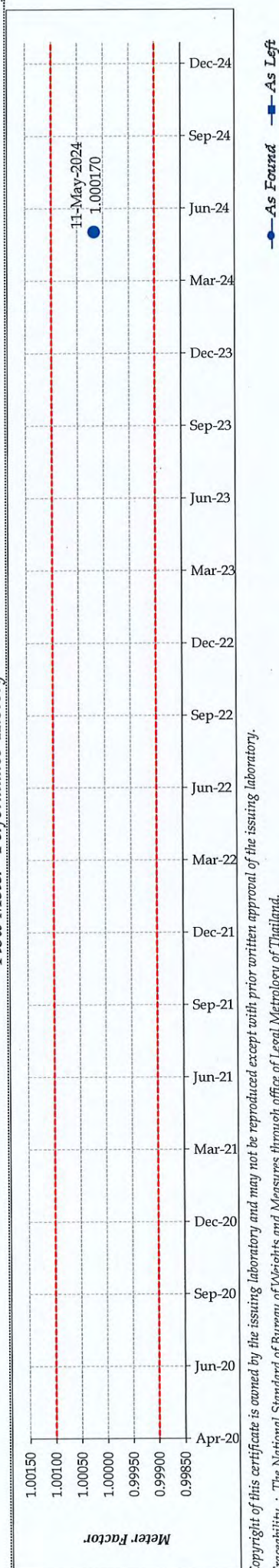
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Certificate No.	:	FLS-LAB3-24-0376
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-17005
Make	:	Endress+Hauser
Model	:	PROMASS F 85FB15-BDEB AAAAFBAB2BSAABSA2+
Serial No.	:	R411E702000
Test Media	:	Water

[illegible]

Flow Meter Performance History



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CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB3-24-0377 ISSUE DATE : 11-May-2024
REQUEST No. : PN-24-0519

UNIT UNDER CALIBRATION

<u>SENSOR DATA</u>		<u>CALIBRATION CONDITION</u>	
Type	: 1" Coriolis Flow Meter	Mode	: Mass Flow Measurement
Manufacturer	: MICRO MOTION	Max. Range	: 0 - 13,600 kg/h
Model	: F100S129CCAZEZZ	Flow Span	: 0 - 3,000 kg/h
Serial No.	: 21355064	Test Media	: Water
Tag No.	: FT-73045	Reference Temp	: 15 Deg C
Connection Type	: 1" ANSI 300		

MAXIMUM PERMISSIBLE

Error	:	± 0.20	%
Range of Repeatability	:	± 0.10	%

TRANSMITTER DATA

Manufacturer : MICRO MOTION
Model : 1700I12AEFEZZZ
Serial No. : 21365702

ENVIRONMENT

Ambient Temperature : (30 ± 5) Deg C
Relative Humidity : < 80 %
Atmosphere Pressure : 900 < P < 1100 mbar

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-014)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND560	B446253843	TH3065-039-072123-ACC-TH	20-Jul-2024
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler-Toledo (Thailand) Limited and Professional Calibration & Services Co.,Ltd

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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Page 1 of 3

FLS-F-016-REV-12

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
 11 Phangmuang Chapoh 2-1, Huai Pong,
 Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB3-24-0377
 DATE OF RECEIVED : 11-May-2024
 DATE OF CALIBRATION : 11-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
 Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

F.C.F. = 281.99 4.67 (Mass Factor = 1.00000)

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	31.67	950.16828	950.50972	-0.036	0.005	0.049
2	49.33	1,479.99990	1,479.46122	0.036	0.041	0.049
3	65.20	1,955.96125	1,954.61855	0.069	0.018	0.049

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

* % Error = [(UUC flowrate - Reference Standard flowrate) / Reference Standard flowrate] x 100

Note : Maximum permissible : Error = \pm 0.20 %
 Range of Repeatability = \pm 0.10 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2.00 , providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0377
Calibration Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : MICRO MOTION
Model : F100S129CCAZEZAZZ
Serial No. : 21355064
Tag No. : FT-73045
Transmitter Information
Manufacturer : MICRO MOTION
Model : 1700I12AEFEZZZ
Serial No. : 21365702

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 13,600 kg/h
Flow Span : 0 - 3,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

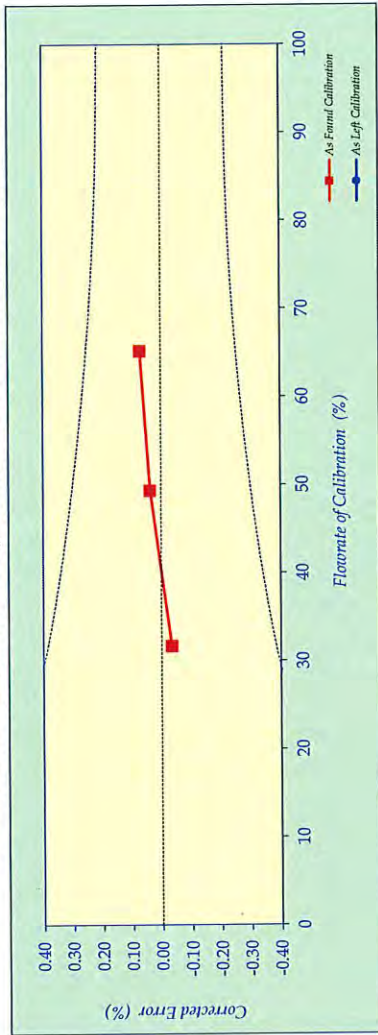
MAXIMUM PERMISSIBLE

Error : \pm 0.20 %
Range of Repeatability : \pm 0.10 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SEIWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Coriolis Flow Meter Performance Curve : Meter Flow Span Setting



As Found Calibration

Flowrate of Flowrate	Error
Flow Span (%)	kg/h
31.67	950.16828
49.33	1,479.99990
65.20	1,955.96125

As Left Calibration

Flowrate of Flowrate	Error
Flow Span (%)	kg/h

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Company Limited.



CALIBRATION CERTIFICATE

1" Coriolis Flow Meter Performance Curve : Meter Flow Specification

Certificate No. : FLS-LAB3-24-0377
Calibration Date : 11-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION


Sensor Information
Manufacturer : MICRO MOTION
Model : F100S129CCAZEZAZZ
Serial No. : 21355064
Tag No. : FT-73045
Transmitter Information
Manufacturer : MICRO MOTION
Model : 1700I12AEFEZZZ
Serial No. : 21365702

CALIBRATION CONDITION

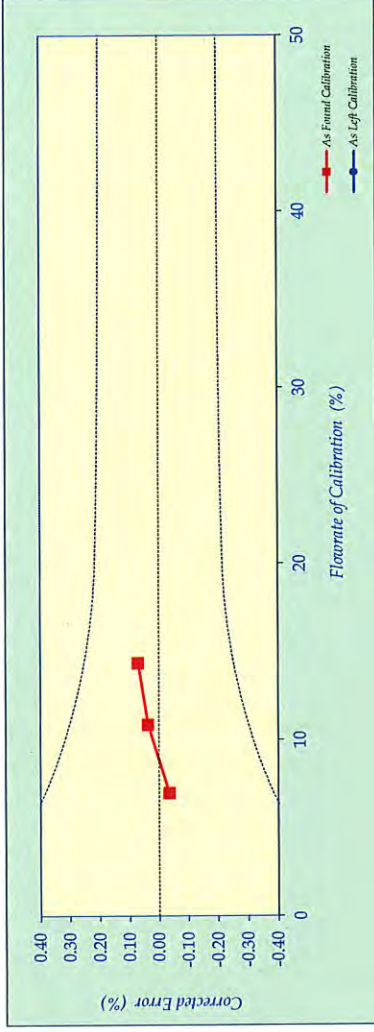
Mode : Mass Flow Measurement
Max. Range : 0 - 13,600 kg/h
Flow Span : 0 - 3,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

MAXIMUM PERMISSIBLE

Error : \pm 0.20 %
Range of Repeatability : \pm 0.10 %

CALIBRATED BY : 

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)



As Found Calibration

Flowrate of	Flowrate	Error
Max. Range	(%)	(%)
6.99	950.16828	-0.036
10.88	1,479.99990	0.036
14.38	1,955.96125	0.069

As Left Calibration

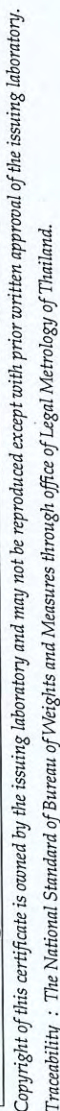
Flowrate of	Flowrate	Error
Max. Range	(%)	(%)
	kg/h	

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Certificate No.	:	FLS-LAB3-24-0377
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-73045
Make	:	MICRO MOTION
Model	:	F100S129CCAZEAZZ
Serial No.	:	21355064
Test Media	:	Water

Flow Meter Performance History



CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB3-24-0382 ISSUE DATE : 14-May-2024
REQUEST No. : PN-24-0519

UNIT UNDER CALIBRATION

<u>SENSOR DATA</u>		<u>CALIBRATION CONDITION</u>	
Type	: 1" Vortex Flow Meter	Mode	: Volumetric Flow Measurement
Manufacturer	: ROSEMOUNT	Flow range	: 0 - 15.3 m ³ /h
Model	: -	Test Media	: Water
Serial No.	: 13330177B	Reference Temp.	: 15 Deg C
Tag No.	: FT-00024		
Connection Type	: 1" ANSI 300		

<u>TRANSMITTER DATA</u>		<u>ENVIRONMENT</u>	
Manufacturer	: ROSEMOUNT	Ambient Temperature	: (30 ± 5) Deg C
Model	: 8800DF010SA3N2D1E7M5A	Relative Humidity	: < 80 %
	: 33T1QC2HR7Q4Q5Q8Q66WG	Atmosphere Pressure	: 900 < P < 1100 mbar
Serial No.	: 13330177		

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-015)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND560	B446253843	TH3065-039-072123-ACC-TH	20-Jul-2024
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler-Toledo (Thailand) Limited and Professional Calibration & Services Co.,Ltd

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☒ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Co., Ltd.

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
 11 Phangmuang Chapoh 2-1, Huai Pong,
 Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB3-24-0382
 DATE OF RECEIVED : 13-May-2024
 DATE OF CALIBRATION : 14-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
 Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

Reference K-Factor = 294.99 Pulse/gallon

Calibration @ point	% Flowrate of Calibration	Flowrate : m ³ /h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	4.79	0.73266	0.73153	0.155	0.037	0.058
2	9.87	1.50964	1.51279	-0.209	0.016	0.058
3	19.63	3.00367	3.01028	-0.220	0.013	0.058

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Calibration	Flowrate : m ³ /h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

* % Error = [(UUC flowrate - Reference Standard flowrate) / Reference Standard flowrate] x 100

Note : Maximum permissible : Error = ± 0.65 %
 Range of Repeatability = ± 0.10 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2.00 , providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Co., Ltd.

CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0382
Calibration Date : 14-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : ROSEMOUNT
Model : -
Serial No. : 13330177B
Tag No. : FT-00024
Transmitter Information
Manufacturer : ROSEMOUNT
Model : 8800DF010SA3N2D1E7M5A
Serial No. : 33T1QC2HR7Q4Q5Q8Q66WG

CALIBRATION CONDITION

Mode : Volumetric Flow Measurement
Flow range : 0 - 15.3 m³/h
Test Media : Water
Reference Temp. : 15 Deg C

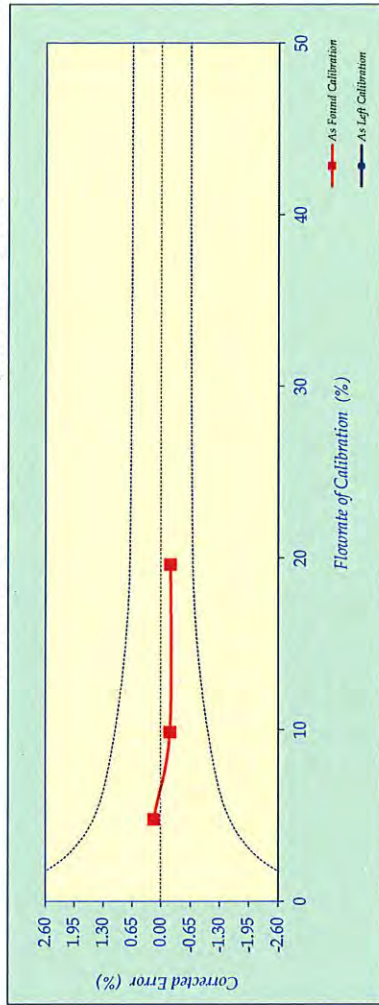
MAXIMUM PERMISSIBLE

Error : ± 0.65 %
Range of Repeatability : ± 0.10 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

1" Vortex Flow Meter Performance Curve



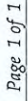
As Found Calibration

Flowrate of Calibration (%)	Flowrate m ³ /h	Error (%)
4.79	0.73266	0.155
9.87	1.50964	-0.209
19.63	3.00367	-0.220

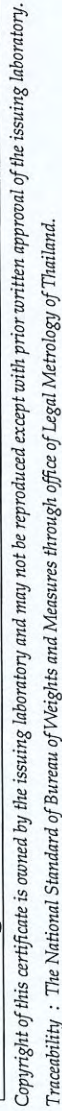
As Left Calibration

Flowrate of Calibration (%)	Flowrate m ³ /h	Error (%)

This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Company Limited.



Certificate No.	:	FLS-LAB3-24-0382
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-00024
Make	:	ROSEMOUNT
Model	:	-
Serial No.	:	13330177B
Test Media	:	Water

Flow Meter Performance History

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB3-24-0383 ISSUE DATE : 14-May-2024
REQUEST No. : PN-24-0519

UNIT UNDER CALIBRATION

<u>SENSOR DATA</u>		<u>CALIBRATION CONDITION</u>	
Type :	2" Coriolis Flow Meter	Mode :	Mass Flow Measurement
Manufacturer :	Endress + Hauser	Max. Range :	0 - 70,000 kg/h
Model :	PROMASS F 8F5B50-BDEB	Flow Span :	0 - 12,000 kg/h
	AAAAFBAB2BSAABSAA2+	Test Media :	Water
Serial No. :	R4134002000	Reference Temp :	15 Deg C
Tag No. :	FT-12014		
Connection Type :	2" ANSI 300		

MAXIMUM PERMISSIBLE

Error : Refer Spec Table.1 page 3 of 3
Range of Repeatability : Refer Spec Table.1 page 3 of 3

<u>TRANSMITTER DATA</u>		<u>ENVIRONMENT</u>	
Manufacturer :	MICRO MOTION	Ambient Temperature :	(30 ± 5) Deg C
Model :	PROMASS 500 8F5B50-BDEB	Relative Humidity :	< 80 %
	AAAAFBAB2BSAABSAA2+	Atmosphere Pressure :	900 < P < 1100 mbar
Serial No. :	R4134002000		

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-014)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND560	B446253843	TH3065-039-072123-ACC-TH	20-Jul-2024
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler-Toledo (Thailand) Limited and Professional Calibration & Services Co.,Ltd

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY :

- ☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☒ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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Page 1 of 3

FLS-F-016-REV-12

CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB3-24-0383
DATE OF RECEIVED : 11-May-2024
DATE OF CALIBRATION : 14-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

Cal Factor = 1.9534

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	4.17	500.22941	503.09258	-0.569	0.086	0.064
2	10.43	1,251.74968	1,253.88856	-0.171	0.077	0.064
3	16.68	2,001.65327	2,003.59930	-0.097	0.014	0.064

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : kg/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

* % Error = $[(UUC \text{ flowrate} - \text{Reference Standard flowrate}) / \text{Reference Standard flowrate}] \times 100$

Note : Maximum permissible : Error = Refer Spec Table.1 page 3 of 3

Range of Repeatability = Refer Spec Table.1 page 3 of 3

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0383
Calibration Date : 14-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress + Hauser
Model : PROMASS F 8F5B50-BDEB
Serial No. : AAAAFB2BSAABSA2+
Tag No. : R4134002000

Transmitter Information
Manufacturer : Endress + Hauser
Model : PROMASS 500 8F5B50-BDEB
Serial No. : AAAAFB2BSAABSA2+
Tag No. : R4134002000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 70,000 kg/h
Flow Span : 0 - 12,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

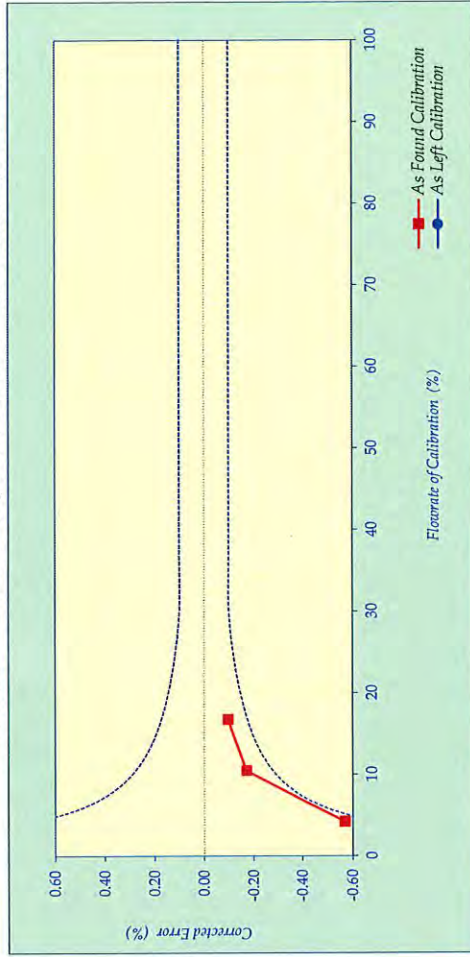
MAXIMUM PERMISSIBLE

Error : Refer Spec Table.1
Range of Repeatability : Refer Spec Table.1

CALIBRATED BY : 

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

2" Coriolis Flow Meter Performance Curve : Meter Flow Span Setting



As Found Calibration			As Left Calibration		
Flowrate of Flowrate	Error		Flowrate of Flowrate	Error	
(%)	kg/h	(%)	(%)	kg/h	(%)
4.17	500.22941	-0.569			
10.43	1,251.74968	-0.171			
16.68	2,001.65327	-0.097			

Table.1 Accuracy and repeatability on liquids

Error = ± [(Zero stability / Flow rate) × 100%] Repeatability = ± [(0.5) × (Zero stability) / (Flow rate) × 100%]					
Zero Stability = 3.50 Kg/h		Kg/h		Repeat	
Flowrate of Flowrate	Error	Flowrate	Limit (%)	Flowrate	Limit (%)
(%)	kg/h	kg/h			
4.17	500.22941	500.22941	0.700		0.350
10.43	1,251.74968	1,251.74968	0.280		0.140
16.68	2,001.65327	2,001.65327	0.175		0.087

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0383
Calibration Date : 14-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress + Hauser
Model : PROMASS F 8F5B50-BDEB
Serial No. : AAAAFB2BSAABSA2+
Tag No. : R4134002000
FT-12014

Transmitter Information
Manufacturer : Endress + Hauser
Model : PROMASS 500 8F5B50-BDEB
Serial No. : AAAAFB2BSAABSA2+
R4134002000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 70,000 kg/h
Flow Span : 0 - 12,000 kg/h
Test Media : Water
Reference Temp : 15 Deg C

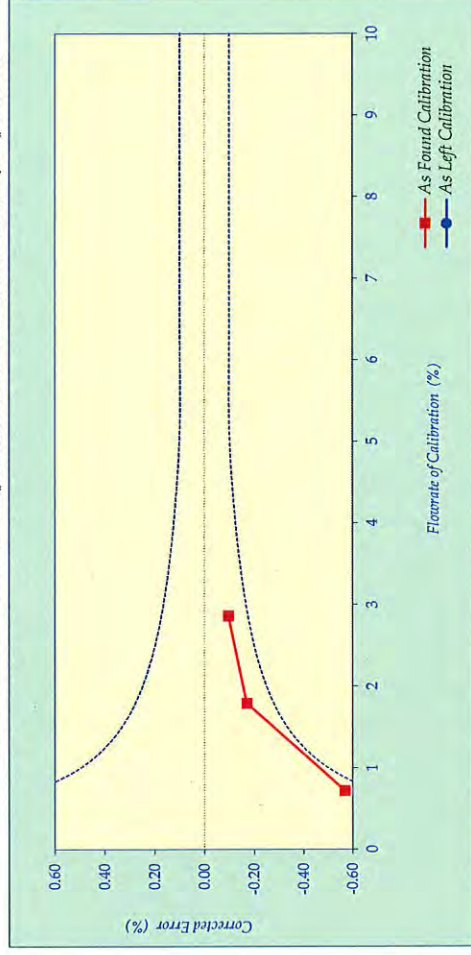
MAXIMUM PERMISSIBLE

Error : Refer Spec Table.1
Range of Repeatability : Refer Spec Table.1

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

2" Coriolis Flow Meter Performance Curve : Meter Flow Specification

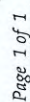


As Found Calibration			As Left Calibration		
Flowrate of Max. Range (%)	Flowrate (kg/h)	Error (%)	Flowrate of Flow Span (%)	Flowrate (kg/h)	Error (%)
0.71	500.22941	-0.569			
1.79	1,251.74968	-0.171			
2.86	2,001.65327	-0.097			

