

OPERATIONAL QUALIFICATION (OQ) of DISSOLUTION TESTER

Location : R&D Center PT Mersifarma TM
Date : October 02, 2025

Certificate of Qualification

No: CQ/MDT034/X/2025

Equipment Identity

Instrument Name : Veego Dissolution Tester

Model : 14 Vessels

Serial Number : 0711022

Owner Identity

Company Name : R&D Center PT Mersifarma TM

Address : Jl. Raya Bogor No.52, Cisalak, Sukmajaya,
Kota Depok 16416

Calibration Equipment

Equipment Name

1. Stop Watch

2. Thermometer

3. Tachometer

Calibration Date : 02 October, 2025

Service Engineer



Randy Churiansyah



PT MULTI DAYU TEKINDO

Ruko Golden Madrid Blok D no 26

MULTI DAYU TEKINDO Jl. Letnan Sutopo, Serpong, Tangerang Selatan, Banten, Indonesia

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OQ-PQ Result :

Performance Test	Observed		Acceptable Criteria	Result
Level Check	0.10"		< 0.5"	Passed
	0.10"		< 0.5"	Passed
Height Check Basket				
Vessel 1 Vessel 8	24.06	23.71	± 2 mm	Passed
Vessel 2 Vessel 9	23.97	24.01		
Vessel 3 Vessel 10	24.29	24.41		
Vessel 4 Vessel 11	25.42	24.01		
Vessel 5 Vessel 12	25.48	25.77		
Vessel 6 Vessel 13	25.31	25.62		
Vessel 7 Vessel 14	25.09	26.08		
Height Check Paddle				
Vessel 1 Vessel 8	25.62	24.09	± 2 mm	Passed
Vessel 2 Vessel 9	25.41	24.88		
Vessel 3 Vessel 10	24.96	25.62		
Vessel 4 Vessel 11	25.07	25.22		
Vessel 5 Vessel 12	24.37	25.77		
Vessel 6 Vessel 13	24.10	25.26		
Vessel 7 Vessel 14	24.03	26.08		
Wobble Check Basket				
Vessel 1 Vessel 8	0.50	0.40	≤ 2 mm	Passed
Vessel 2 Vessel 9	0.60	0.50		
Vessel 3 Vessel 10	0.45	0.60		
Vessel 4 Vessel 11	0.60	0.50		
Vessel 5 Vessel 12	0.50	0.50		
Vessel 6 Vessel 13	0.35	0.45		
Vessel 7 Vessel 14	0.55	0.65		
Wobble Check Paddle				
Vessel 1 Vessel 8	0.55	0.50	≤ 2 mm	Passed
Vessel 2 Vessel 9	0.50	0.40		
Vessel 3 Vessel 10	0.30	0.20		
Vessel 4 Vessel 11	0.40	0.30		
Vessel 5 Vessel 12	0.50	0.50		
Vessel 6 Vessel 13	0.50	0.30		
Vessel 7 Vessel 14	0.50	0.50		
Temperature Check				
Vessel 1 Vessel 8	0.30	0.30	± 0.5°C	Passed
Vessel 2 Vessel 9	0.30	0.10		
Vessel 3 Vessel 10	0.20	0.20		
Vessel 4 Vessel 11	0.10	0.30		
Vessel 5 Vessel 12	0.20	0.20		
Vessel 6 Vessel 13	0.10	0.10		
Vessel 7 Vessel 14	0.10	0.20		
RPM & Vibration Check				
50	50.5		± 2	Passed
100	100.1		± 4	Passed
150	150.3		± 6	Passed
Time Check				
15.00	0.0 seconds		± 18 seconds	Passed



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Performance Test	Observed	Acceptable Criteria	Result
PVT Test Paddle			
Std % Difference	1.08 %	$\leq 2.00\%$	Passed
% CV	3.3 %	$\leq 5.4\%$	Passed
Geometric Mean %	49 %	$\geq 45\% \leq 57\%$	Passed
PVT Test Basket			
Std % Difference	0.30 %	$\leq 2.00\%$	Passed
% CV	1.6 %	$\leq 5.4\%$	Passed
Geometric Mean %	85 %	$\geq 45\% \leq 57\%$	Passed

1. Introduction

This document is intended to provide a validated record of the **Dissolution Tester System Unit** throughout its operational lifetime via a structured framework designed to allow complete documentation of the system.

