

# 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %


### 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 %

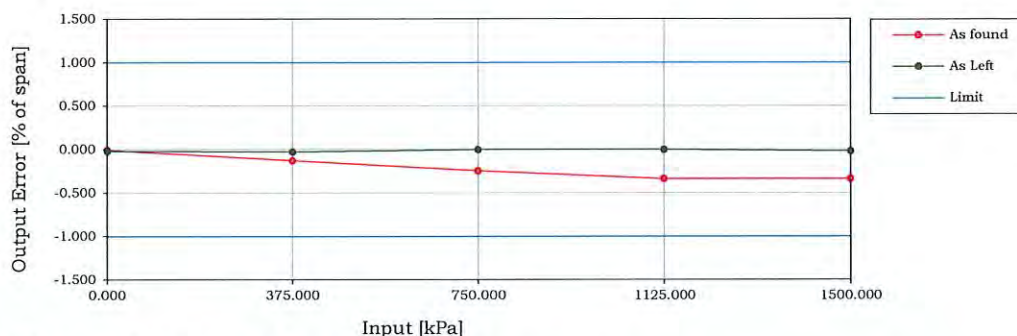
## Reference Standard :

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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FLS-F-016-REV-12

## 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

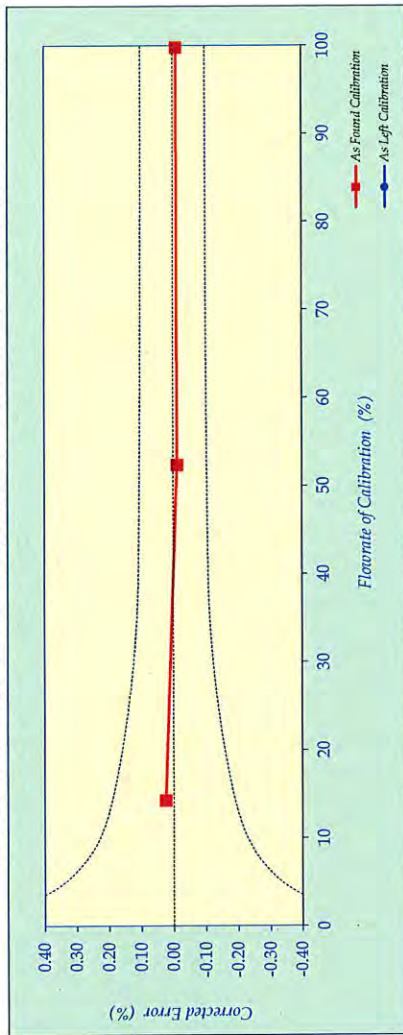
### MAXIMUM PERMISSIBLE

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	
(%) kg/h	(%)
14.26	142.62436
52.36	523.62923
99.79	997.92359
	-0.011

### As Left Calibration

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

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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

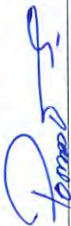
Sensor Information  
Manufacturer : Endress + Hauser  
Model : PROMASS F 8F5B08-BDE  
Serial No. : R409FE02000  
Tag No. : FT-73012  
Transmitter Information  
Manufacturer : Endress + Hauser  
Model : PROMASS 500 8F5B08-BDE  
Serial No. : R409FE02000

### 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

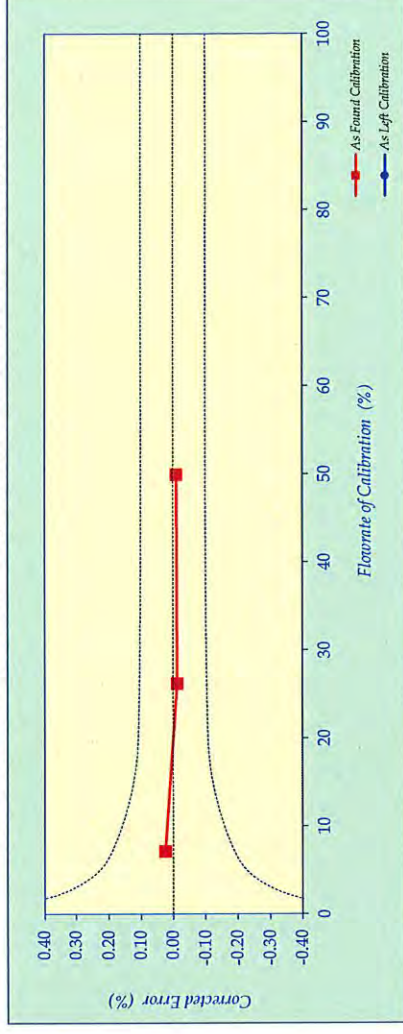
### MAXIMUM PERMISSIBLE

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

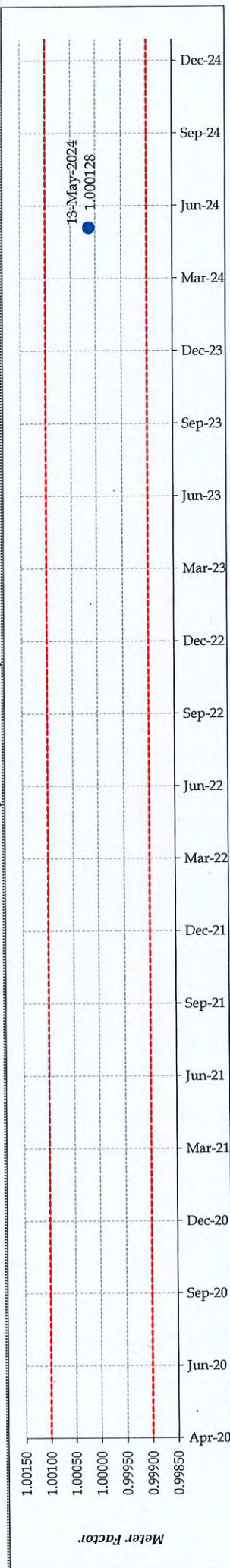
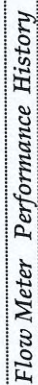
Flowrate of	Flowrate	Error
Max. Range	UUC	
(%)	kg/h	(%)

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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 815B08-BDE
	:	BABAAFBAB2BSAABSA2+
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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## 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 =  $\pm 0.10$  %  
 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-LAB1-24-0120  
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

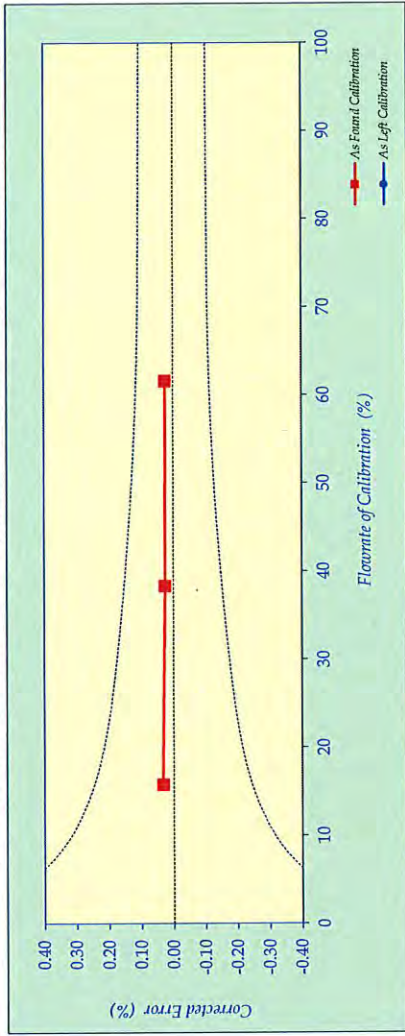
## MAXIMUM PERMISSIBLE

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

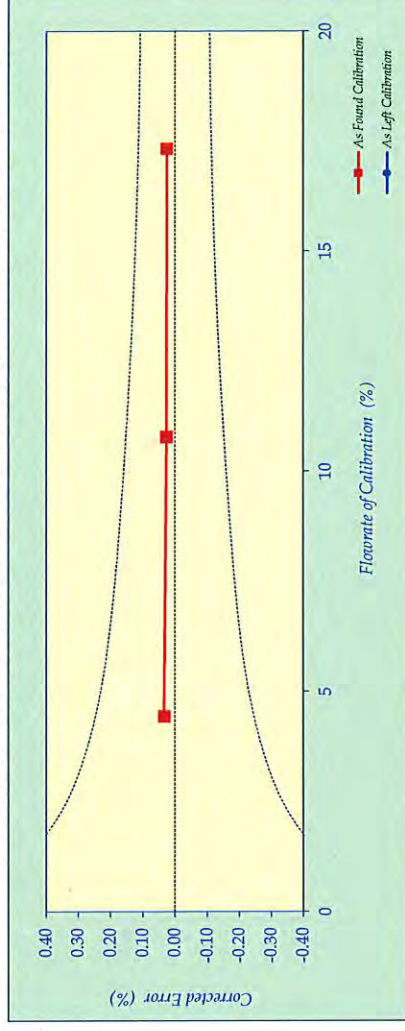
## MAXIMUM PERMISSIBLE

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	(%)

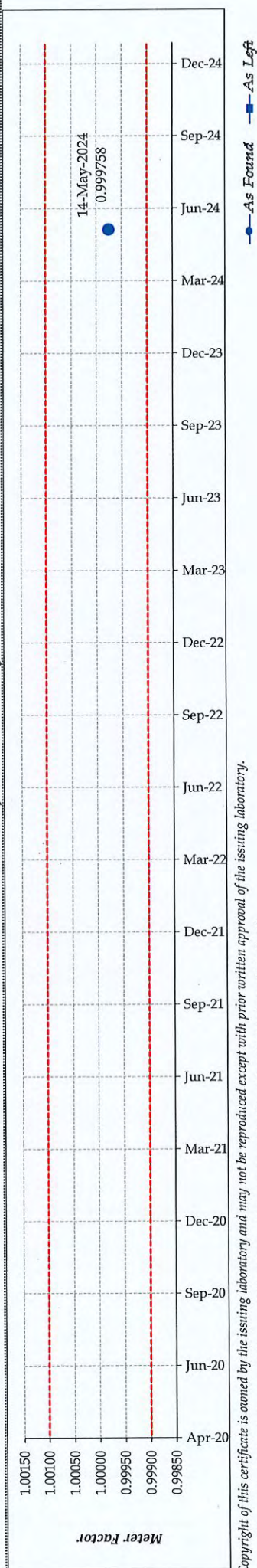
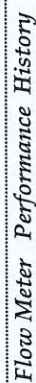
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# METER CONTROL CHART PERFORMANCE HISTORY

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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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-LAB1-24-0121  
 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