Table.1 Accuracy and repeatability on liquids

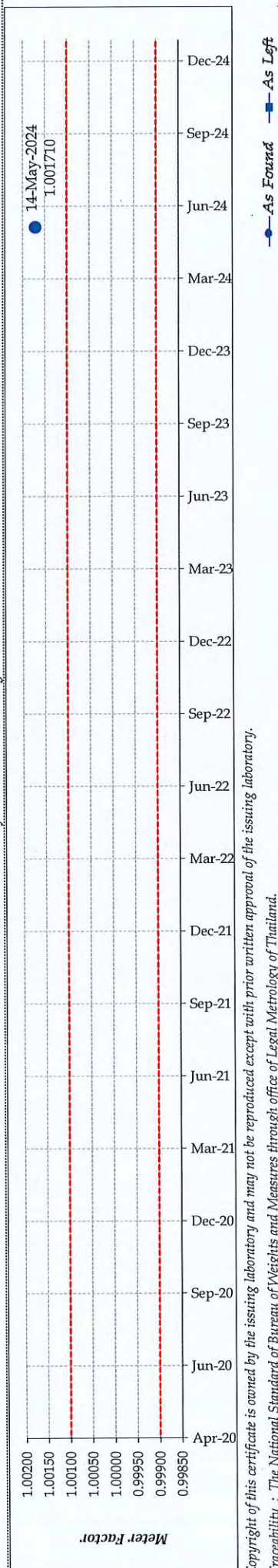
Error = $\pm \left[\frac{\text{Zero stability} / \text{Flow rate}}{\text{Flow rate}} \times 100\% \right]$			Repeatability = $\pm \left[\frac{(0.5) \times (\text{Zero stability})}{\text{Flow rate}} \times 100\% \right]$		
Flowrate of Max. Range (%)	Flowrate (kg/h)	Error	Flowrate of Zero Stability = 3.50 Kg/h	Limit (%)	Repeat Limit (%)
0.71	500.22941				
1.79	1,251.74968				
2.86	2,001.65327				

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METER CONTROL CHART PERFORMANCE HISTORY

Certificate No.	:	FLS-LAB3-24-0383
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-12014
Make	:	Endress + Hauser
Model	:	PROMASS F 8F5B50-BDEB AAAAFBA2BSAA2+
Serial No.	:	R4134002000
Test Media	:	Water

[illegible]

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CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

LOCATION : Flow Calibration Laboratory
Flowlab & Service Co., Ltd., Rayong

CERTIFICATE No. : FLS-LAB3-24-0384
REQUEST No. : PN-24-0519

ISSUE DATE : 14-May-2024

UNIT UNDER CALIBRATION

SENSOR DATA		CALIBRATION CONDITION	
Type	: 2" Coriolis Flow Meter	Mode	: Mass Flow Measurement
Manufacturer	: Endress + Hauser	Max. Range	: 0 - 70 t/h
Model	: PROMASS F 8F5B50-BDEB	Flow Span	: 0 - 30 t/h
	: AAAAFBAB2BSAABSAA2+	Test Media	: Water
Serial No.	: R409F902000	Reference Temp	: 15 Deg C
Tag No.	: FT-73004		
Connection Type	: 2" ANSI 300		

MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

TRANSMITTER DATA

Manufacturer : MICRO MOTION
Model : PROMASS 500 8F5B50-BDEB
Serial No. : R409F902000

ENVIRONMENT

Ambient Temperature : (30 \pm 5) Deg C
Relative Humidity : < 80 %
Atmosphere Pressure : 900 < P < 1100 mbar

MEASUREMENT PROCEDURE :

This unit under calibration was calibrated according to is ISO International Standard 4185, Measurement of Liquid flow in closed conduits - Weighing Method. [Ref.No.ISO 4185 : 1980/cor.1:1993(E)] which is referred to method Instruction No. (FLS-W-014)

REFERENCE STANDARD USED

Item	Description	Model	Serial No.	Certificate No.	Due Date
1	Electronic Weight Scale	IND560	B446253843	TH3065-039-072123-ACC-TH	20-Jul-2024
	Electronic Weight Scale	IND560 Panel	B446247282	S23085285	22-Aug-2024
2	Counter/Timer	L81007FR	090616-153	231120CA17	22-Nov-2024
	Counter/Timer	L81007FR	090616-152	231120CA18	22-Nov-2024

TRACEABILITY : This certificate is traceable to SI unit through Mettler-Toledo (Thailand) Limited, Thai Calibration Services Co.,Ltd., and Professional Calibration & Services Co.,Ltd.

CALIBRATED BY:

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

APPROVED BY:

- ☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☒ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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CALIBRATION CERTIFICATE

CUSTOMER : Kuraray GC Advanced Materials Co., Ltd.
11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

CERTIFICATE No. : FLS-LAB3-24-0384
DATE OF RECEIVED : 11-May-2024
DATE OF CALIBRATION : 14-May-2024

UNIT UNDER CALIBRATION RESULT :

The results of unit under calibration was found accurate as show on date and place of calibration only which is valid exclusively for calibrated meter as mentioned in certificate.

Condition As-Received : ☒ Used Flow Meter ☐ New Flow Meter
Requirement to : ☒ Without Adjustment ☐ With Adjustment

AS FOUND CALIBRATION

Cal Factor = 2.0157

Calibration @ point	% Flowrate of Flow Span	Flowrate : t/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			
1	6.85	2.05514	2.05588	-0.036	0.004	0.049
2	30.24	9.07179	9.07374	-0.021	0.037	0.046
3	83.44	25.03131	25.03106	0.001	0.009	0.046

AS LEFT CALIBRATION

Calibration @ point	% Flowrate of Flow Span	Flowrate : t/h		Error * (%)	Repeat (%)	Uncertainty (%)
		Unit Under Calibration	Reference Standard			

Reference Temp = 15 Deg C

$$* \% \text{ Error} = [(\text{UUC flowrate} - \text{Reference Standard flowrate}) / \text{Reference Standard flowrate}] \times 100$$

Note : Maximum permissible : Error = \pm 0.10 %

Range of Repeatability = \pm 0.05 %

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

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CALIBRATION CERTIFICATE

Certificate No. : FLS-LAB3-24-0384
Calibration Date : 14-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueang Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress + Hauser
Model : PROMASS F 8F5B50-BDEB
Serial No. : AAAAFB2BSAABSAA2+
Tag No. : R409F902000
FT-73004
Transmitter Information
Manufacturer : Endress + Hauser
Model : PROMASS 500 8F5B50-BDEB
Serial No. : AAAAFB2BSAABSAA2+
R409F902000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 70 t/h
Flow Span : 0 - 30 t/h
Test Media : Water
Reference Temp : 15 Deg C

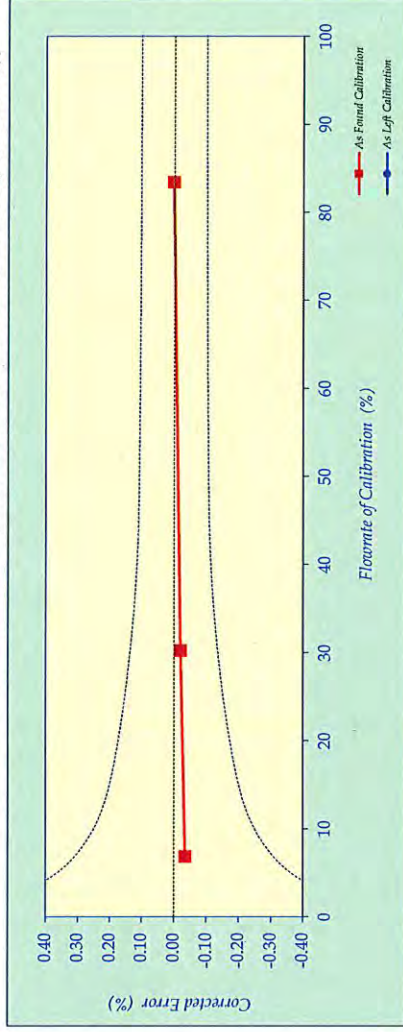
MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

2" Coriolis Flow Meter Performance Curve: Meter Flow Span Setting



As Found Calibration

Flowrate of Flow Span (%)	Flowrate t/h	Error (%)
6.85	2.05514	-0.036
30.24	9.07179	-0.021
83.44	25.03131	0.001

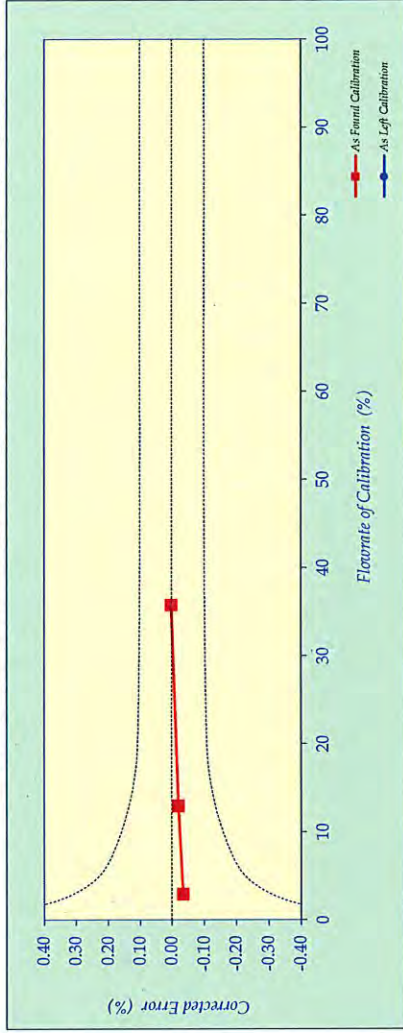
As Left Calibration

Flowrate of Flow Span (%)	Flowrate t/h	Error (%)



CALIBRATION CERTIFICATE

2" Coriolis Flow Meter Performance Curve : Meter Flow Specification



Certificate No. : FLS-LAB3-24-0384
Calibration Date : 14-May-2024
Customer : Kuraray GC Advanced Materials Co., Ltd.
: 11 Phangmuang Chapoh 2-1, Huai Pong,
: Mueng Rayong District, Rayong 21150

UNIT UNDER CALIBRATION

Sensor Information
Manufacturer : Endress + Hauser
Model : PROMASS F 8F5B50-BDEB
Serial No. : R409F902000
Tag No. : FT-73004
Transmitter Information
Manufacturer : Endress + Hauser
Model : PROMASS 500 8F5B50-BDEB
Serial No. : R409F902000

CALIBRATION CONDITION

Mode : Mass Flow Measurement
Max. Range : 0 - 70 t/h
Flow Span : 0 - 30 t/h
Test Media : Water
Reference Temp : 15 Deg C

MAXIMUM PERMISSIBLE

Error : \pm 0.10 %
Range of Repeatability : \pm 0.05 %

CALIBRATED BY : *Thana S.*

☐ THANAWAT MAHARAT (Technician)
☒ PORNPHATTHA SETWONG (Technician)
☐ LATTAPAN KAMJING (Engineer)

As Found Calibration

Flowrate of Max. Range (%)	Flowrate t/h	Error (%)
2.94	2.05514	-0.036
12.96	9.07179	-0.021
35.76	25.03131	0.001

As Left Calibration

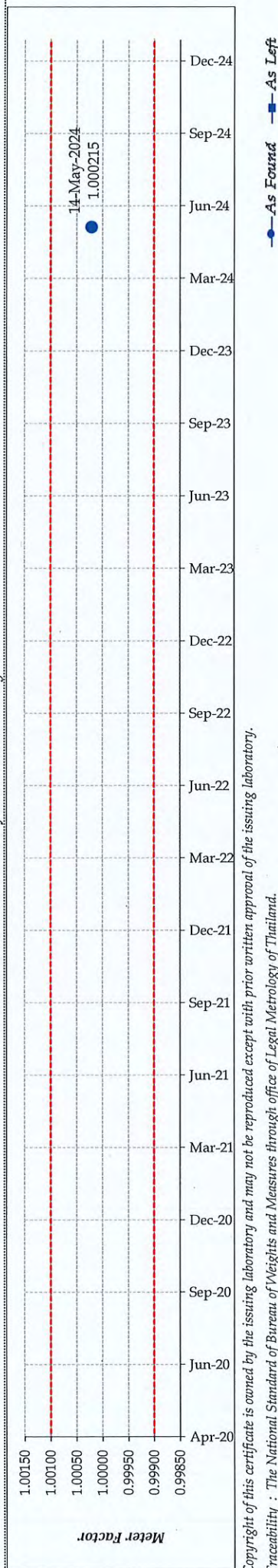
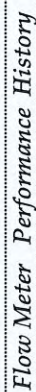
Flowrate of Max. Range (%)	Flowrate t/h	Error (%)

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METER CONTROL CHART PERFORMANCE HISTORY

Certificate No.	:	FLS-LAB3-24-0384
Customer	:	Kuraray GC Advanced Materials Co., Ltd.
Tag No.	:	FT-73004
Make	:	Endress + Hauser
Model	:	PROMASS F 8F5B50-BDEB AAAAFBAB2BSAABSA.A2+
Serial No.	:	R409F902000
Test Media	:	Water

[illegible]

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Traceability : The National Standard of Bureau of Weights and Measures through office of Legal Metrology of Thailand.