The Dissolution Tester System Units can be operated as a stand-alone or can be integrated with and online or offline sampling and analysis setup. **The Scope of this Qualification Logbook is limited to providing physical Qualification of the Unit as a Stand-alone system only with no accessories interfaced.**

It Covers all aspect of the system form design criteria through installation, operation and maintenance with emphasis placed on the role of the suppliers in assisting the customer to meet all equipment qualification requirements.

For the operation and handling of the Dissolution Tester use the Operation Manual valid to corresponding firmware version

2. System Details

System	Model	Serial Number
Veego Dissolution Tester	14 Vessels	0711022

3. Calibration Equipment

System	Model	Serial Number	Calibration Date
Stop Watch	Q&Q	HS-46	November 25 th 2024
Thermometer	APPA-51	03000216	November 22 th 2024

CONFIRMATION

I hereby confirm that all the qualification above is accurate

PERFORMER Randy Date : 02/10/2025 Signed : 

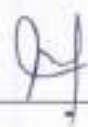
REVIEWER Juwita Riskani Date : 05/12/2025 Signed : 

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4. Operational Qualification (OQ)

4.1 Shaft and Vessel ID

- Ensure that the system is fitted with stirring elements in all active shaft positions.
- Note the **Shaft ID** (Number or Serial Number)

Position	Identification
1	S1
2	S2
3	S3
4	S4
5	S5
6	S6
7	S7
8	S8
9	S9
10	S10
11	S11
12	S12
13	S13
14	S14

- Ensure that vessels are placed in all active vessel positions and that rotational positions are marked.
- Note the **Vessel ID** (Number or Serial Number)

Position	Identification
1	V1
2	V2
3	V3
4	V4
5	V5
6	V6
7	V7
8	V8
9	V9
10	V10
11	V11
12	V12
13	V13
14	V14

4.2 Level Check

- Check the level on the vessel plate with a spirit level, parallel and vertical to the front, if using a digital spirit level, the base plate inclination should not be more than 0.5° in each of the two directions. With a bubble level, the bubble should be within lines.

Level Check	Observed Level	Acceptance Criteria	Results Pass/Fail
Horizontal	0.10°	$\leq 0.5^\circ$	Passed
Vertical	0.10°	$\leq 0.5^\circ$	Passed

4.3 Height Check Basket

- Use the Level Probe Instrument or equal to measure the distance between the inside bottom of the vessel and the bottom of the Baskets for each position. The USP states that the distance between the inside bottom of the Vessel and the bottom of the stirring element is maintained at 25 ± 2 mm during the test.
- Document the Identification (Number or Serial Number) of each basket if available
- Document the results of the Height Check Basket in the checklist below

Height Check Basket		Observed Height	Acceptance Criteria	Results Pass/Fail
Position	Identification			
1	B1	24.06 mm	± 2 mm	Passed
2	B2	23.97 mm	± 2 mm	Passed
3	B3	24.29 mm	± 2 mm	Passed
4	B4	25.42 mm	± 2 mm	Passed
5	B5	25.48 mm	± 2 mm	Passed
6	B6	25.31 mm	± 2 mm	Passed
7	B7	25.09 mm	± 2 mm	Passed
8	B8	23.71 mm	± 2 mm	Passed
9	B9	24.01 mm	± 2 mm	Passed
10	B10	24.41 mm	± 2 mm	Passed
11	B11	24.01 mm	± 2 mm	Passed
12	B12	25.77 mm	± 2 mm	Passed
13	B13	25.62 mm	± 2 mm	Passed
14	B14	26.08 mm	± 2 mm	Passed