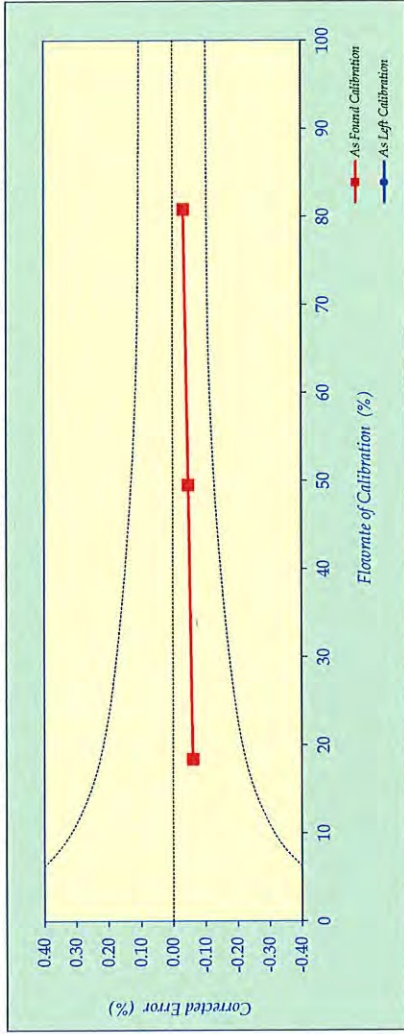
## MAXIMUM PERMISSIBLE

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

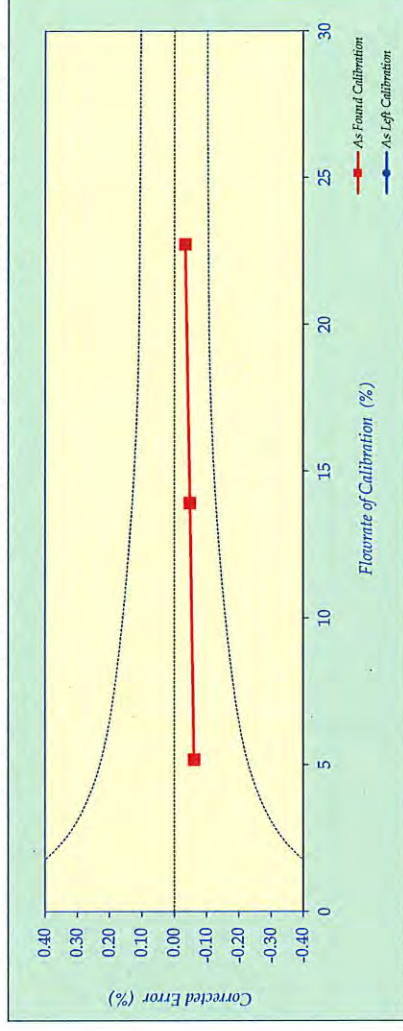
### MAXIMUM PERMISSIBLE

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

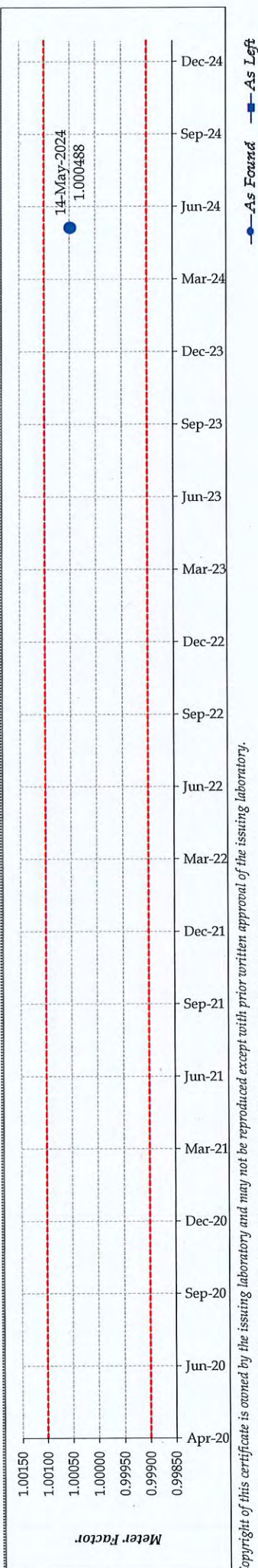
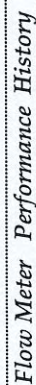
Flowrate of Max. Range (%)	Flowrate UUC kg/h	Error (%)

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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

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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 =  $\pm 0.10$  %  
 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)  
☒ 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

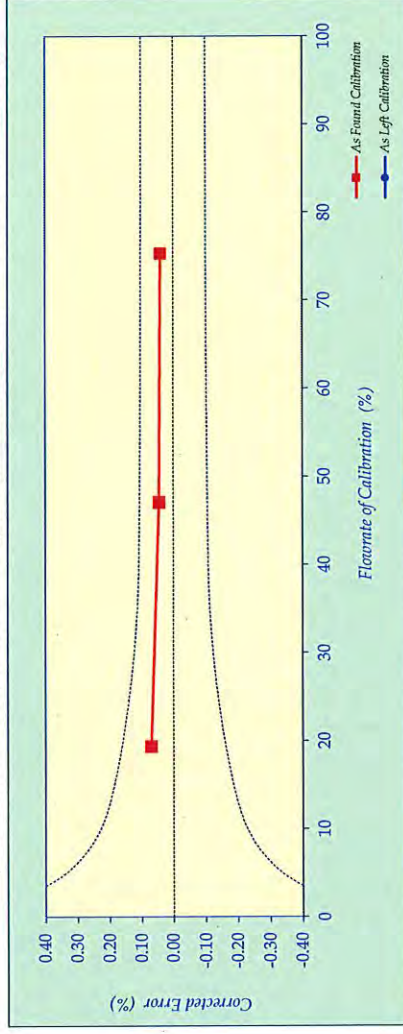
## MAXIMUM PERMISSIBLE

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

## CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)  
☒ PORNPHATTHA SEIWONG (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	(%)
19.37 154.93746	0.069
47.05 376.37198	0.043
75.33 602.67916	0.038

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## CALIBRATION CERTIFICATE

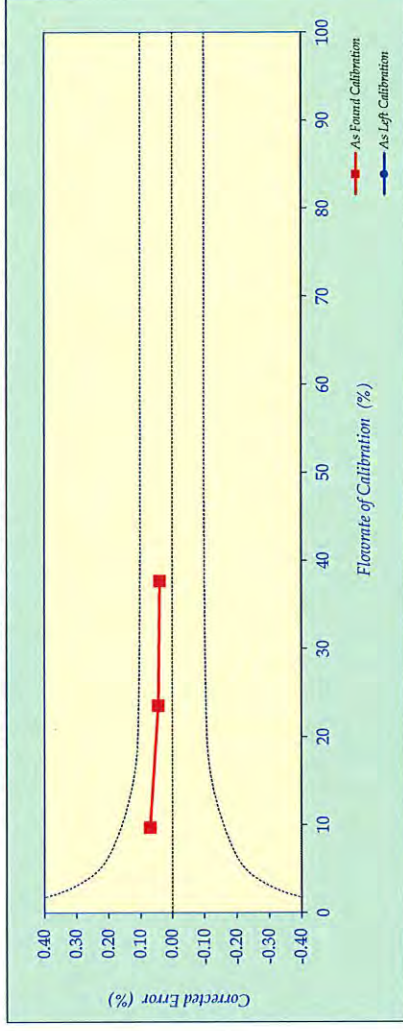
Certificate No. : FLS-LAB1-24-0122  
Calibration Date : 14-May-2024  
Customer : Kuraray GC Advanced Materials Co., Ltd.  
: 11 Phangmuang Chapoh 2-1, Huai Pong,  
: Mueang Rayong District, Rayong 21150

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

1" Coriolis Flow Meter Performance Curve : Meter Flow Specification



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

As Left Calibration			
Flowrate	Flowrate	Flowrate	Error
Max. Range	UUC	UUC	
(%)	kg/h	kg/h	(%)

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

CALIBRATED BY : *Porn P.S.*

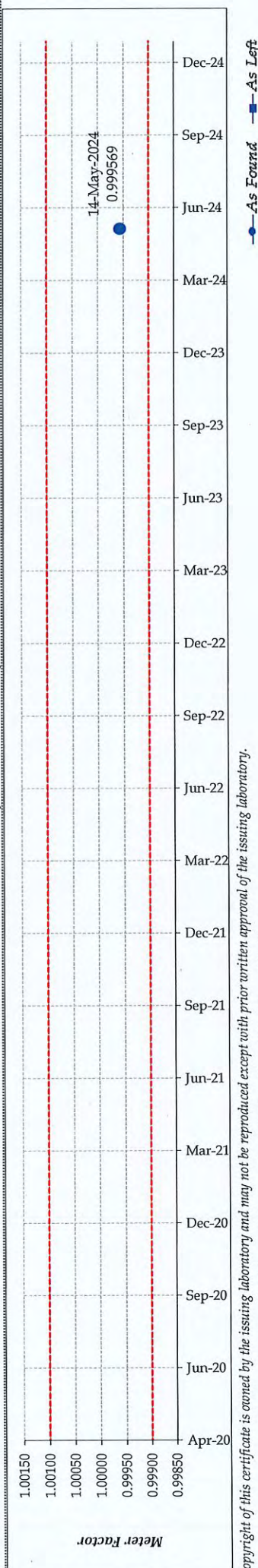
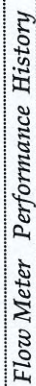
- ☐ THANAWAT MAHARAT (Technician)  
☒ PORNPHATTHA SETWONG (Technician)  
☐ LATTAPAN KAMJING (Engineer)

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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><b>SENSOR DATA</b></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><b>CALIBRATION CONDITION</b></p> <p>Mode : Volumetric Flow Measurement Flow range : 0 - 6,000 l/h Test Media : Water Reference Temp. : 15 Deg C</p>
--	--

<p><b>TRANSMITTER DATA</b></p> <p>Manufacturer : - Model : - Serial No. : -</p>	<p><b>MAXIMUM PERMISSIBLE</b></p> <p>Error : <math>\pm 0.75</math> % Range of Repeatability : <math>\pm 0.20</math> %</p>
---	---

<p><b>ENVIRONMENT</b></p> <p>Ambient Temperature : <math>(30 \pm 5)</math> Deg C Relative Humidity : <math>&lt; 80</math> % Atmosphere Pressure : <math>900 &lt; P &lt; 1100</math> 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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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 =  $\pm 0.75$  %  
Range of Repeatability =  $\pm 0.20$  %

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)

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# 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

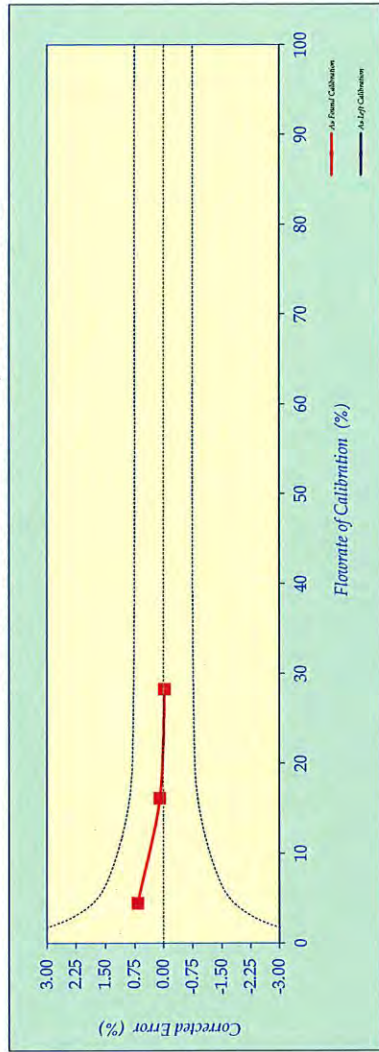
## MAXIMUM PERMISSIBLE

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

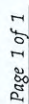
Flowrate of Calibration (%)	Flowrate UUC l/h	Error (%)
4.48	268.89837	0.673
16.16	969.39897	0.094
28.29	1,697.31611	-0.025

## As Left Calibration

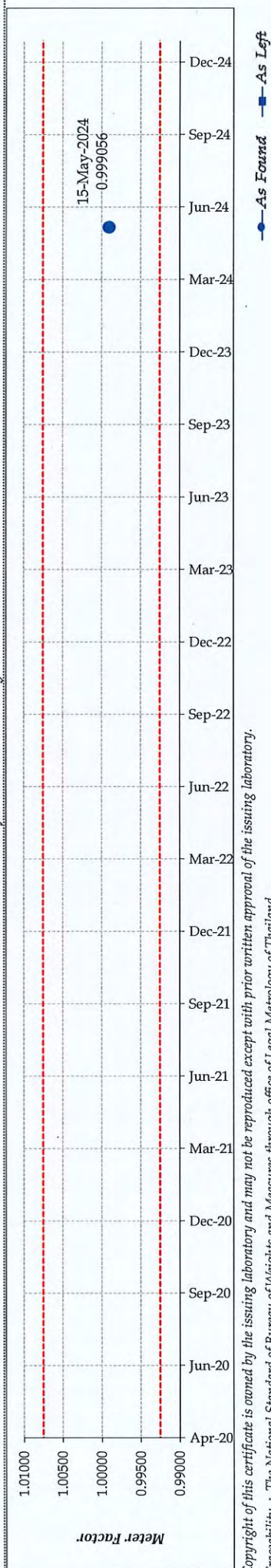
Flowrate of Calibration (%)	Flowrate UUC l/h	Error (%)