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0021
Received Date : 8-May-2024
Calibration Date : 9-May-2024

Request No. : PN-24-0519
Issue Date : 9-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5824547
Model : PT100
Tag No. / ID. No. : TE-21011S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	875-115	660TL18030002	SG-T-00261/67	19-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By : Thanawat M.

☒ THANAWAT MAHARAT (Technician)

☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By : Siripong K.

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0021

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824547
Length of probe : 650 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
-0.03	0.04	0.07	0.20
37.52	37.63	0.11	0.20
74.97	75.20	0.22	0.20
112.43	112.64	0.21	0.22
149.94	150.07	0.14	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0038
Received Date : 12-May-2024
Calibration Date : 13-May-2024

Request No. : PN-24-0519
Issue Date : 13-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1
A. Muang, Rayong 21150

Equipment : Temperature Gauge
Manufacturer : OKAZAKI
Serial No. : AEE0557403
Model : PT100
Tag No. / ID. No. : TE-77026
Resolution : 0.01 °C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :



☒ THANAWAT MAHARAT (Technician)

☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0038

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : OKAZAKI Type : RTD 3Wire Serial No. : AEE0557403
Length of probe : 685 mm. Diameter : 5 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment
Function : Temperature Measurement

Parameter setting : - Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.30	0.84	0.53	0.97
74.22	73.73	-0.49	0.97
150.19	149.64	-0.55	0.97
224.97	225.56	0.59	0.97
299.89	299.39	-0.50	0.97

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage
factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0039
Received Date : 12-May-2024
Calibration Date : 13-May-2024

Request No. : PN-24-0519
Issue Date : 13-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1
A. Muang, Rayong 21150

Equipment : Temperature Gauge
Manufacturer : YAMARI
Serial No. : 5824746
Model : PT100
Tag No./ID. No. : TE-77004S
Resolution : 0.01 °C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0039

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824746
Length of probe : 685 mm. Diameter : 5 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment
Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.23	0.81	0.58	0.39
74.74	74.54	-0.20	0.39
149.29	148.76	-0.53	0.39
224.43	223.94	-0.49	0.40
299.24	298.74	-0.49	0.40

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage
factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0040
Received Date : 12-May-2024
Calibration Date : 13-May-2024
Request No. : PN-24-0519
Issue Date : 13-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1
A. Muang, Rayong 21150

Equipment : Temperature Gauge
Manufacturer : OKAZAKI
Serial No. : AEE0557406
Model : PT100
Tag No./ID. No. : TE-77054
Resolution : 0.01 °C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :



☒ THANAWAT MAHARAT (Technician)

☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :



☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0040

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : OKAZAKI Type : RTD 3Wire Serial No. : AEE0557406
Length of probe : 685 mm. Diameter : 5 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : - Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.32	0.79	0.47	0.56
74.68	74.30	-0.38	0.56
149.80	149.76	-0.03	0.56
225.02	225.49	0.46	0.56
299.51	298.93	-0.58	0.56

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0041
Received Date : 12-May-2024
Calibration Date : 13-May-2024

Request No. : PN-24-0519
Issue Date : 13-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1
A. Muang, Rayong 21150

Equipment : Temperature Gauge
Manufacturer : YAMARI
Serial No. : 5824643
Model : PT100
Tag No. / ID. No. : TE-74013
Resolution : 0.01 °C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %


Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025


Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :


☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :


☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0041

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824643
Length of probe : 685 mm. Diameter : 5 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.24	0.70	0.46	0.28
74.99	74.92	-0.07	0.28
150.00	149.80	-0.20	0.28
225.26	224.75	-0.51	0.30
300.21	299.64	-0.57	0.30

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0042
Received Date : 12-May-2024
Calibration Date : 13-May-2024

Request No. : PN-24-0519
Issue Date : 13-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1
A. Muang, Rayong 21150

Equipment : Temperature Gauge
Manufacturer : YAMARI
Serial No. : 5824642
Model : PT100
Tag No. / ID. No. : TE-74012
Resolution : 0.01 °C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0042

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824642
Length of probe : 685 mm. Diameter : 5 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.30	0.88	0.58	0.27
75.11	75.56	0.45	0.27
150.15	150.54	0.39	0.27
224.81	225.34	0.53	0.28
300.29	300.14	-0.15	0.28

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0043
Received Date : 13-May-2024
Calibration Date : 14-May-2024

Request No. : PN-24-0519
Issue Date : 14-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature Gauge
Manufacturer : YAMARI
Serial No. : 5824742
Model : PT100
Tag No. / ID. No. : TE-77011S
Resolution : 0.01 °C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0043

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824742
Length of probe : 685 mm. Diameter : 5 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.34	-0.08	-0.42	0.21
75.49	74.97	-0.52	0.21
150.29	149.87	-0.42	0.21
225.11	224.69	-0.42	0.23
300.16	299.62	-0.54	0.23

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0019
Received Date : 9-May-2024
Calibration Date : 9-May-2024

Request No. : PN-24-0519
Issue Date : 9-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5824568
Model : PT100
Tag No. / ID. No. : TE-21068
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %


Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	875-115	660TL18030002	SG-T-00261/67	19-Mar-2025


Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

- 
☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

- 
☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0019

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824568
Length of probe : 650 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
-0.02	0.11	0.13	0.21
24.98	25.12	0.14	0.21
50.03	50.13	0.11	0.21
74.98	75.17	0.19	0.23
99.96	100.19	0.23	0.23

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage
factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0020
Received Date : 8-May-2024
Calibration Date : 9-May-2024

Request No. : PN-24-0519
Issue Date : 9-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5824543
Model : PT100
Tag No. / ID. No. : TE21001S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	875-115	660TL18030002	SG-T-00261/67	19-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0020

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824543
Length of probe : 650 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
-0.02	0.09	0.11	0.20
37.45	37.60	0.15	0.20
74.96	75.21	0.24	0.20
112.43	112.69	0.26	0.22
149.88	150.08	0.20	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0022
Received Date : 8-May-2024
Calibration Date : 9-May-2024

Request No. : PN-24-0519
Issue Date : 9-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5824552
Model : PT100
Tag No. / ID. No. : TE-21031S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	875-115	660TL18030002	SG-T-00261/67	19-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0022

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824552
Length of probe : 650 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
-0.02	0.07	0.09	0.20
50.01	50.07	0.07	0.20
99.95	100.06	0.11	0.20
149.89	149.89	0.00	0.22
199.85	199.66	-0.19	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0023
Received Date : 9-May-2024
Calibration Date : 10-May-2024

Request No. : PN-24-0519
Issue Date : 10-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5824556
Model : PT100
Tag No./ID. No. : TE-21041S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025


Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :


☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :


☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0023

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824556
Length of probe : 650 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : - Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
-0.02	0.04	0.06	0.90
49.96	50.03	0.08	0.90
99.96	99.98	0.02	0.90
149.90	149.60	-0.30	0.91
199.87	199.64	-0.23	0.91

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0024
Received Date : 9-May-2024
Calibration Date : 10-May-2024

Request No. : PN-24-0519
Issue Date : 10-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5539799
Model : PT100
Tag No. / ID. No. : TE-22016S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :


☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :


☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0024

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5539799
Length of probe : 400 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
-0.02	0.25	0.27	0.20
49.96	50.34	0.37	0.20
99.94	100.32	0.38	0.20
149.93	150.02	0.09	0.22
199.88	199.75	-0.13	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0025
Received Date : 9-May-2024
Calibration Date : 10-May-2024

Request No. : PN-24-0519
Issue Date : 10-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5539796
Model : PT100
Tag No. / ID. No. : TE-22020S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability


This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :


☒ THANAWAT MAHARAT (Technician)

☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :


☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0025

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5539796
Length of probe : 400 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
-0.02	0.08	0.10	0.20
49.98	50.39	0.41	0.20
99.99	100.48	0.49	0.20
149.97	150.06	0.09	0.22
199.86	199.87	0.01	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0026
Received Date : 10-May-2024
Calibration Date : 11-May-2024

Request No. : PN-24-0519
Issue Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 6088850
Model : PT100
Tag No. / ID. No. : TE-45019S
Resolution : 0.01 °C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0026

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with Standard Thermometer

Condition As-Received



Used Item



New Item

Sensor Detail

Manufacturer : YAMARI Type RTD 3Wire Serial No. : 6088850
Length of probe : 811 mm. Diameter 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.09	0.31	0.22	0.20
112.78	112.75	-0.03	0.20
225.01	225.51	0.50	0.20
337.45	337.59	0.14	0.22
450.15	450.26	0.11	0.22

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 6088850
Length of probe : 811 mm. Diameter 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : After Adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.09	0.41	0.32	0.20
112.81	112.77	-0.04	0.20
225.01	225.51	0.50	0.20
337.44	337.57	0.13	0.22
450.13	450.24	0.11	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0027

Received Date : 10-May-2024

Calibration Date : 11-May-2024

Request No. : PN-24-0519

Issue Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.

Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor

Manufacturer : YAMARI

Serial No. : 5855991

Model : PT100

Tag No./ID. No. : TE-53002S

Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °CRelative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0027

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5855991
Length of probe : 655 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.04	0.06	0.02	0.20
62.54	62.57	0.03	0.20
125.03	125.25	0.22	0.20
187.38	187.86	0.48	0.22
250.44	250.67	0.23	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0028
Received Date : 10-May-2024
Calibration Date : 11-May-2024

Request No. : PN-24-0519
Issue Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5855943
Model : PT100
Tag No. / ID. No. : TE-45039S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	875-115	660TL18030002	SG-T-00261/67	19-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0028

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5855943
Length of probe : 650 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.03	-0.02	-0.05	0.20
37.49	37.60	0.11	0.20
74.98	75.02	0.04	0.20
112.38	112.42	0.04	0.22
149.85	149.82	-0.03	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0029
Received Date : 10-May-2024
Calibration Date : 11-May-2024

Request No. : PN-24-0519
Issue Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5824613
Model : PT100
Tag No./ID. No. : TE-73002S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	875-115	660TL18030002	SG-T-00261/67	19-Mar-2025


Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :


☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :


☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0029

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824613
Length of probe : 605 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.13	0.33	0.20	0.20
24.87	24.39	-0.49	0.20
49.70	49.90	0.20	0.20
74.89	74.93	0.04	0.22
99.90	99.82	-0.08	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0030
Received Date : 10-May-2024
Calibration Date : 11-May-2024

Request No. : PN-24-0519
Issue Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5855860
Model : PT100
Tag No. / ID. No. : TE-41017S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0030

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5855860
Length of probe : 520 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.04	0.15	0.11	0.20
99.98	100.09	0.11	0.20
200.01	199.96	-0.06	0.20
299.91	299.92	0.01	0.22
400.10	399.96	-0.14	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0031
Received Date : 10-May-2024
Calibration Date : 11-May-2024

Request No. : PN-24-0519
Issue Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5856004
Model : PT100
Tag No./ ID. No. : TE-52001S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By : Thanawat M.

- ☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By : 

- ☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0031

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5856004
Length of probe : 665 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.04	-0.06	-0.10	0.20
62.62	62.50	-0.12	0.20
125.06	125.07	0.01	0.20
187.21	187.12	-0.09	0.22
249.85	249.34	-0.51	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0032
Received Date : 10-May-2024
Calibration Date : 11-May-2024

Request No. : PN-24-0519
Issue Date : 11-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 585960
Model : PT100
Tag No./ ID. No. : TE-46016
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-79	42484-3	CL1-T235108	7-Nov-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :



- ☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :



- ☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0032

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 585960
Length of probe : 650 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.04	-0.11	-0.15	0.20
74.97	74.89	-0.08	0.20
149.83	149.70	-0.13	0.20
224.97	225.32	0.35	0.22
299.92	299.76	-0.16	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage
factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0033
Received Date : 11-May-2024
Calibration Date : 12-May-2024

Request No. : PN-24-0519
Issue Date : 12-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.
Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor
Manufacturer : YAMARI
Serial No. : 5824736
Model : PT100
Tag No./ID. No. : TE-75014S
Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °C
Relative Humidity : 65 ± 20 %


Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	ADT875-660	660TH22020027	SG-T-00267/67	22-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :


☒ THANAWAT MAHARAT (Technician)
☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :


☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)
☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0033

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with
Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824736
Length of probe : 685 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.04	0.05	0.01	0.20
49.98	50.11	0.13	0.20
99.92	100.06	0.14	0.20
149.84	149.86	0.03	0.22
199.96	199.80	-0.16	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

Certificate of Calibration

Page 1 of 2

Certificate No. : FLS-LAB.INS.7-24-0034

Received Date : 11-May-2024

Calibration Date : 12-May-2024

Request No. : PN-24-0519

Issue Date : 12-May-2024

Customer : Kuraray GC Advanced Materials Co., Ltd.

Address : 11 Phangmuang Chapoh 2-1, Huai Pong,
Mueang Rayong District, Rayong 21150

Equipment : Temperature RTD Sensor

Manufacturer : YAMARI

Serial No. : 5824737

Model : PT100

Tag No. / ID. No. : TE-75015S

Resolution : 0.01 C

Environment Condition

Ambient Temperature : 23 ± 3 °CRelative Humidity : 65 ± 20 %

Reference Standard Instrument

Instrument	Model	Serial No.	Cert No.	Due Date
Advanced Signal Calibrator	Ametek / ACS 400	671266-00960	24E62	10-Jan-2025
Standard PRT	ISOTECH/935-14-98	39190-2	23I633	9-Jun-2024
Dry box Additel	875-115	660TL18030002	SG-T-00261/67	19-Mar-2025

Traceability

This Certification is traceable to the International System of Unit maintained at : National Institute of Metrology Thailand (NIMT).

Calibrated By :

☒ THANAWAT MAHARAT (Technician)☐ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)

Approved By :

☒ SIRIPONG KREUSIRIPAIBOON (Assist. Technical Manager)☐ SIRIRAT BUNYABORVORNWIWAT (Technical Manager)

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FLS-F-133-REV.3

Certificate No. : FLS-LAB.INS.7-24-0034

Page 2 of 2

Calibration Method

This instrument was calibrated by using in-house method FLS-WI-032 by comparison with

Standard Thermometer

Condition As-Received



Used Item



New Item

Channel No. : A

Sensor Detail

Manufacturer : YAMARI Type : RTD 3Wire Serial No. : 5824737
Length of probe : 685 mm. Diameter : 6.4 mm. Immersion Depth : 140 mm.

Result of calibration : Without adjustment

Function : Temperature Measurement

Parameter setting : -

Unit : °C

Standard Value	UUC* Reading	Error	uncertainty (±)
0.04	-0.03	-0.07	0.20
37.47	37.57	0.10	0.20
74.96	75.13	0.17	0.20
112.41	112.60	0.19	0.22
149.84	149.91	0.07	0.22

* UUC : Unit under calibration.

The certificate is valid only to the item calibrated on date and place of calibration.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

End of Certificate

FLS-F-133-REV.3

ภาคผนวก ข-43

ผังแนวเส้นระดับเสียง (Noise Contour Map)



Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

KGC Plant 2 site (Top) : All Plant

Reference Number : Lot 23148025

Measurement Date : Feb 27-29, 2024



ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250, Thailand | PHONE +66 0 2760 3000 | FAX +66 0 2760 3197
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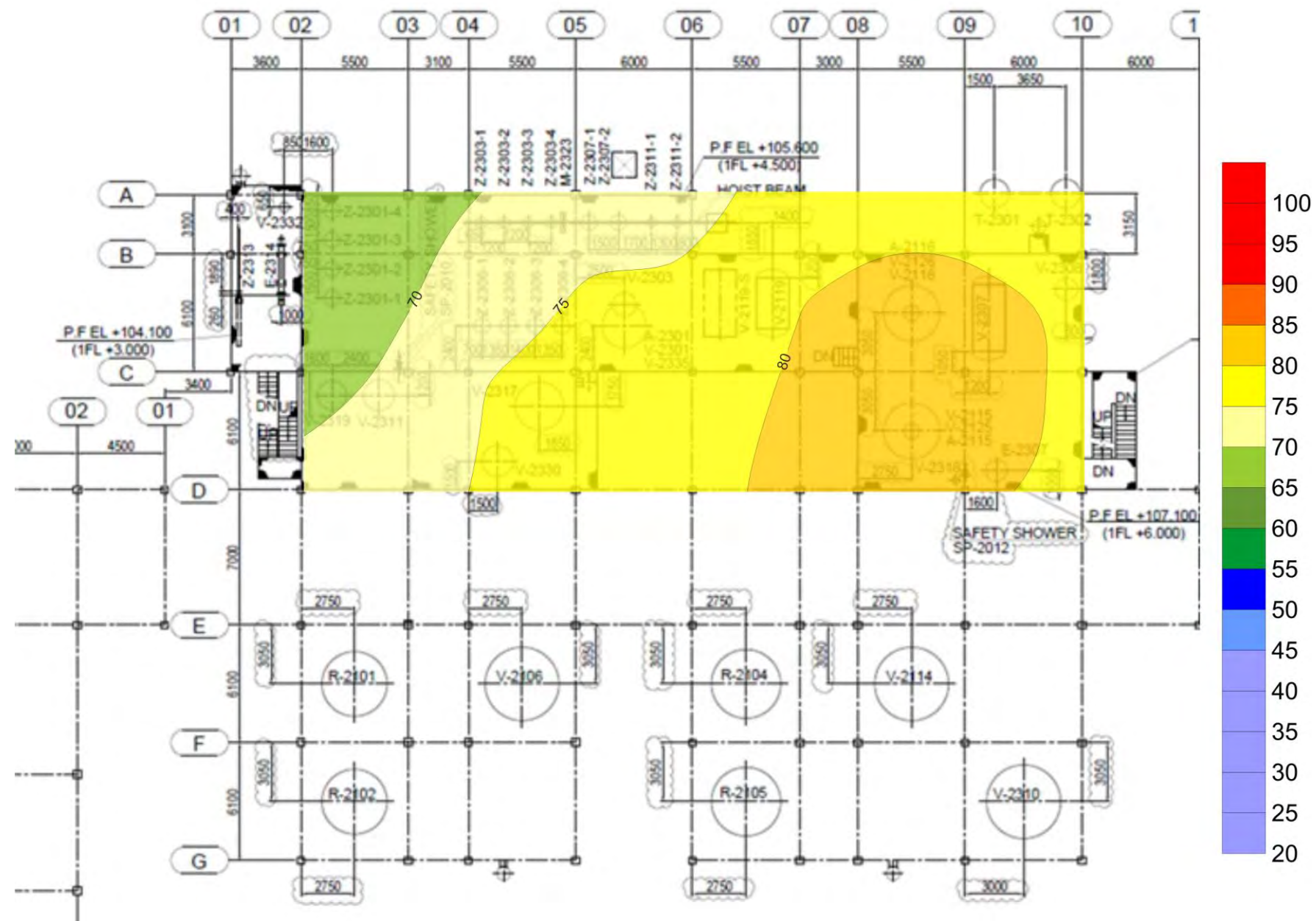
Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425571

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Bottom) : Unit Plot Plan of HSBC 2nd Floor