4.4 Height Check Paddle

- Use the Level Probe Instrument or equal to measure the distance between the inside bottom of the vessel and the bottom of the paddle for each position. The USP states that the distance between the inside bottom of the Vessel and the bottom of the stirring element is maintained at 25 ± 2 mm during the test.
- Document the Identification (Number or Serial Number) of each paddle if available
- Document the results of the Height Check Paddle in the checklist below

Height Check Paddle		Observed Height	Acceptance Criteria	Results Pass/Fail
Position	Identification			
1	P1	25.62 mm	± 2 mm	Passed
2	P2	25.41 mm	± 2 mm	Passed
3	P3	24.96 mm	± 2 mm	Passed
4	P4	25.07 mm	± 2 mm	Passed
5	P5	24.37 mm	± 2 mm	Passed
6	P6	24.10 mm	± 2 mm	Passed
7	P7	24.03 mm	± 2 mm	Passed
8	P8	24.09 mm	± 2 mm	Passed
9	P9	24.88 mm	± 2 mm	Passed
10	P10	25.62 mm	± 2 mm	Passed
11	P11	25.22 mm	± 2 mm	Passed
12	P12	25.77 mm	± 2 mm	Passed
13	P13	25.26 mm	± 2 mm	Passed
14	P14	26.08 mm	± 2 mm	Passed

4.5 Wobble Check - Basket

- Position the drive unit to the height of the Wobble Meter.
- Lock the Wobble Meter at the Vessel of Position 1 and touch the shaft and the gauge pointer reads slightly more than zero.
- Correct the shaft height, so that the Wobble Meter Touches the bottom rim of the basket.
- Start stirring at the lowest velocity (e.g. 30 RPM) or rotate the shaft manually.
- Read the maximum and the minimum deflection on the instrument dial in 0.1 mm resolution. The difference / distance absolute / total runout is called the wobble. The USP states that the total runout is ≤ 2.0 mm absolute.
- Document the results of the Basket Wobble Check in the checklist below.
- Repeat steps 1 to 6 for each position.
- The test is passed in total, if all existing position passed.

Basket Wobble Position	Minimum Deflection (mm)	Maximum Deflection (mm)	Distance Absolute Observed (mm)	Acceptance Criteria	Results Pass/Fail
1	0.40 mm	0.90 mm	0.50 mm	≤ 2 mm	Passed
2	0.30 mm	0.90 mm	0.60 mm	≤ 2 mm	Passed
3	0.50 mm	0.95 mm	0.45 mm	≤ 2 mm	Passed
4	0.40 mm	1.00 mm	0.60 mm	≤ 2 mm	Passed
5	0.40 mm	0.90 mm	0.50 mm	≤ 2 mm	Passed
6	0.50 mm	0.85 mm	0.35 mm	≤ 2 mm	Passed
7	0.35 mm	0.90 mm	0.55 mm	≤ 2 mm	Passed
8	0.40 mm	0.80 mm	0.40 mm	≤ 2 mm	Passed
9	0.50 mm	1.00 mm	0.50 mm	≤ 2 mm	Passed
10	0.50 mm	1.10 mm	0.60 mm	≤ 2 mm	Passed
11	0.40 mm	0.90 mm	0.50 mm	≤ 2 mm	Passed
12	0.40 mm	0.90 mm	0.50 mm	≤ 2 mm	Passed
13	0.55 mm	1.00 mm	0.45 mm	≤ 2 mm	Passed
14	0.30 mm	0.95 mm	0.65 mm	≤ 2 mm	Passed

4.6 Wobble Check -Paddle

- Position the drive unit to the height of the Wobble Meter.
- Lock the Wobble Meter at the Vessel of Position 1 and touch the shaft and the gauge pointer reads slightly more than zero.
- Correct the shaft height, so that the Wobble Meter Touches the shaft 1 cm above the top of the paddle blade.
- Start stirring at the lowest velocity (e.g. 30 RPM) or rotate the shaft manually.
- Read the maximum and the minimum deflection on the instrument dial in 0.1 mm resolution. The difference / distance absolute / total runout is called the wobble. The USP states that the total runout is ≤ 2.0 mm absolute.
- Document the results of the Paddle Wobble Check in the checklist below.
- Repeat steps 1 to 6 for each position.
- The test is passed in total, if all existing position passed.