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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

[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-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 =  $\pm$  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 M.  
☒ THANAWAT MAHARAT (Technician)  
☐ PORNPHATTHA SETWONG (Technician)  
☐ LATTAPAN KAMJING (Engineer)

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# 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

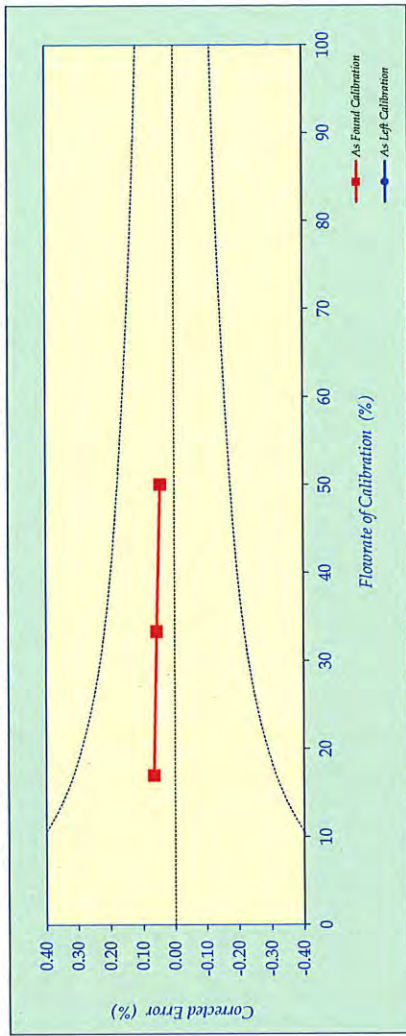
## MAXIMUM PERMISSIBLE

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	

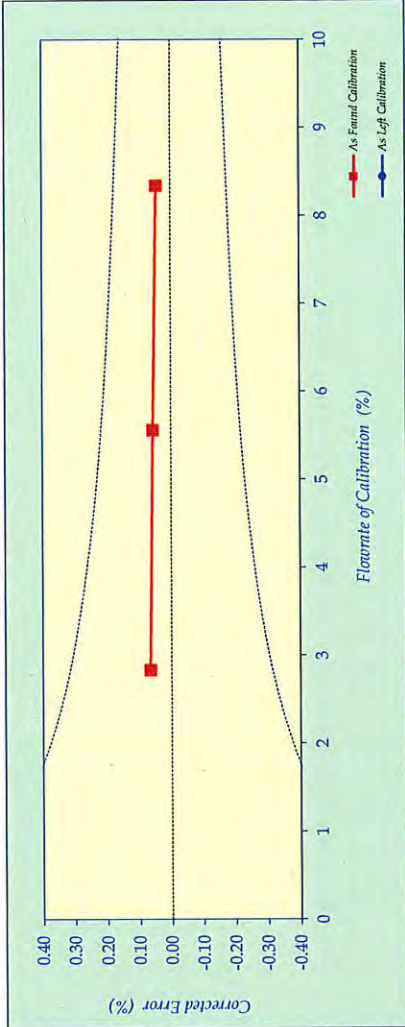
As Left Calibration			
Flowrate of Flow Span (%)	Flowrate (kg/h)	Error (%)	

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## 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

### 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 %

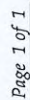
### CALIBRATED BY :

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

As Found Calibration			As Left Calibration		
Flowrate of	Flowrate	Error	Flowrate of	Flowrate	Error
Max. Range	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			

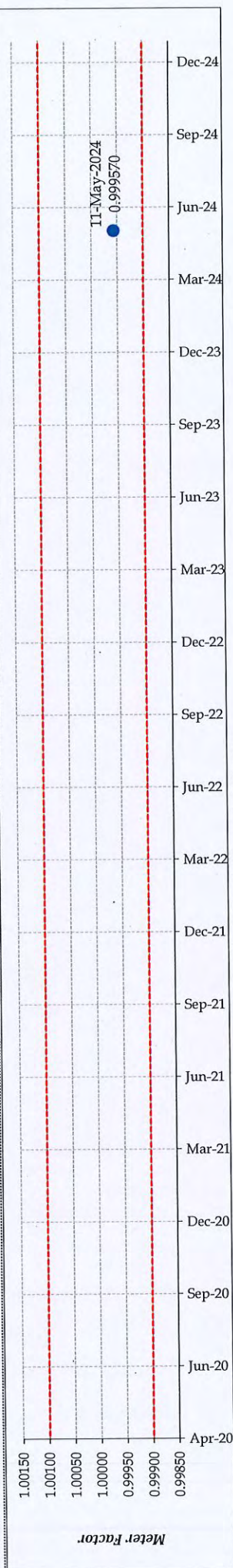
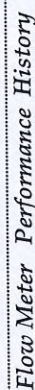
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# METER CONTROL CHART PERFORMANCE HISTORY

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]

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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-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 :  $\pm$  0.10 %  
Range of Repeatability :  $\pm$  0.05 %

#### TRANSMITTER DATA

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

#### 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
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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## 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 =  $\pm 0.10$  %  
 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-LAB3-24-0375  
 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

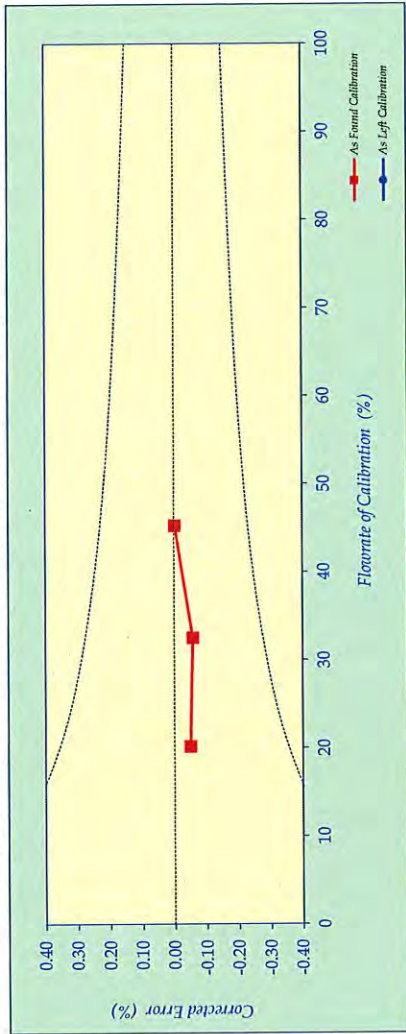
## MAXIMUM PERMISSIBLE

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

CALIBRATED BY :

- ☐ THANAWAT MAHARAT (Technician)  
☒ 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 (%)	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 (%)

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

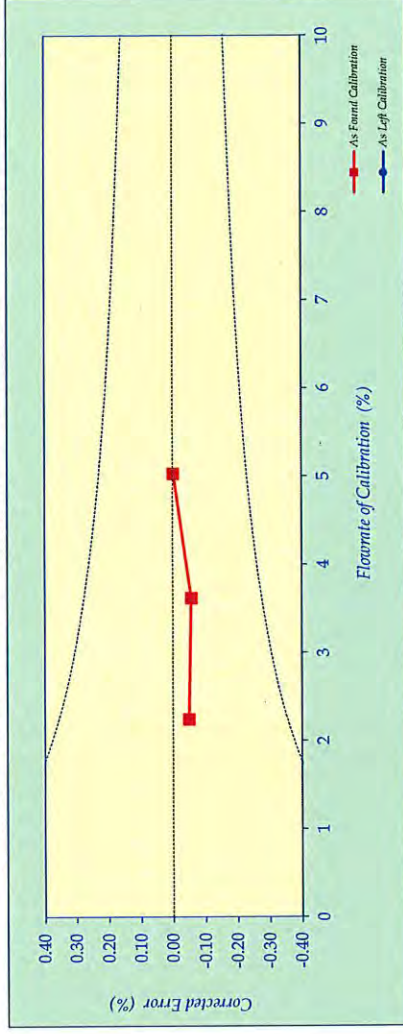
### MAXIMUM PERMISSIBLE

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

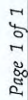
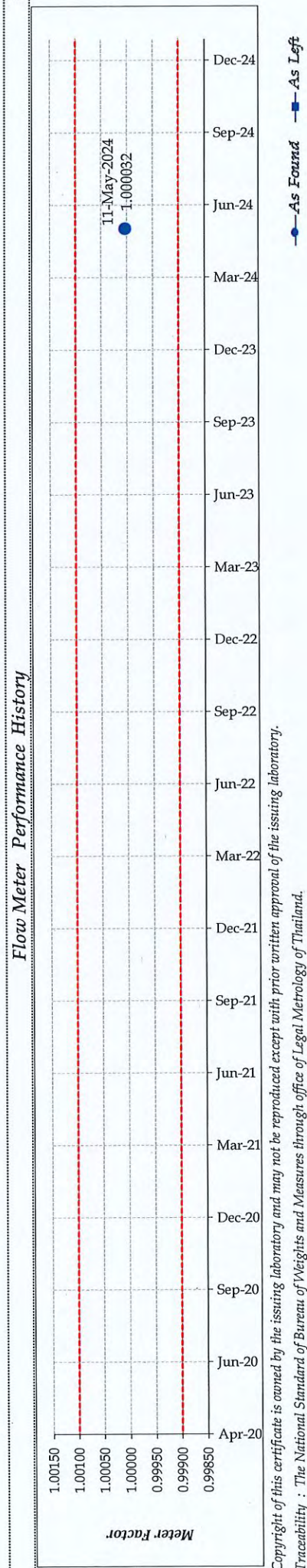
Flowrate of Max. Range (%)	Flowrate (kg/h)	Error (%)
2.25	404.35941	-0.050
3.62	651.32279	-0.058
5.03	905.23500	-0.003

### As Left Calibration

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

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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 =  $\pm$  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)

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

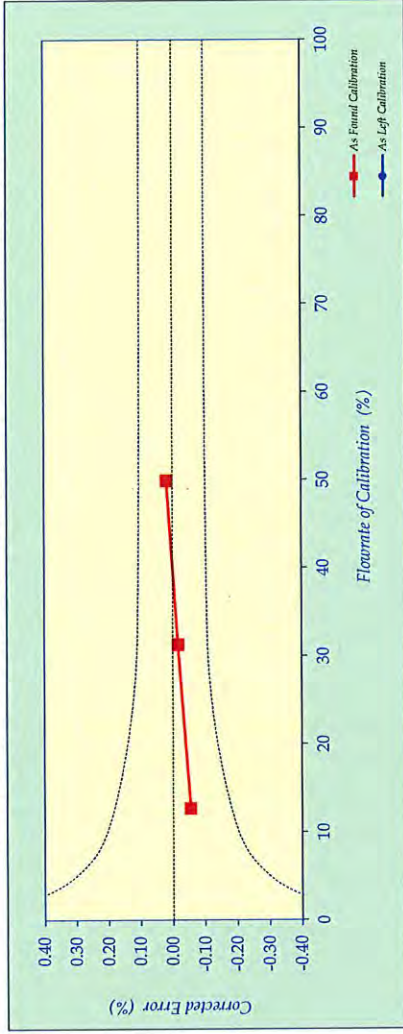
## MAXIMUM PERMISSIBLE

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 (%)