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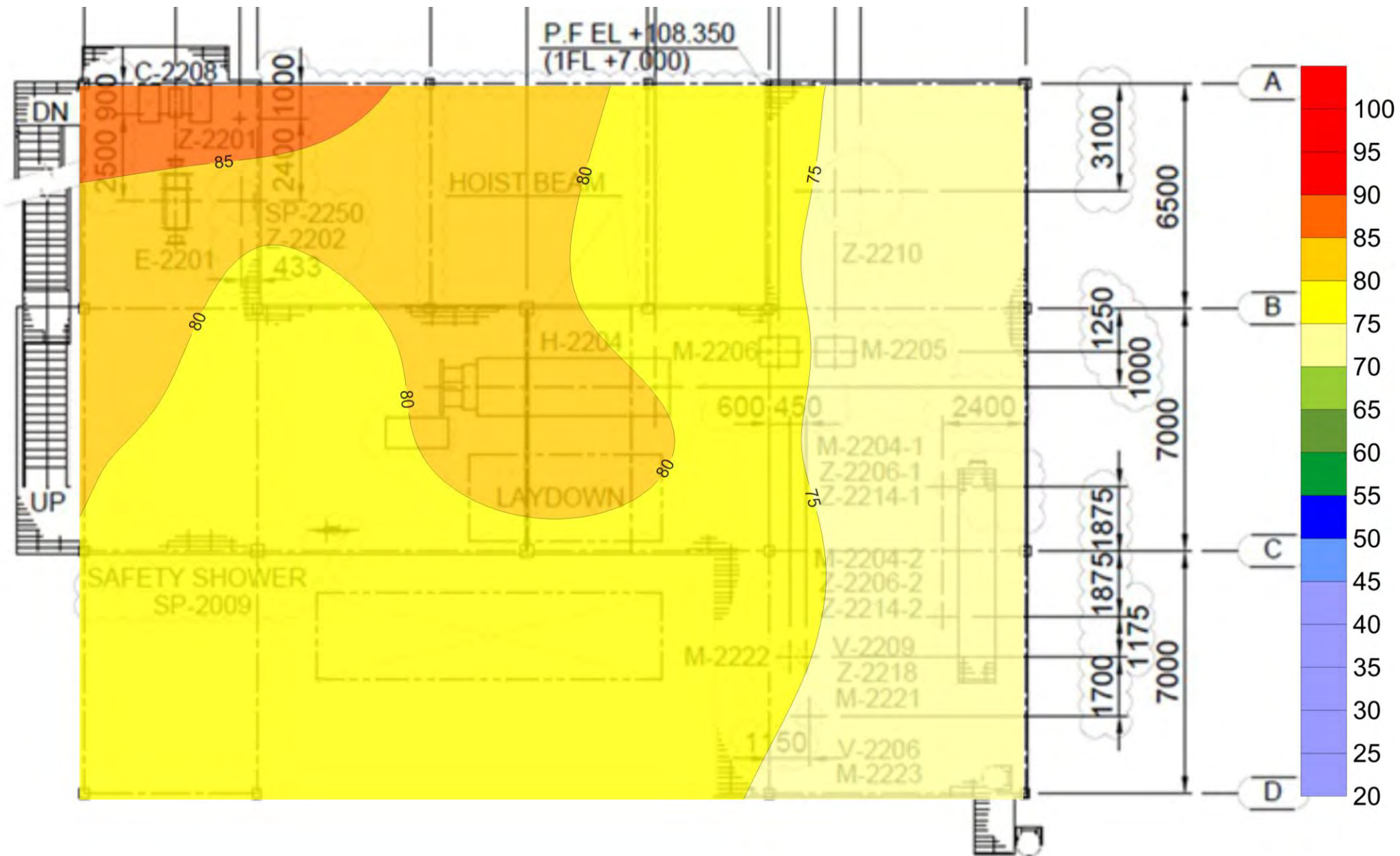
Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425580

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Bottom) : Unit Plot Plan of HSBC PWH 2nd Floor



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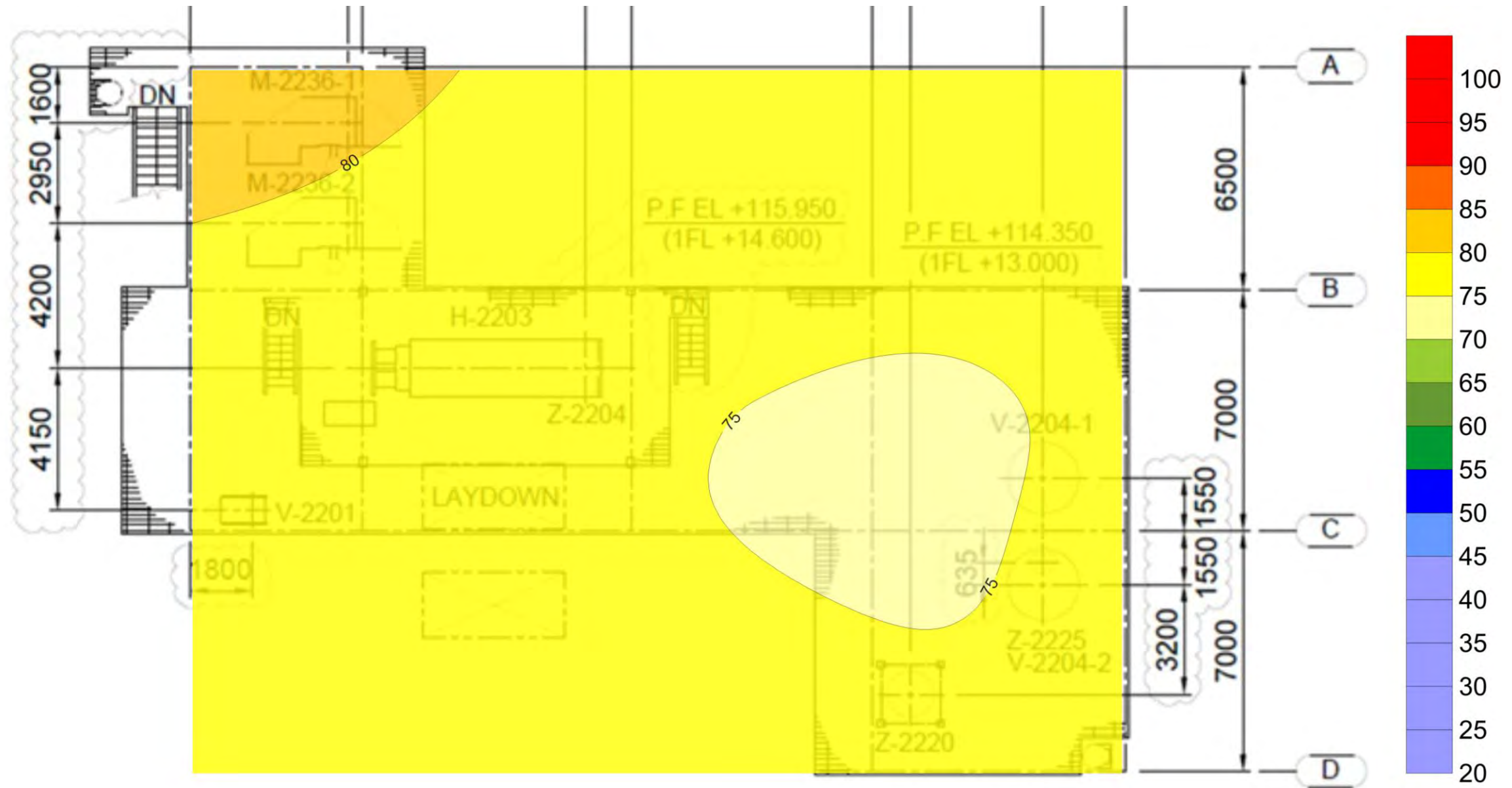
Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425581

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Bottom) : Unit Plot Plan of HSBC PWH 3rd Floor



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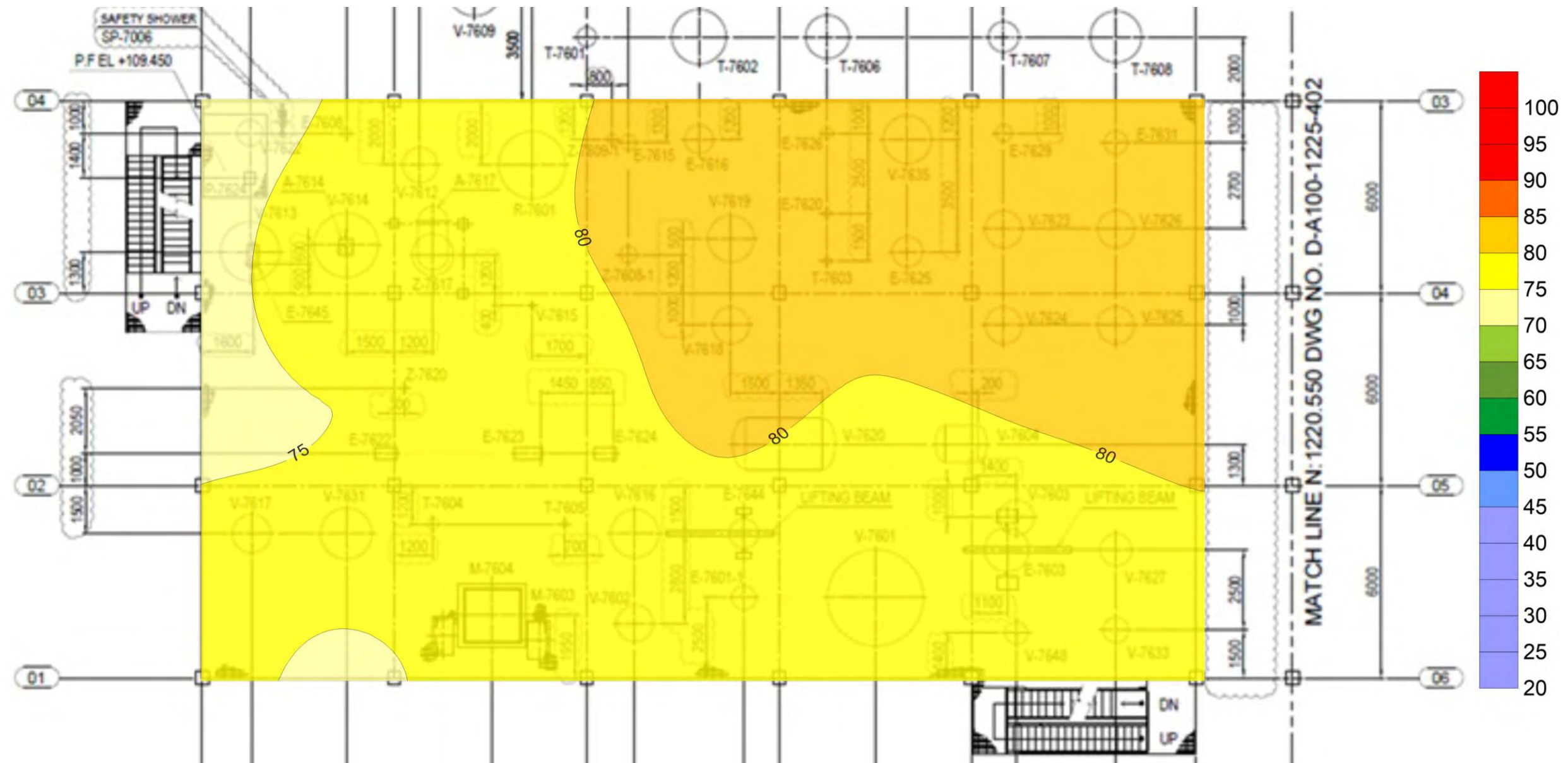
Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425582