Paddle Wobble Position	Minimum Deflection (mm)	Maximum Deflection (mm)	Distance Absolute Observed (mm)	Acceptance Criteria	Results Pass/Fail
1	0.40 mm	0.95 mm	0.55 mm	< 2 mm	Passed
2	0.40 mm	0.90 mm	0.50 mm	< 2 mm	Passed
3	0.40 mm	0.70 mm	0.30 mm	< 2 mm	Passed
4	0.45 mm	0.85 mm	0.40 mm	< 2 mm	Passed
5	0.30 mm	0.80 mm	0.50 mm	< 2 mm	Passed
6	0.35 mm	0.85 mm	0.50 mm	< 2 mm	Passed
7	0.30 mm	0.80 mm	0.50 mm	< 2 mm	Passed
8	0.20 mm	0.70 mm	0.50 mm	< 2 mm	Passed
9	0.40 mm	0.80 mm	0.40 mm	< 2 mm	Passed
10	0.35 mm	0.55 mm	0.20 mm	< 2 mm	Passed
11	0.50 mm	0.80 mm	0.30 mm	< 2 mm	Passed
12	0.40 mm	0.90 mm	0.50 mm	< 2 mm	Passed
13	0.40 mm	0.70 mm	0.30 mm	< 2 mm	Passed
14	0.40 mm	0.90 mm	0.50 mm	< 2 mm	Passed

4.7 RPM and Vibration Check

- Place a piece of reflective tape on one of the shafts to be able to aim the light beam of the tachometer to the tape.
- Set the unit to the required RPM of 50. Make a measurement as explained in the instructions for the use of the tachometer. The USP states that a used Speed Regulating Device allows the shaft rotation speed selected and maintained at the rate specified in the individual monograph to be within $\pm 4\%$.
- Repeat the procedure explained in (b) for the required RPM of 100 and 150.
- Furthermore, the USP states that no part of the assembly, including the environment in which the assembly is placed, contributes significant vibration apart from the smoothly rotating stirring elements. Check for all vessel positions simultaneously at 50,100 and 150 RPM
 - the Synchronous Motion,
 - the Smooth Motion and
 - that there is no significant vibration
- Document the result of the RPM Check and Vibration Check in the checklist below.

Note : All Spindled turn with identical rotational velocity because the spindle's drive is performed through one motor and one belt. Therefore, the RPM measurement on any position will hold true for all positions. Nevertheless, the synchronous, smoot motion, and vibration of all spindles must be checked.

Shaft Position	RPM Set Point	RPM Measurement	Deviation Observed	Acceptance Criteria	Results Pass/Fail
See chapter 2.7 (a)	50	50.5	0.5	± 2	Passed
	100	100.1	0.1	± 4	Passed
	150	150.3	0.3	± 6	Passed

Shaft Position	RPM Set Point	Synchronous Motion	Smooth Motion	No Significant Vibration	Results Pass/Fail
See chapter 2.7 (a)	50	Yes	Yes	Yes	Passed
	100	Yes	Yes	Yes	Passed
	150	Yes	Yes	Yes	Passed

4.8 Temperature Check

- Ensure each vessel is filled with 900mL of DI water and covered with a vessel cover.
- Run the heating at 37°C and wait for final temperature stability in the vessels. The USP States that the water bath permit holding the temperature inside the vessels at $37 \pm 0.5^\circ\text{C}$ during the test and keeping the bath fluid in constant smooth motion.
- Measure the actual value of the temperature in each vessel using calibrated Temperature Sensing Device and simultaneously compare with the displayed temperature value of each vessel (if available). The displayed temperature values should agree within $\pm 0.25^\circ\text{C}$ with the reference values. Otherwise perform a calibration of the built in thermometer (s) according to the Operational Manual and add the calibration protocol. Repeat point (c).
- Document the results in the checklist below.