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

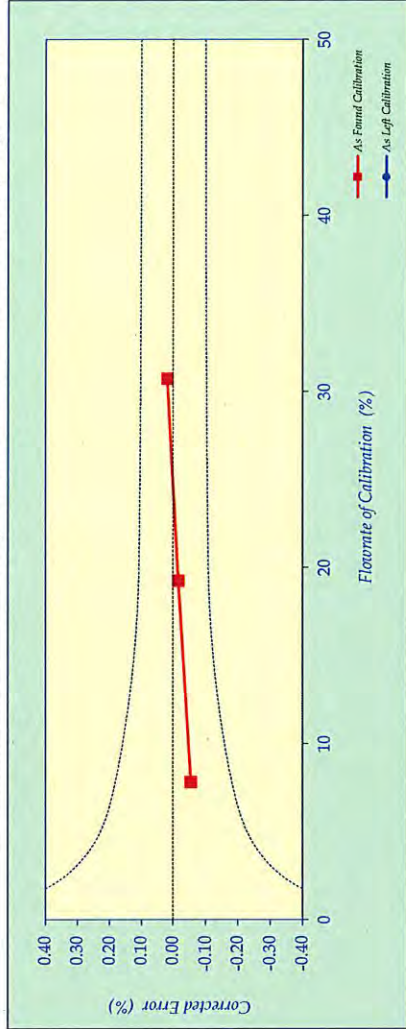
## MAXIMUM PERMISSIBLE

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

CALIBRATED BY :

☐ THANAWAT MAHARAT (Technician)  
☒ PORNPHATTHA 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

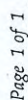
Flowrate of	Flowrate	Error
Max. Range	(%)	kg/h
		(%)

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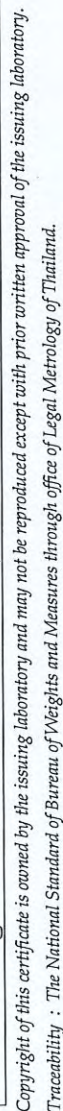
Page 1 of 1

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



## 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

SENSOR DATA		CALIBRATION CONDITION	
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		

MAXIMUM PERMISSIBLE	
Error	: $\pm$ 0.10 %
Range of Repeatability	: $\pm$ 0.05 %

TRANSMITTER DATA		ENVIRONMENT	
Manufacturer	: Endress+Hauser	Ambient Temperature	: (30 $\pm$ 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 =  $\pm 0.10$  %  
 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)

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-LAB3-24-0376  
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. : AAAAFBAB2BSAAABSA A2+  
Tag No. : R411E702000  
Transmitter Information  
Manufacturer : Endress+Hauser  
Model : PROMASS 500 8F5B15-BDEB  
Serial No. : AAAAFBAB2BSAAABSA A2+  
Tag No. : R411E702000

## CALIBRATION CONDITION

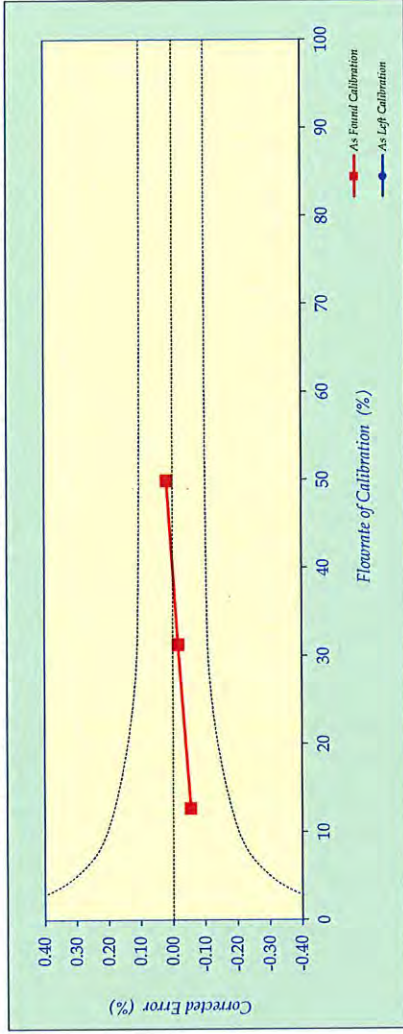
Mode : Mass Flow Measurement  
Max. Range : 0 - 6,500 kg/h  
Flow Span : 0 - 4,000 kg/h  
Test Media : Water  
Reference Temp : 15 Deg C

## MAXIMUM PERMISSIBLE

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

CALIBRATED BY : *[Signature]*

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



## 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

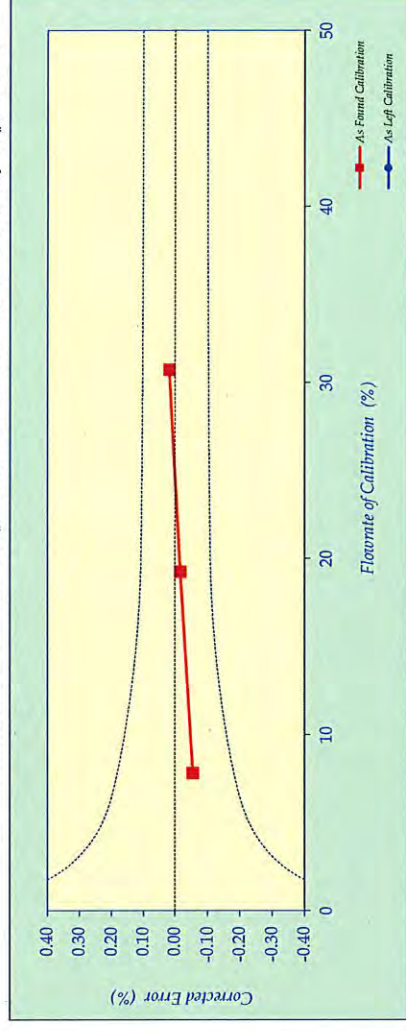
## MAXIMUM PERMISSIBLE

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

CALIBRATED BY :

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

1" Cortolis Flow Meter Performance Curve : Meter Flow Specification



## As Found Calibration

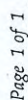
Flowrate of	Flowrate	Error
Max. Range	kg/h	(%)
7.82	508.21674	-0.056
19.26	1,251.99725	-0.017
30.74	1,998.09132	0.017

## As Left Calibration

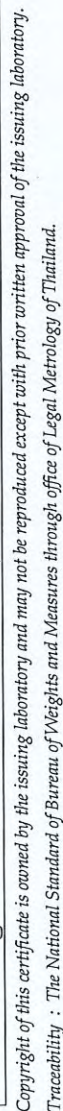
Flowrate of	Flowrate	Error
Max. Range	kg/h	(%)

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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 85B15-BDEB AAAAFBAB2BSAABSA2+
Serial No.	:	R411E702000
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-LAB3-24-0377  
**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 :	MICRO MOTION	Max. Range :	0 - 13,600 kg/h
Model :	F100S129CCAZEZZZ	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)

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-LAB3-24-0377  
 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

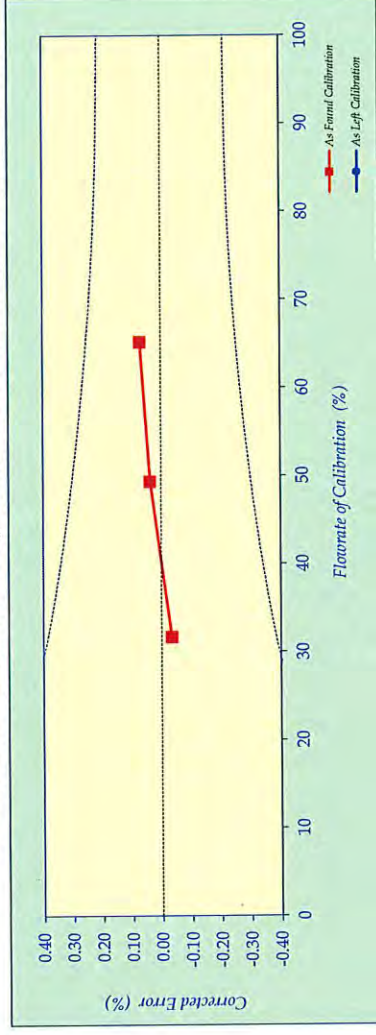
## MAXIMUM PERMISSIBLE

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 -0.036
49.33	1,479.99990 0.036
65.20	1,955.96125 0.069

## 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

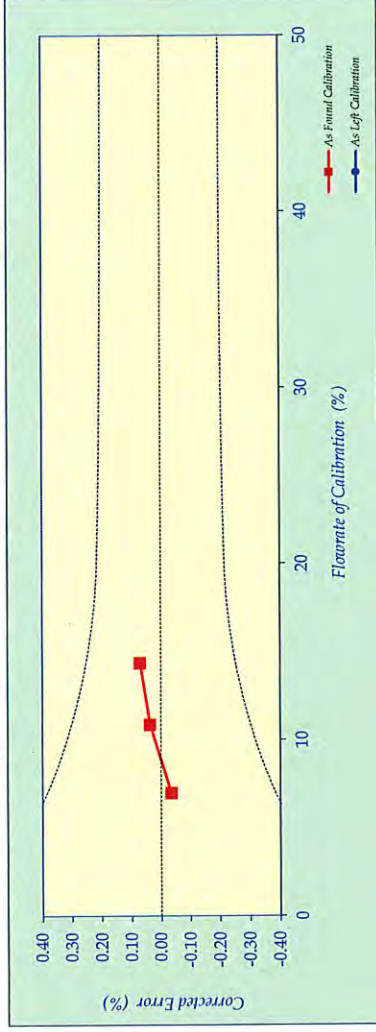
Mode : Mass Flow Measurement  
Max. Range : 0 - 13,600 kg/h  
Flow Span : 0 - 3,000 kg/h  
Test Media : Water  
Reference Temp : 15 Deg C

### 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	kg/h	(%)
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	(%)

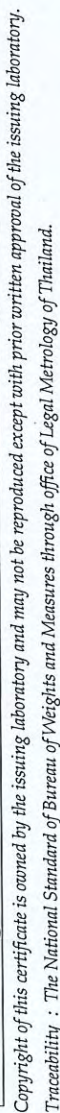
This certification may not be reproduced other than in full, except with prior written approval of the issuing laboratory of Flowlab & Service Company Limited.





Certificate No.	:	FLS-LAB3-24-0377
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



—●— 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-LAB3-24-0382      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 <sup>3</sup> /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		

<u>MAXIMUM PERMISSIBLE</u>	
Error	: ± 0.65 %
Range of Repeatability	: ± 0.10 %

### 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)

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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-LAB3-24-0382  
 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 <sup>3</sup> /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 <sup>3</sup> /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)

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# 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 m<sup>3</sup>/h  
Test Media : Water  
Reference Temp. : 15 Deg C

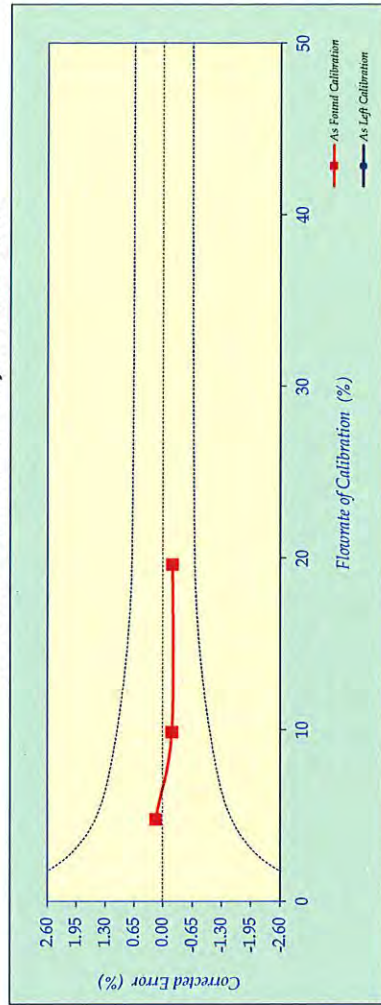
## MAXIMUM PERMISSIBLE

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 <sup>3</sup> /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 <sup>3</sup> /h	Error (%)