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 76) 2nd Floor



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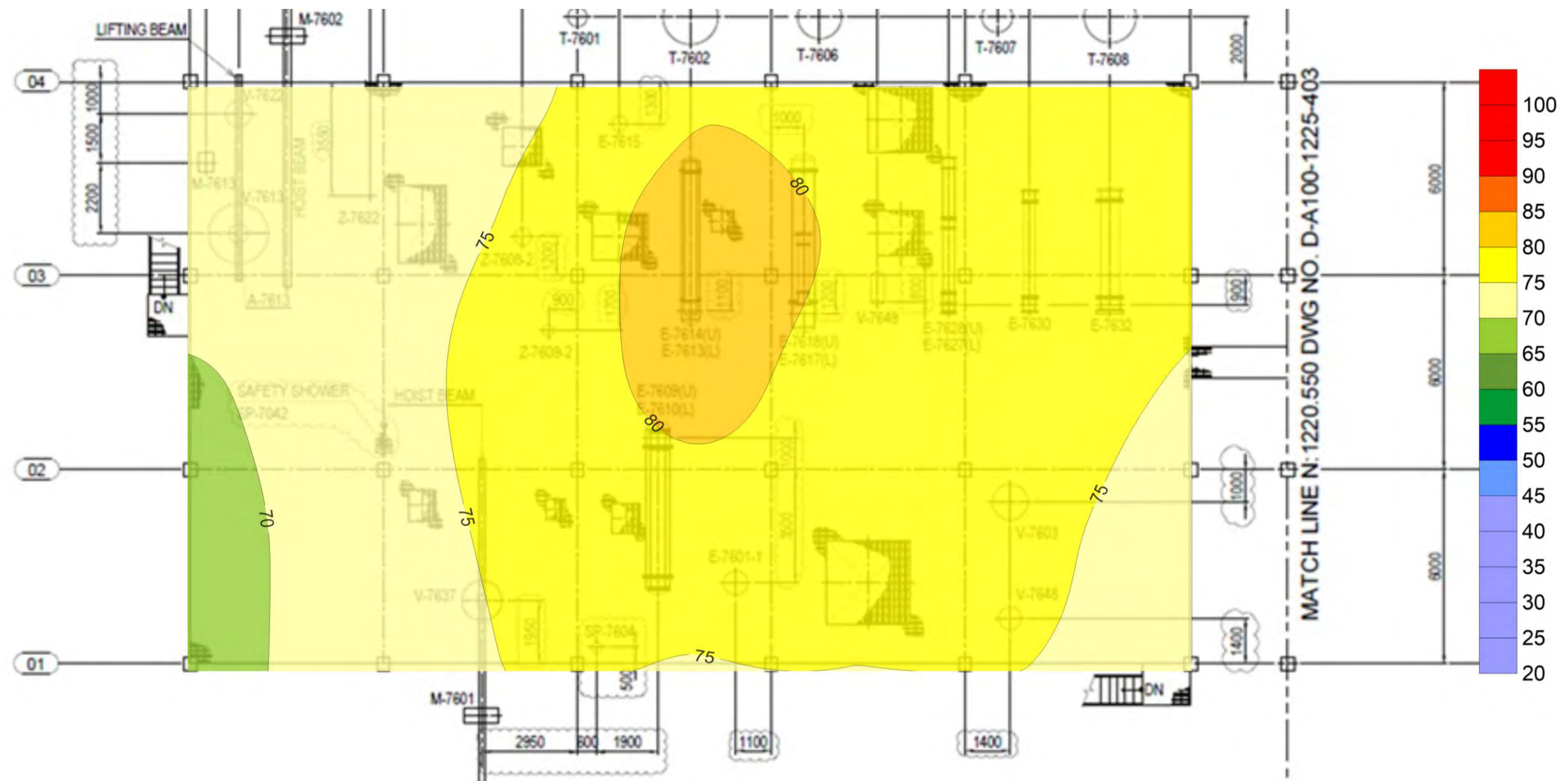
Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425583

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 76) 3rd Floor



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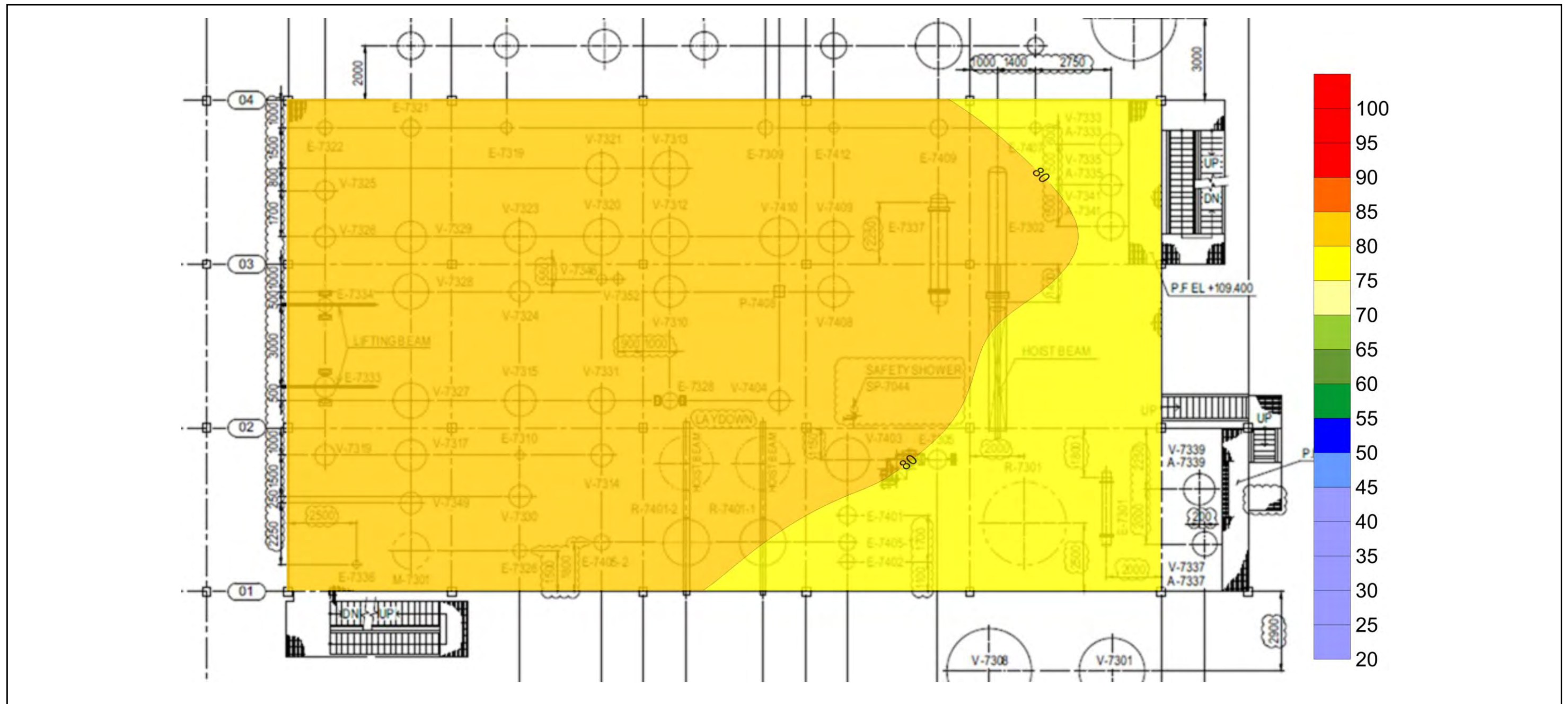
Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425584

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 73 & 74) 2nd Floor



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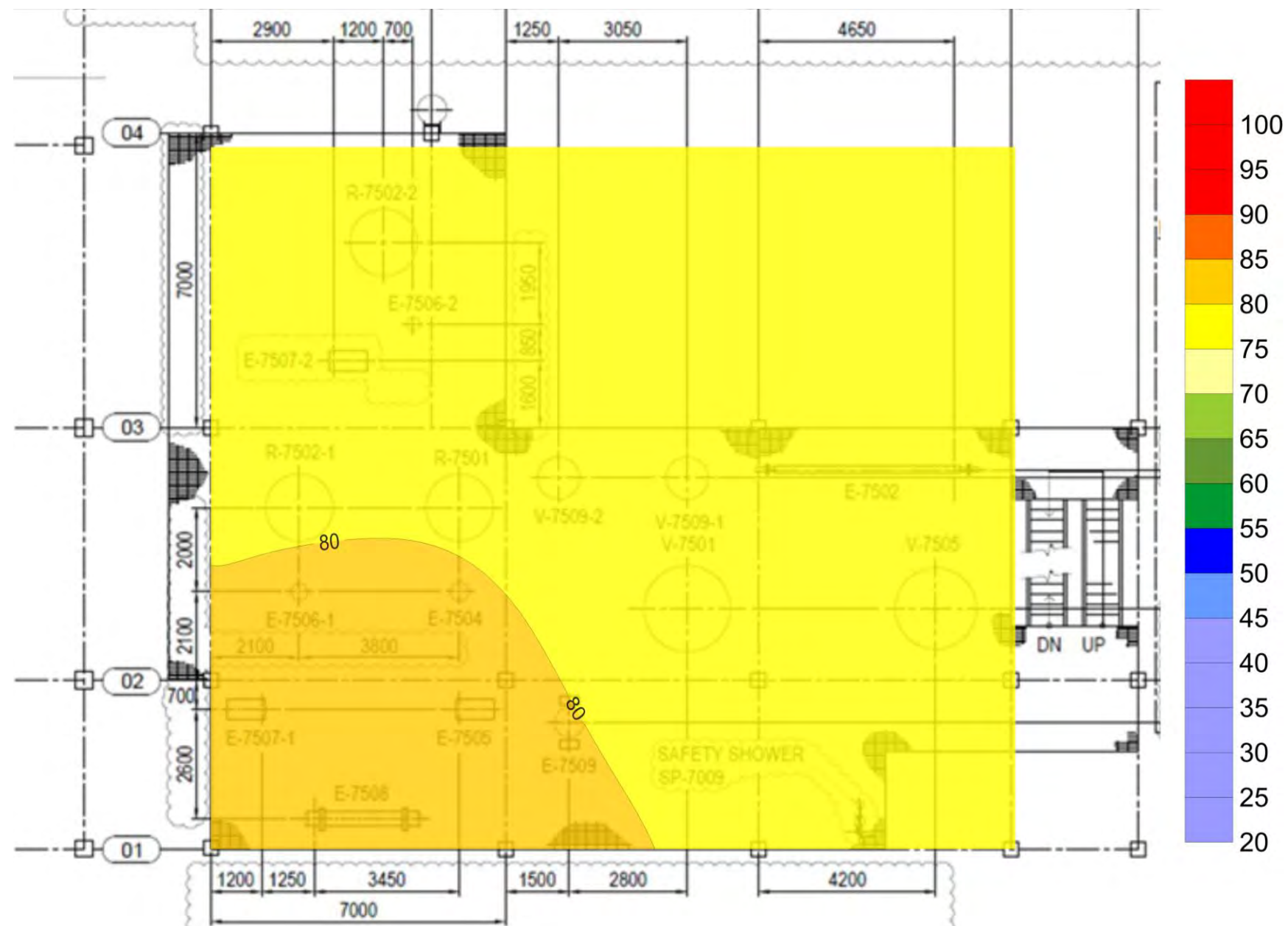
Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425586