Note : There are two facts to distinguish : first, the temperature calibration of the internal thermometer(s) indicated in comparison with the measured external temperature of the calibrated Temperature Sensing Device; second, the heating control for reaching and indicating internal temperature. Specification covers both, matching of the external and internal temperature with set temperature.

Vessel Number	Set Point °C	Measured Temperature °C	Max. Deviation Observed from Set Point °C	Acceptance Criteria °C	Results Pass/Fail
1	37.0	37.3	0.3	$\pm 0.5^\circ\text{C}$	Passed
2		37.3	0.3	$\pm 0.5^\circ\text{C}$	Passed
3		37.2	0.2	$\pm 0.5^\circ\text{C}$	Passed
4		37.1	0.1	$\pm 0.5^\circ\text{C}$	Passed
5		37.2	0.2	$\pm 0.5^\circ\text{C}$	Passed
6		37.1	0.1	$\pm 0.5^\circ\text{C}$	Passed
7		37.1	0.1	$\pm 0.5^\circ\text{C}$	Passed
8		37.3	0.3	$\pm 0.5^\circ\text{C}$	Passed
9		37.1	0.1	$\pm 0.5^\circ\text{C}$	Passed
10		37.2	0.2	$\pm 0.5^\circ\text{C}$	Passed
11		37.3	0.3	$\pm 0.5^\circ\text{C}$	Passed
12		37.2	0.2	$\pm 0.5^\circ\text{C}$	Passed
13		37.1	0.1	$\pm 0.5^\circ\text{C}$	Passed
14		37.2	0.2	$\pm 0.5^\circ\text{C}$	Passed

4.9 System Control Check (Time Check)

- Ensure each vessel is filled with 900mL of DI water (also for 2L and 4L vessels) and covered with a vessel cover.
- Check the time periods which are suitable for routine, e.g. 15 minutes. Measure the right timing with simultaneous activation of a calibrated timer watch and confirmation at the unit. The USP states that specimens are to be withdrawn only at the stated times within a tolerance of $\pm 2\%$, if two or more times are specified
- if available check the functionality of the sophisticated instrument operation (e.g. parameter settings, printer interface).
- Document the results in the checklist below.

Test Description	Time Set Point mm:ss	Time Measurement mm:ss	Deviation Observed in seconds	Acceptance Criteria in seconds	Results Pass/Fail
System Control Check	15:00	15:00	0.0	± 18	Passed

5. Summary of Result

Summary of Results		
All qualification tests were successfully completed.	Pass	☒
Some of the qualification tests required correction in order to successfully complete.*	Pass after correction	☐
Some of the qualification tests were not successfully completed.	Fail	☐

5.1 Additional Comments

1. Pada Saat Kalibrasi Autosampler menggunakan flow 5ml/min, hasil tidak akurat dengan flow yang digunakan terdapat penyimpangan sebesar 1,79 - 3,77 gr dengan syarat 5gr ± 0.15

5.2 OQ Completion

Qualification Company : PT Multi Dayu Tekindo

Qualification Engineer : Randy

Qualification Date : October 02, 2025

Customer Representative :

Position/Job Title :

Department/Section :

CONFIRMATION

I hereby confirm that all the operation qualification results above is accurate

PERFORMER Randy Date : 02/10/2025 Signed : 

REVIEWER Juwita Ristiani Date : 05/12/2025 Signed : 

APPENDIX

Spectrofotometry Analysis Report

PT Mersifarma TM

[Wavelengths]
Wavelength Name:
Wavelength:

WL242,0
242,00 nm

Column for Cal. Curve:
Cal. Curve Type:
Cal. Curve Unit:
Selected Wavelength:
Concentration:

WL242,0
Single Point
mg/mL
WL242,0
99.6000

[Calibration Curve]