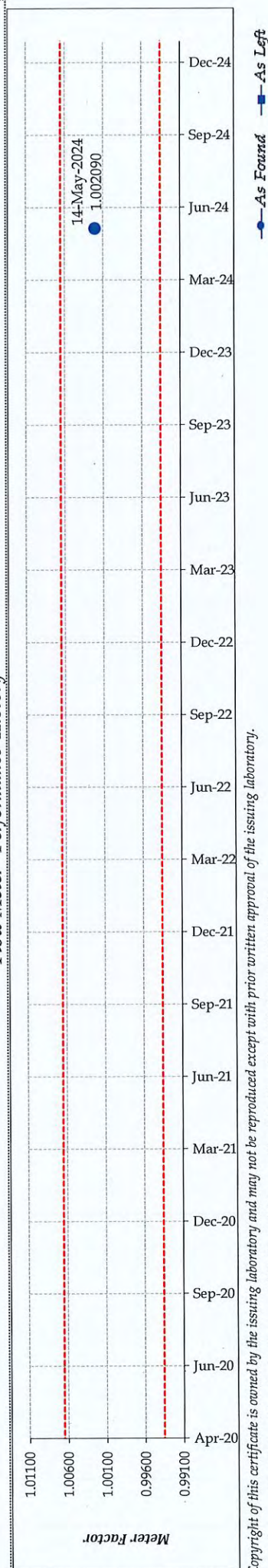
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# METER CONTROL CHART PERFORMANCE HISTORY

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

[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-LAB3-24-0383  
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 - 70,000 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

### TRANSMITTER DATA

Manufacturer : MICRO MOTION  
Model : PROMASS 500 8F5B50-BDEB  
Serial No. : AAAAFBAB2BSAABSAA2+  
Serial No. : R4134002000

### 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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## 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

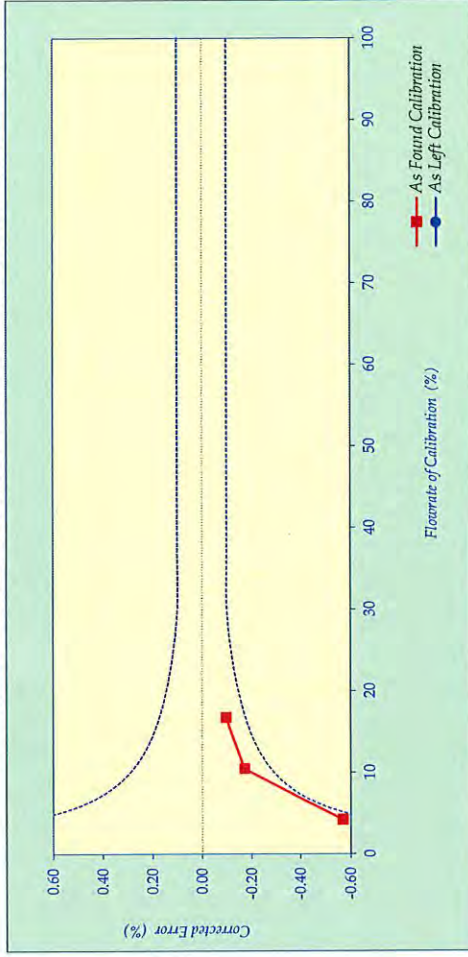
## MAXIMUM PERMISSIBLE

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	
Flow Span (%)	kg/h	(%)	Flow Span (%)	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		Flowrate		Repeat	
Flowrate of Flow Span (%)	kg/h	Error	Limit (%)	Limit (%)	
4.17	500.22941	0.700	0.350		
10.43	1,251.74968	0.280	0.140		
16.68	2,001.65327	0.175	0.087		

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-LAB3-24-0383  
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

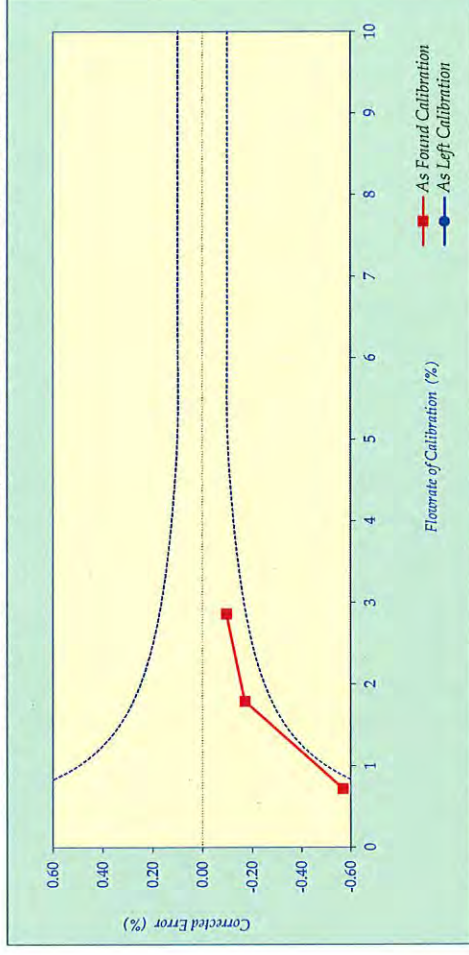
### MAXIMUM PERMISSIBLE

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

### CALIBRATED BY :

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

2" Coriolis Flow Meter Performance Curve : Meter Flow Specification



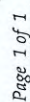
As Found Calibration			As Left Calibration		
Flowrate of	Flowrate	Error	Flowrate of	Flowrate	Error
Max. Range			Flow Span		
(%)	kg/h	(%)	(%)	kg/h	(%)
0.71	500.22941	-0.569			
1.79	1,251.74968	-0.171			
2.86	2,001.65327	-0.097			

**Table.1 Accuracy and repeatability on liquids**

Error = ± [(Zero stability / Flow rate) x 100%] Repeatability = ± [(0.5)x(Zero stability) / Flow rate) x 100%]					
Zero Stability = 3.50 Kg/h		Flowrate		Error	Repeat
Flowrate of		Max. Range		Limit (%)	Limit (%)
(%)		kg/h			
0.71		500.22941		0.700	0.350
1.79		1,251.74968		0.280	0.140
2.86		2,001.65327		0.175	0.087

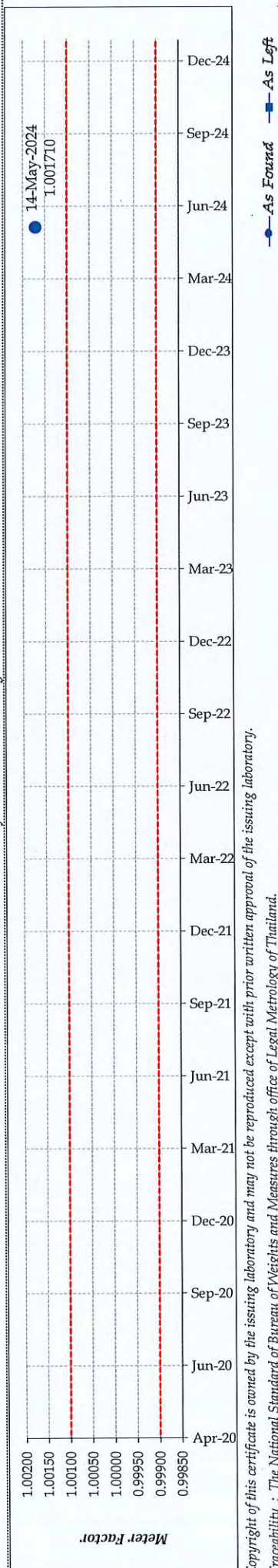
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# METER CONTROL CHART PERFORMANCE HISTORY

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 AAAAFBAB2BSAA2+ R4134002000
Serial No.	:	
Test Media	:	Water

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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      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 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 : ± 0.10 %  
Range of Repeatability : ± 0.05 %

### TRANSMITTER DATA

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

### 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
	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

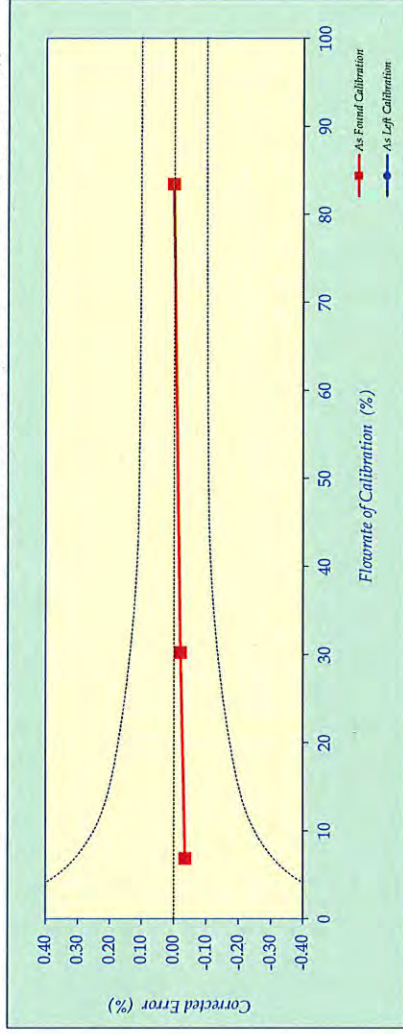
## MAXIMUM PERMISSIBLE

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

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,  
: Muang 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

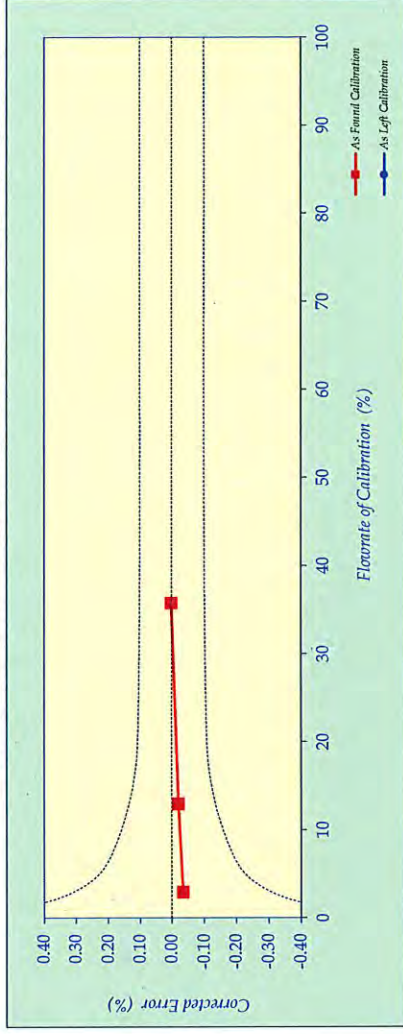
### MAXIMUM PERMISSIBLE

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

CALIBRATED BY : *Thana S.*

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

2" Coriolis Flow Meter Performance Curve : Meter Flow Specification



### 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 (%)

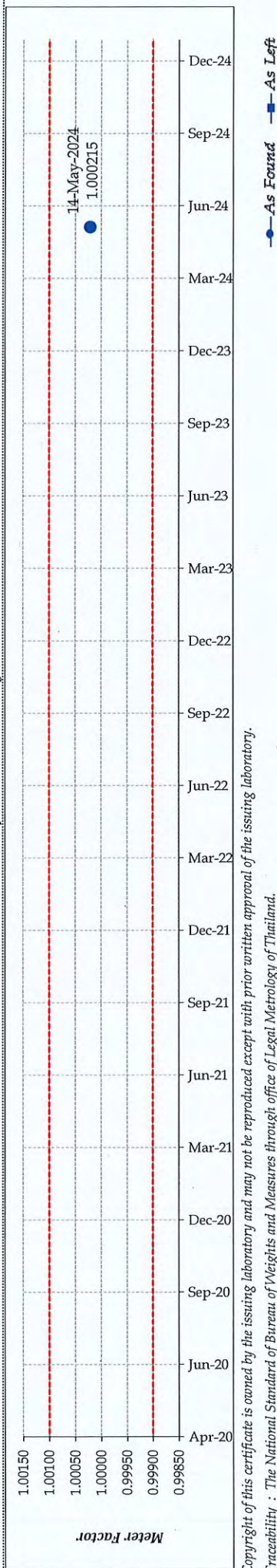
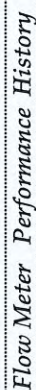
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# METER CONTROL CHART PERFORMANCE HISTORY