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 75) 2nd Floor



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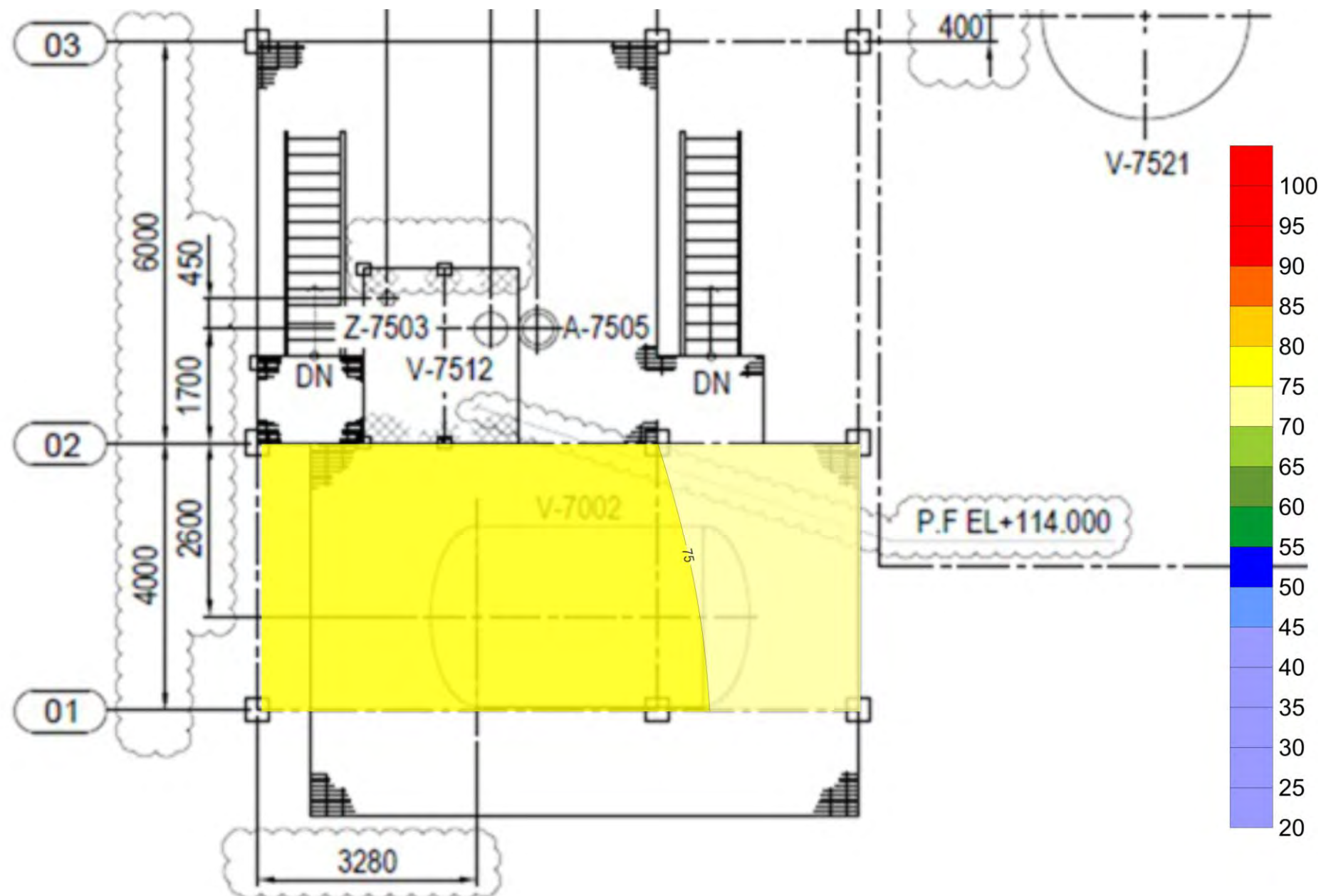
Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425587

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 75) 3rd Floor



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Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425588

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 77) 2nd Floor

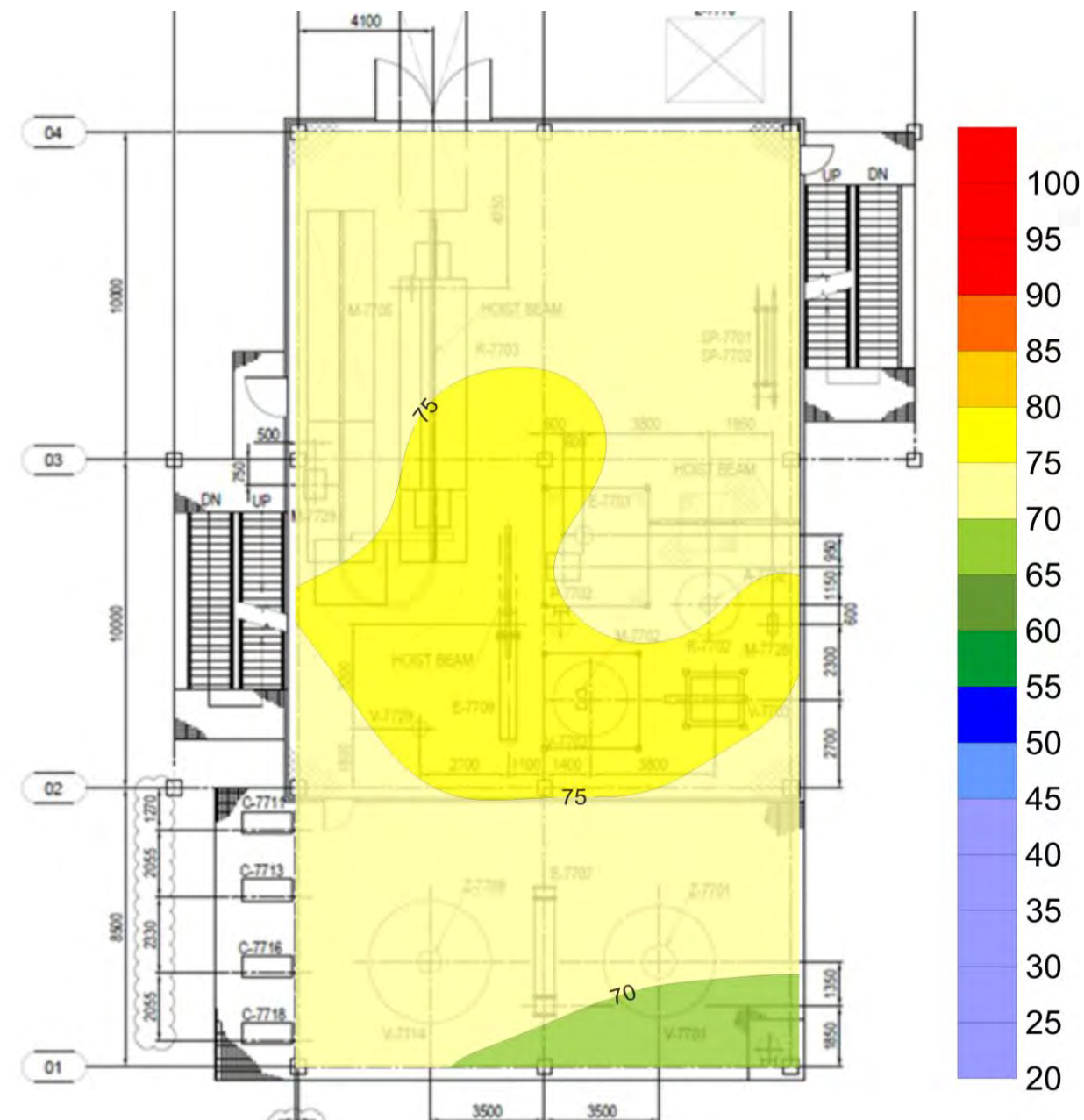


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Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 77) 4th Floor



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Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425591

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 77) 5th Floor



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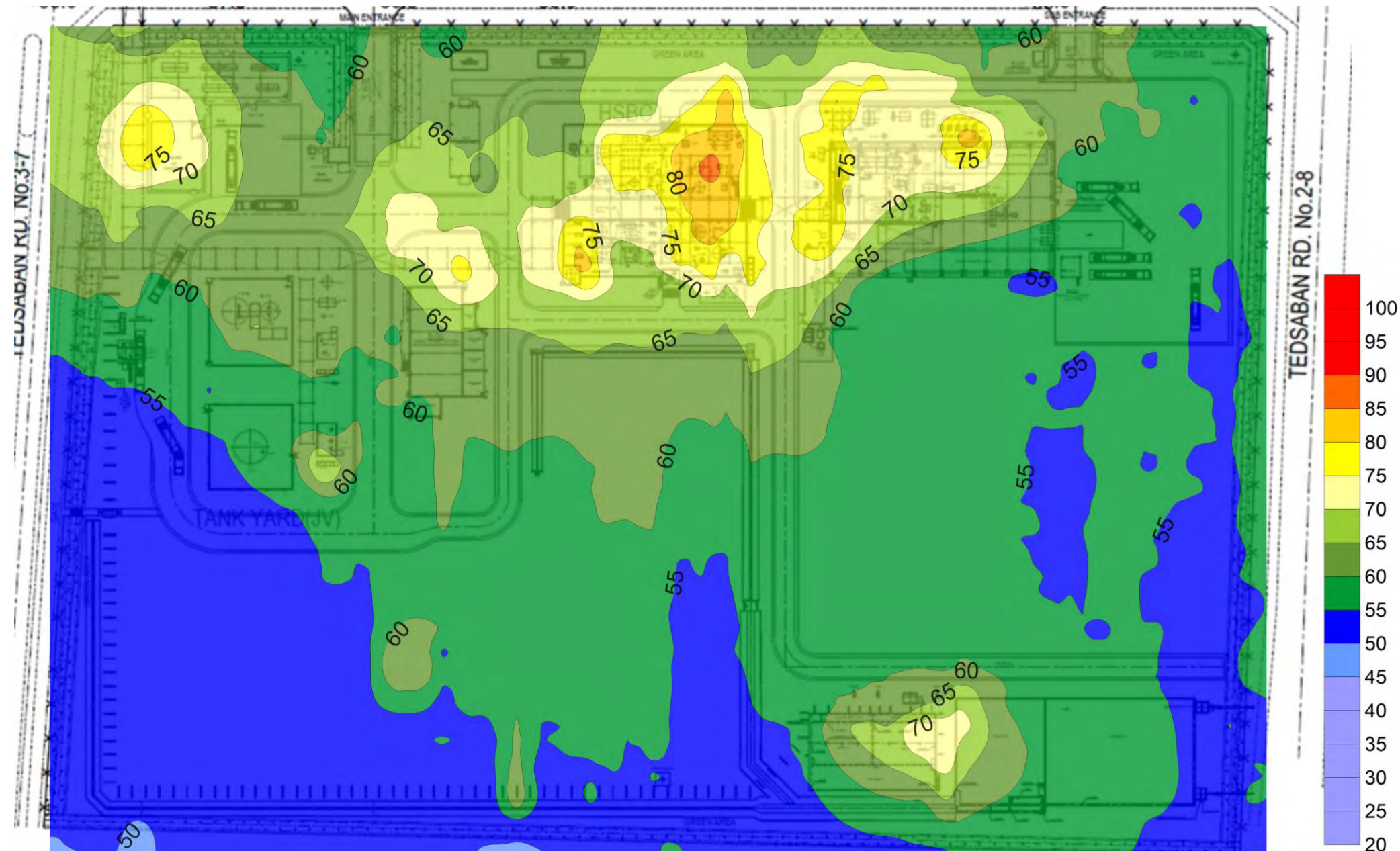
Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425592

Measurement Date : Feb 27-29, 2024

KGC Plant 2 site (Bottom)



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