Standard Table

	Sample ID	Type	Ex	Conc	WL242,0	Wgt.Factor	Comments
1	Standard	Std-Repeat		99.600	0.336	1.000	
2	Standard-2	Std-Repeat		99.600	0.336	1.000	
3	Standard-3	Std-Repeat		99.600	0.336	1.000	
4	Standard-4	Std-Repeat		99.600	0.336	1.000	
5	Standard-5	Std-Repeat		99.600	0.336	1.000	
6	Standard-6	Std-Repeat		99.600	0.336	1.000	
7	Standard-Avg	Average		99.600	0.336	1.000	Avg of preceding 6 Samples

Sample Table

	Sample ID	Type	Ex	Conc	WL242,0	Comments
1	Basket1	Unknown		231.785	0.781	
2	Basket2	Unknown		226.453	0.763	
3	Basket3	Unknown		227.151	0.765	
4	Basket4	Unknown		223.107	0.752	
5	Basket5	Unknown		221.577	0.747	
6	Basket6	Unknown		225.340	0.759	
7	Basket7	Unknown		229.895	0.775	
8	Basket8	Unknown		223.859	0.754	
9	Basket9	Unknown		227.839	0.768	
10	Basket10	Unknown		222.885	0.751	
11	Basket11	Unknown		222.093	0.748	
12	Basket12	Unknown		232.702	0.784	
13	Basket13	Unknown		227.309	0.766	
14	Standard2	Unknown		99.016	0.334	
15						

Spectrophotometry Analysis Report

PT Mersifarma TM

[Wavelengths]
Wavelength Name:
Wavelength:

WL242,0
242,00 nm

Column for Cal. Curve:
Cal. Curve Type:
Cal. Curve Unit:
Selected Wavelength:
Concentration:

WL242,0
Single Point
mg/mL
WL242,0
99.6000

[Calibration Curve]

Standard Table

	Sample ID	Type	Ex	Conc	WL242,0	Wgt.Factor	Comments
1	Standar	Std-Repeat		99.600	0.374	1.000	
2	Standar-2	Std-Repeat		99.600	0.374	1.000	
3	Standar-3	Std-Repeat		99.600	0.374	1.000	
4	Standar-4	Std-Repeat		99.600	0.374	1.000	
5	Standar-5	Std-Repeat		99.600	0.374	1.000	
6	Standar-6	Std-Repeat		99.600	0.374	1.000	
7	Standar-Avg	Average		99.600	0.374	1.000	Avg of preceding 6 Samples

Sample Table

	Sample ID	Type	Ex	Conc	WL242,0	Comments
1	Paddle1	Unknown		133.338	0.501	
2	Paddle2	Unknown		132.216	0.497	
3	Paddle3	Unknown		131.343	0.493	
4	Paddle4	Unknown		118.608	0.446	
5	Paddle5	Unknown		131.562	0.494	
6	Paddle6	Unknown		132.554	0.498	
7	Paddle7	Unknown		124.693	0.468	
8	Paddle8	Unknown		127.655	0.480	
9	Paddle9	Unknown		137.002	0.515	
10	Paddle10	Unknown		128.284	0.482	
11	Paddle11	Unknown		131.254	0.493	
12	Paddle12	Unknown		129.430	0.486	
13	Paddle13	Unknown		130.035	0.488	
14	Paddle14	Unknown		130.620	0.491	
15	Standard2	Unknown		97.486	0.366	
16						