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 AAAAFBAB2BSAABSA2+
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

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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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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

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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. : 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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

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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. : 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

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

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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 : 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %


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

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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. : 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %


### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %


### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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*

☒ 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

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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. : 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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

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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. : 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %


### 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

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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. : 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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

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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

#### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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 Request No. : PN-24-0519  
Received Date : 10-May-2024 Issue Date : 11-May-2024  
Calibration 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %


### 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.7-24-0031

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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %

### 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 :  $23 \pm 3$  °C  
Relative Humidity :  $65 \pm 20$  %


### 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 :  $23 \pm 3$  °CRelative Humidity :  $65 \pm 20$  %

### 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

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ผังแนวเส้นระดับเสียง (Noise Contour Map)













Reference Number : Lot 2425571

### KGC Plant 2 site (Bottom) : Unit Plot Plan of HSBC 2nd Floor





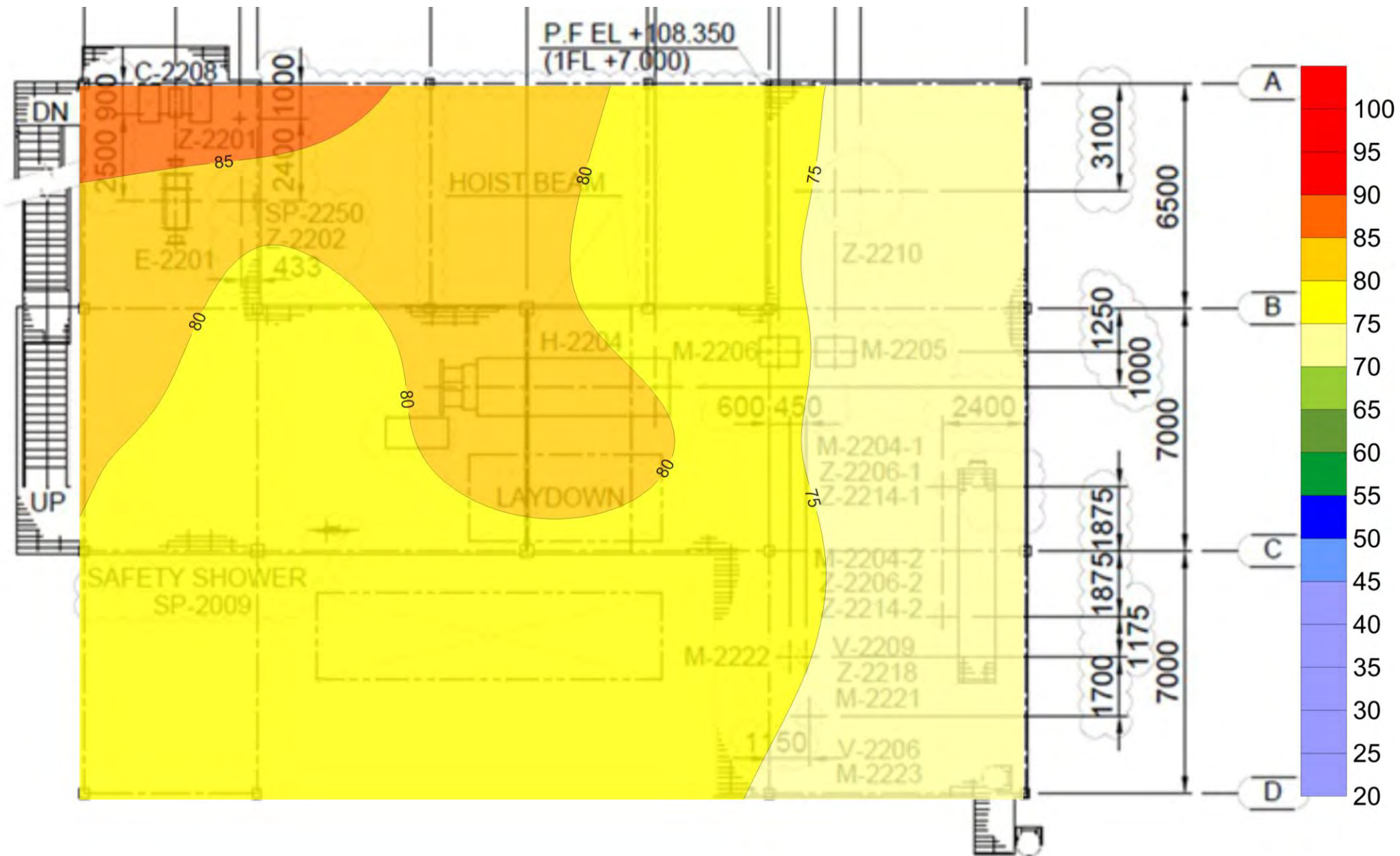
# Noise Contour Map

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



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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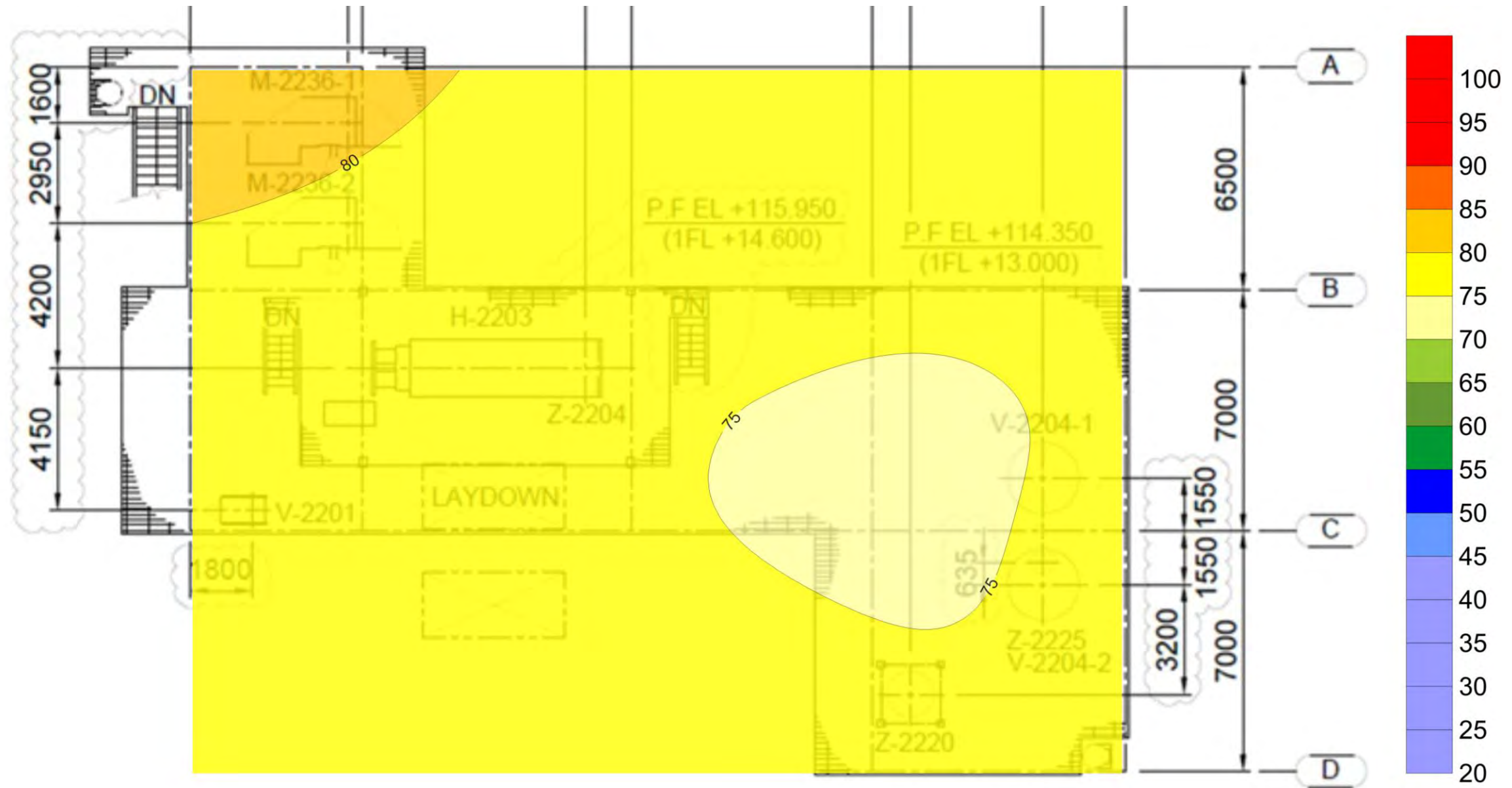
# Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425581

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Bottom) : Unit Plot Plan of HSBC PWH 3rd Floor



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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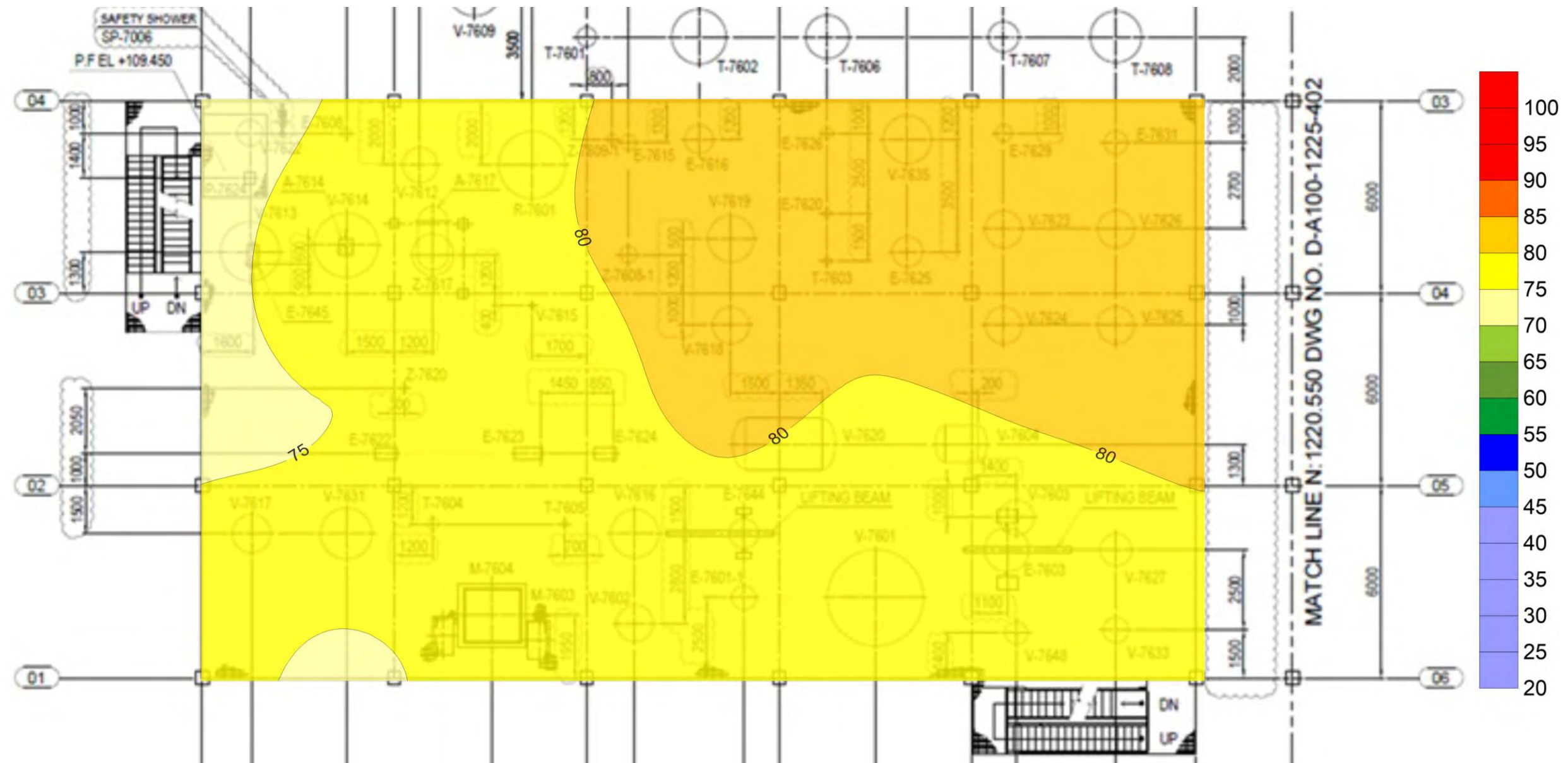
# Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425582

Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 76) 2nd Floor



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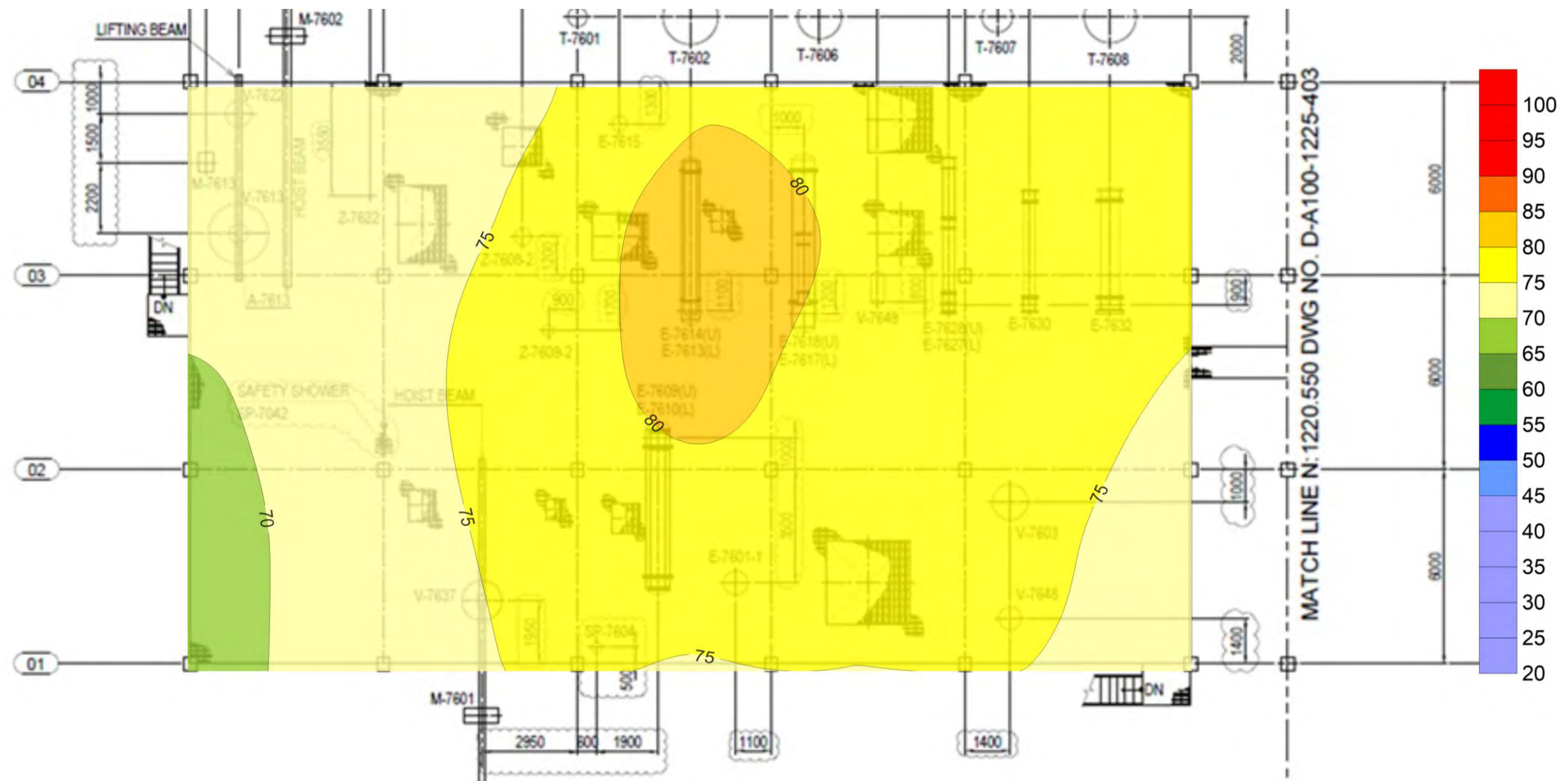
# Noise Contour Map

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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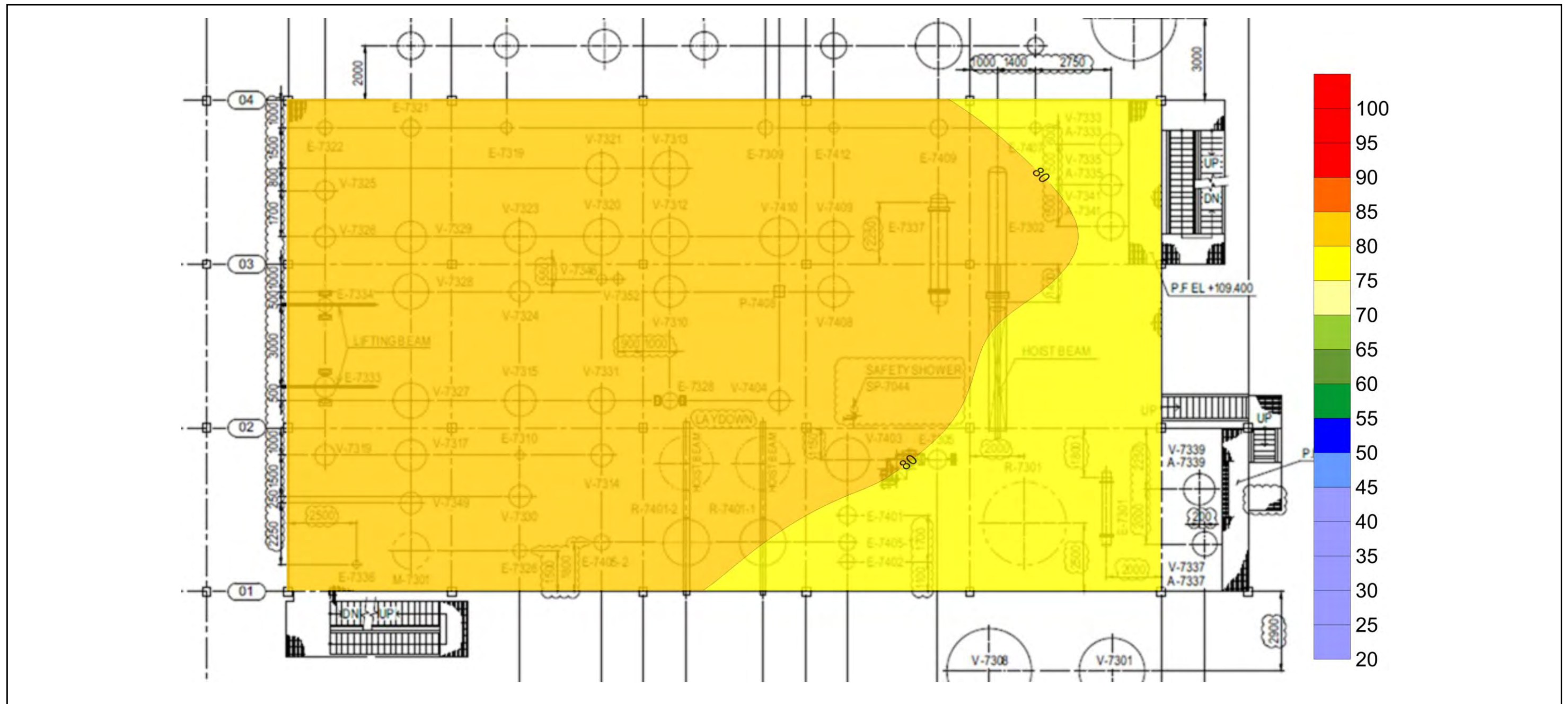
# Noise Contour Map

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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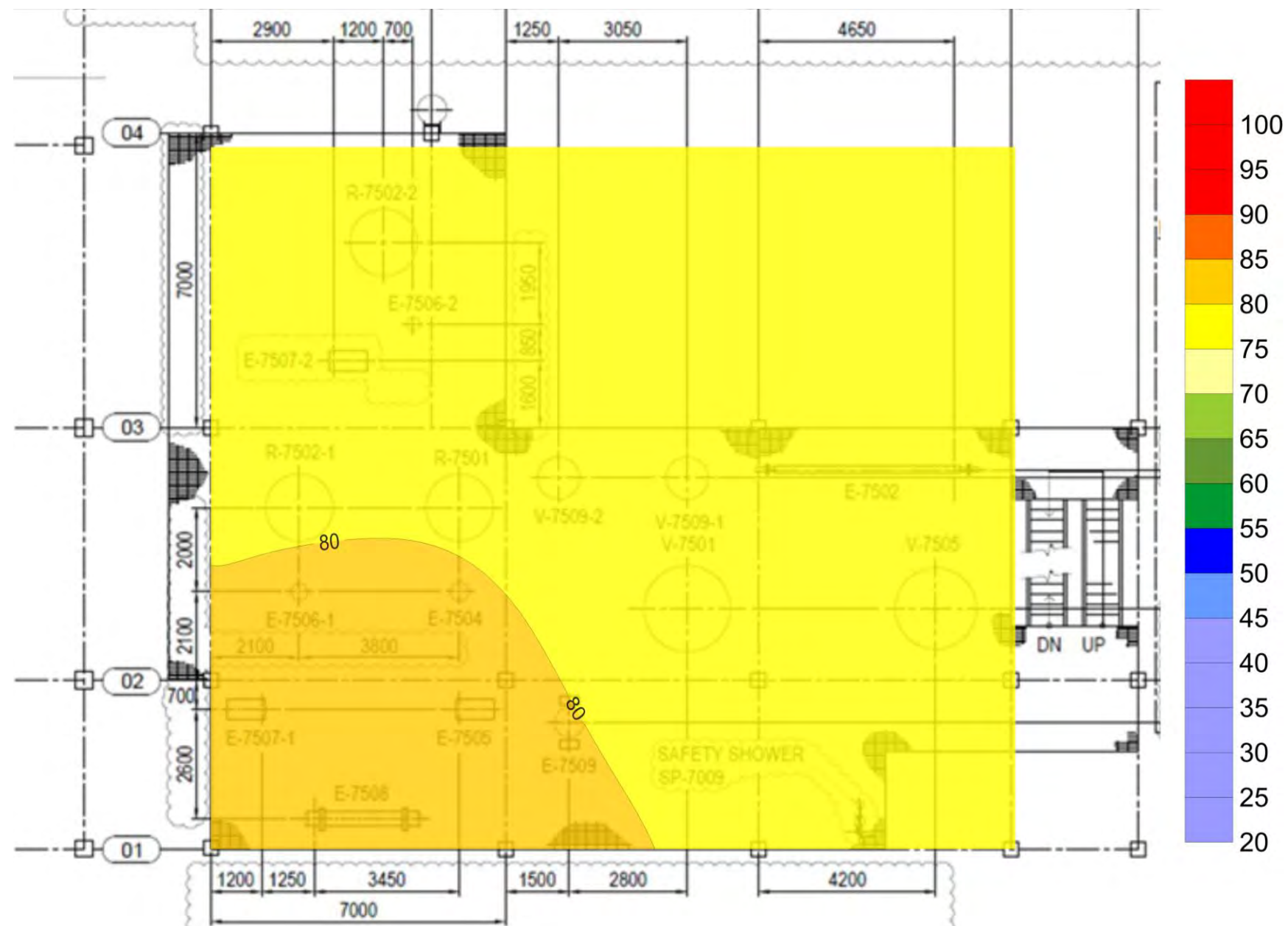
# Noise Contour Map

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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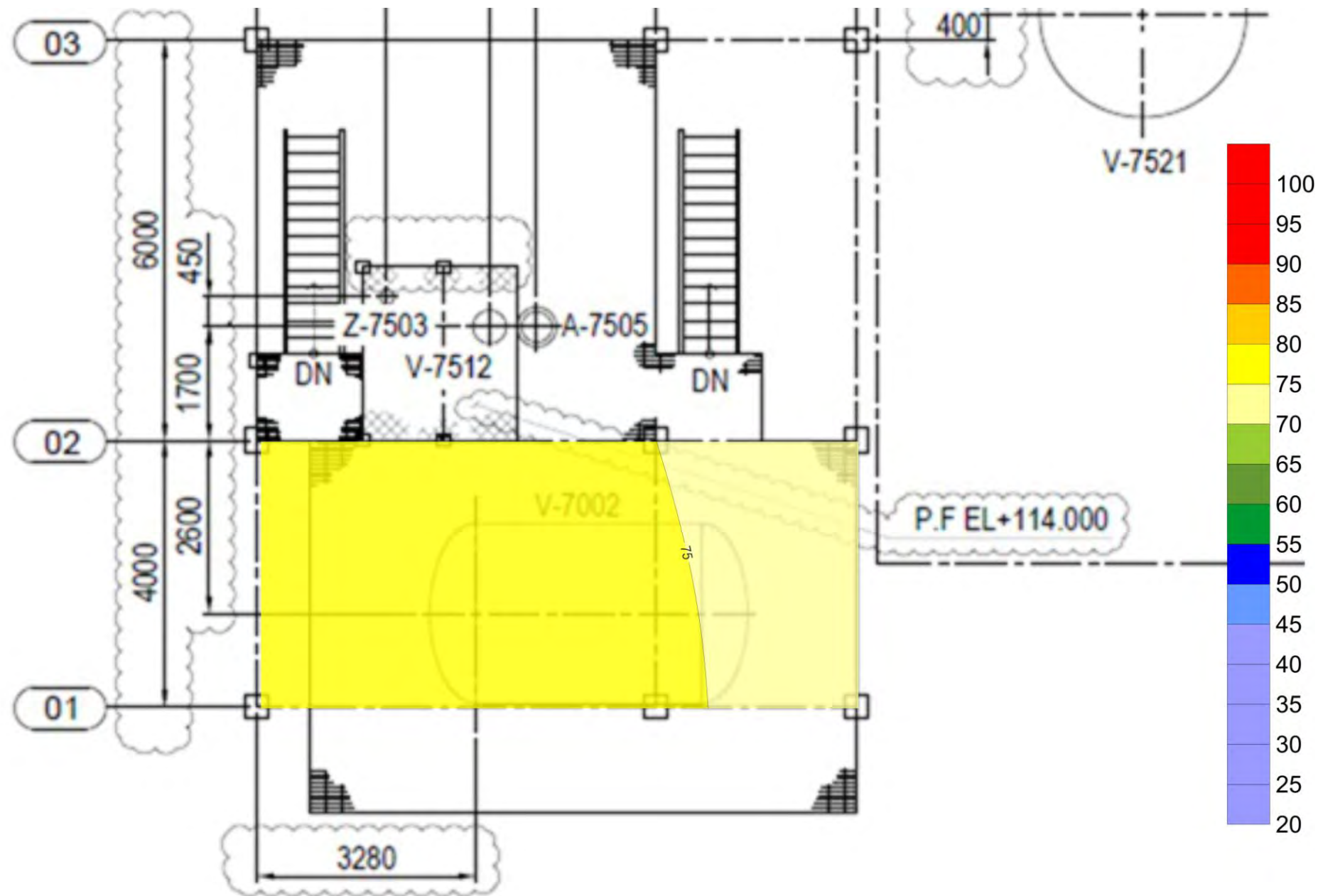
# Noise Contour Map

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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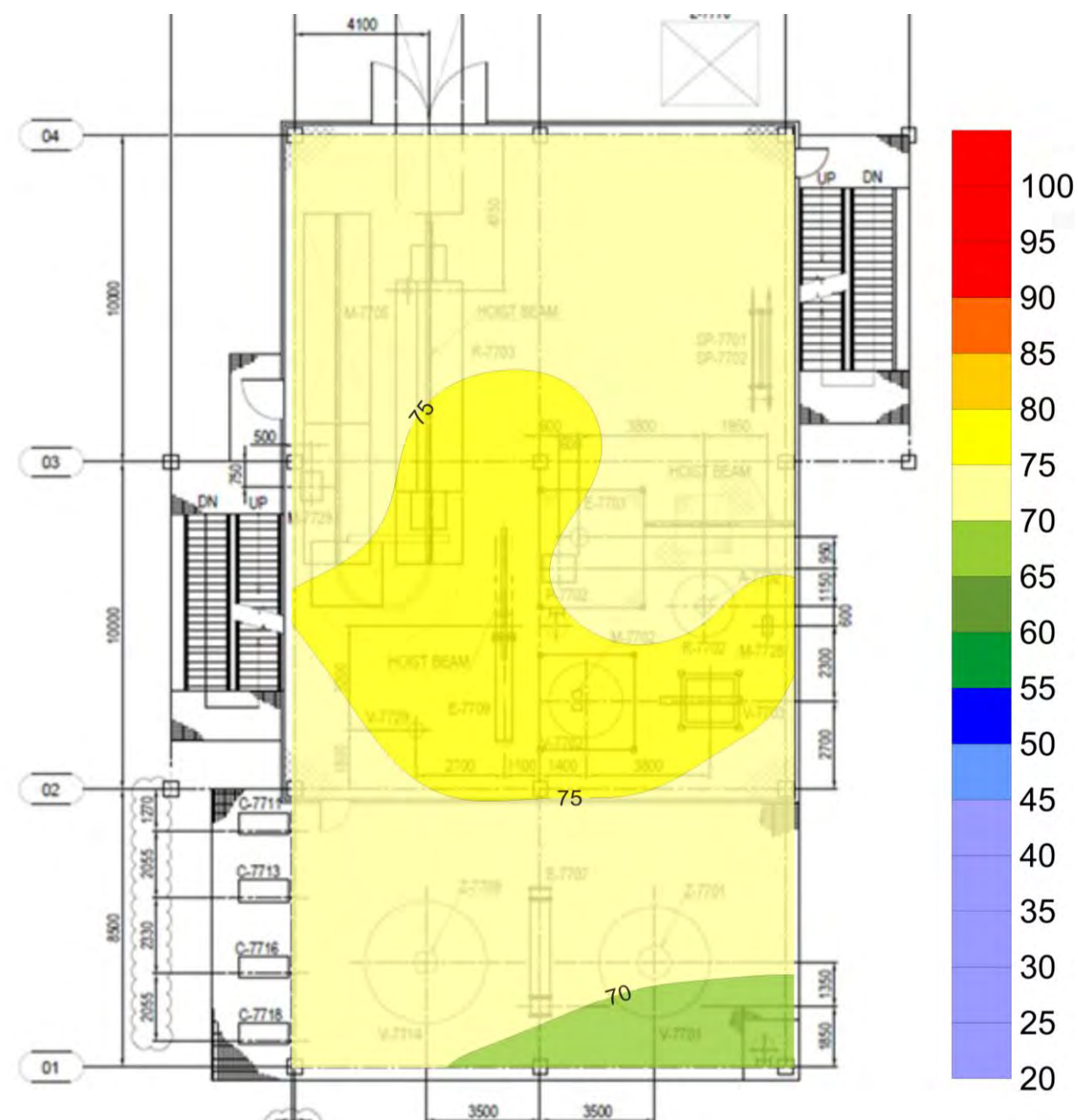






Measurement Date : Feb 27, 2024

KGC Plant 2 site (Top) : Unit Plot Plan of PA9T (Unit 77) 4th Floor



## Life Sciences

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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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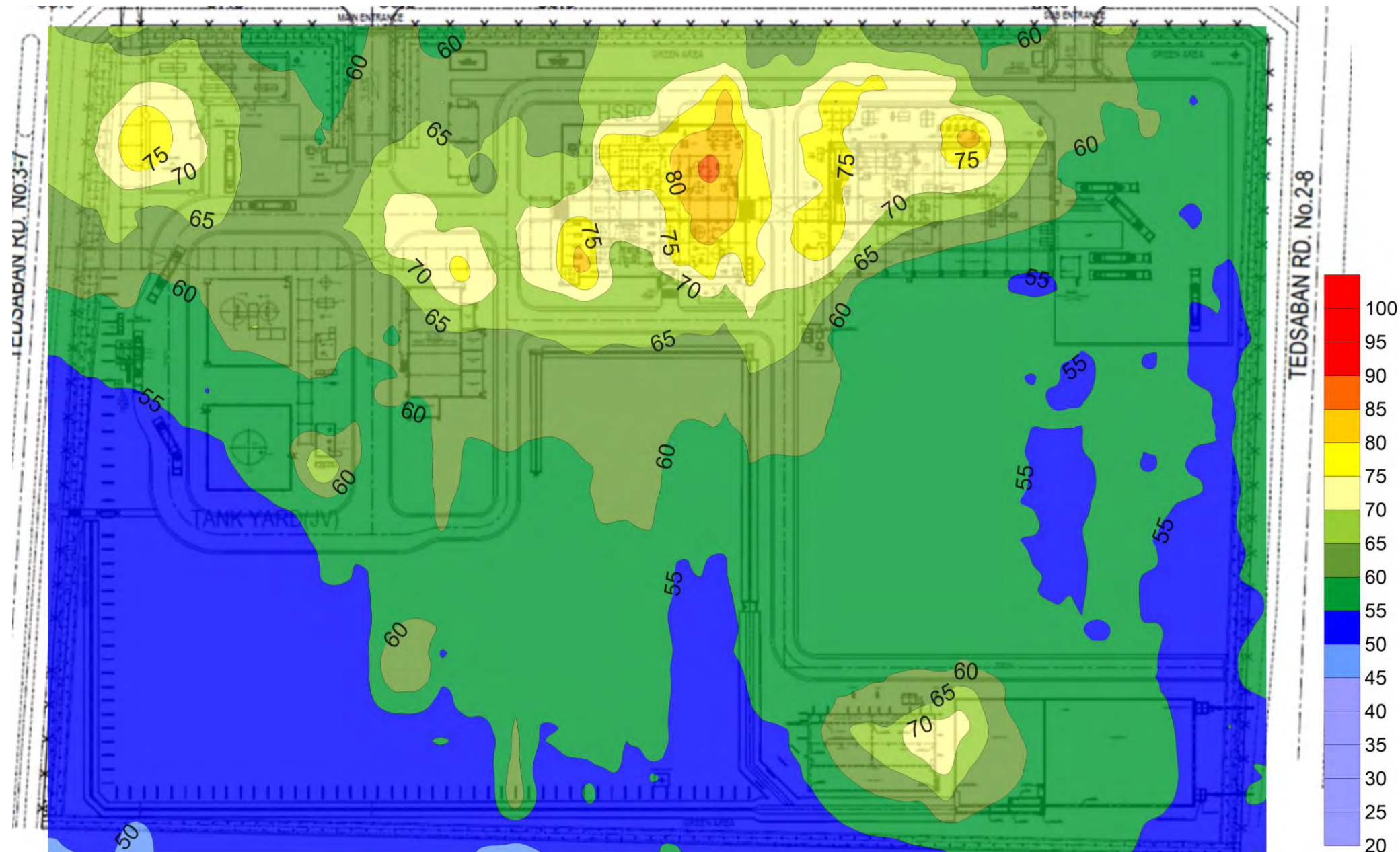
# Noise Contour Map

Kuraray GC Advanced Materials Co., Ltd.

Reference Number : Lot 2425592

Measurement Date : Feb 27-29, 2024

KGC Plant 2 site (Bottom)



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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