Height Check Basket
Basket 1



Basket 2



Basket 3



Basket 4



Basket 5



Basket 6



Basket 7



Basket 8



Height Check Basket
Basket 9



Basket 10



Basket 11



Basket 12



Basket 13



Basket 14



Height Check Paddle
Paddle 1



Paddle 5



Paddle 2



Paddle 6



Paddle 3



Paddle 7



Paddle 4



Paddle 8



Height Check Paddle
Paddle 9



Paddle 10



Paddle 11



Paddle 12



Paddle 13



Paddle 14



Temperature Check

Vessel 1



Vessel 2



Vessel 3



Vessel 4



Vessel 5



Vessel 6



Vessel 7



Vessel 8



Vessel 9



Vessel 10



Vessel 11



Vessel 12



Vessel 13



Vessel 14



Timer Check



Perhitungan Kalibrasi Autosampler

flow 5

WT Sample	WT Collected Sample		deviation
10,44	13,75	3,31	-1,69
10,07	13,84	3,77	-1,23
10,18	13,58	3,40	-1,6
10	12,94	2,94	-2,06
9,98	12,59	2,61	-2,39
10,46	12,51	2,05	-2,95
10,06	11,85	1,79	-3,21
10,28	12,42	2,14	-2,86
10,15	12,51	2,36	-2,64
10,26	12,94	2,68	-2,32
10,13	13,03	2,90	-2,1
10,33	13,17	2,84	-2,16

Cert No : 04162T24

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SERTIFIKAT KALIBRASI

Calibration Certificate

IDENTITAS ALAT

Equipment Identity

Nama Alat : TERMOMETER DIGITAL
Name

Merck Pabrik : APPA
Manufacturer

Tipe / Nomor Seri : CHROMEL-ALUMEL / SN: 03000216
Type / Serial Number

Kapasitas / Resolusi : Kapasitas : -50 – 190 °C
Capacity / Resolution Resolusi : 0,1 °C

IDENTITAS PEMILIK

Owner Identity

Nama Perusahaan : PT MULTI DAYU TEKINDO
Company / Principal

Alamat : RUKO GOLDEN MADRID BLOK D NO. 26, JL. LETNAN SUTOPO,
Address BSD CITY, SERPONG, KOTA TANGERANG SELATAN

IDENTITAS STANDAR

Standard identity

Nama : Secondary Reference PRT AM1750-20 S/N: 1620209
Name

Ketelusuran : Tertelusur ke satuan SI melalui LK-160-IDN
Traceability



Diterbitkan Tanggal : 25 November 2024

Issuance date

Manajer Teknis Kalibrasi
Technical Manager of Calibration



H. Rosadi, M.Sc.

PT NATIONAL ANDALAN SERVICES LABORATORIUM KALIBRASI

Laboratory of Calibration

Jalan Arie Surjalingga No. 128, Pasir Kuda, Bogor Barat, Kota Bogor, 16119 - Indonesia

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Komite Akreditasi Nasional
Laboratorium Kalibrasi
LK - 208 - IDN

Cert. No : 04162T24

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TAMBAHAN INFORMASI

Information Notes

NAMA ALAT <i>Equipment</i>	: TERMOMETER DIGITAL		
TEMPAT KALIBRASI <i>Location</i>	: LAB. KAL. SUHU PT NAS		
TANGGAL KALIBRASI <i>Calibration date</i>	: 11 NOVEMBER 2024		
SUHU RUANGAN <i>Room temperature</i>	: 20,7	+	0,2 °C
KELEMBAHAN <i>Humidity</i>	: 56	+	2 % RH

1. Keotentikan

a) Alat ini dikalibrasi oleh PT Nasional Andalan Services (PT NAS) yang telah terakreditasi oleh Komite Akreditasi Nasional (KAN) berdasarkan SNI ISO/IEC 17025 : 2017 dengan nomor akreditasi : LK-208-IDN

b) Alat tersebut dikalibrasi dengan Secondary Reference PRT AM1750-20 S/N: 1620209, terakreditasi ke SI melalui LK-160-IDN

1. Traceability

a) The Measuring Instrument was calibrated by PT Nasional Andalan Services (PT NAS) that is accredited by National Accreditation Committee (KAN) based on SNI ISO/IEC 17025:2017 with accreditation No. LK-208-IDN

b) This Measuring Instrument was calibrated by using Secondary Reference PRT AM1750-20 S/N: 1620209, that is thoroughly traceable to SI unit in Calibration Laboratory LK-160-IDN

2. Metode Kalibrasi

a) Alat ini dikalibrasi mengikuti Instruksi Kerja No. WI-T01-02/NAS-CAL/2016 (JIS Z 8710:1993)

b) Kalibrasi Termometer Digital ini dilakukan dengan cara perbandingan langsung dengan Secondary Reference PRT AM1750-20 S/N: 1620209 yang terakreditasi ke LK-160-IDN

2. Calibration Method

a) This Measuring Instrument was calibrated by complying with work instruction No. WI-T01-02/NAS-CAL/2016 (JIS Z 8710:1993)

b) The Calibration of this Glass Thermometer was carried out by directly comparing to Digital Thermometer and Secondary Reference PRT AM1750-20 S/N: 1620209 that was calibrated by LK-160-IDN

3. Hasil Kalibrasi

a) Hasil Kalibrasi diperoleh dari hasil rata-rata pengukuran sebanyak 5 kali selang yang tertera di lembar ke 3 pada sertifikat kalibrasi ini.

b) Hasil Kalibrasi yang dicantumkan dalam sertifikat kalibrasi ini adalah nilai koreksi dari nilai alat yang dikalibrasi terhadap nilai alat standar serta nilai ketidakpastian pada tingkat kepercayaan 95% dengan faktor cakupan $k = 2$

3. Calibration Result

a) The calibration result was resulted in the average of measuring results of 5 repetition and written on page 3 within this calibration certificate

b) The calibration result within this certificate there are expressed by correction value between the calibrated Digital Thermometer and Secondary Reference PRT AM1750-20 S/N: 1620209 results, the uncertainty of measurement within confidence level 95% with coverage factor $k = 2$

4. Nilai Ketidakpastian Bersamaan

Nilai Ketidakpastian bersamaan dalam proses kalibrasi alat ini diperoleh dari sumber-sumber kesalahan tipe A dan tipe B sesuai dengan JCGM 100:2008 "Evaluation of Measurement Data - Guide to the Expression of Uncertainty in Measurement" yang dinyatakan pada tingkat kepercayaan 95% dengan faktor cakupan $k = 2$

4. The Expression of Expanded Uncertainty

The value Expanded Uncertainty of Calibration process was estimated from all error sources of Type A and Type B complying with JCGM 100:2008 "Evaluation of Measurement Data - Guide to the Expression of Uncertainty in Measurement" and expressed within confidence level 95% and coverage factor $k = 2$

Cert No : 04162T24

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LAPORAN HASIL KALIBRASI*Report of Calibration*

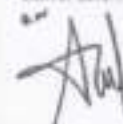
NAMA ALAT : TERMOMETER DIGITAL
Equipment
 TEMPAT KALIBRASI : LAB. KAL. SUHU PT NAS
Location
 TANGGAL KALIBRASI : 11 NOVEMBER 2024
Calibration date
 SUHU RUANGAN : 20,7 °C ± 0,2 °C
Room temperature
 KELEMBABAN : 56 % RH ± 2 % RH
Humidity

HASIL KALIBRASI

SETTING SUHU (°C)	PENUNJUKAN ALAT (°C)	PEMBACAAN STANDAR (°C)	KOREKSI (°C)
-30,0	-29,3	-29,475	-0,2
23,0	25,7	25,123	-0,6
50,0	49,8	50,391	0,6
100,0	100,2	100,169	0,0
150,0	150,6	150,955	0,4
190,0	190,6	191,066	0,5

Ketidakpastian = 0,20 °C (k = 2,0)

Petugas Kalibrasi
 Calibration Officer



Moch. Fadhl Nurfaidzi

Cert. No : 04170TF24

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SERTIFIKAT KALIBRASI

Calibration Certificate

IDENTITAS ALAT

Equipment identity

Nama Alat : TIMER
Name

Merek Pabrik : Q&Q
Manufacturer

Tipe / Nomor Seri : - / SN: -
Type / Serial Number

Kapasitas / Resolusi : Kapasitas : -
Capacity / Resolution Resolusi : 0,01 Detik

IDENTITAS PEMILIK

Owner identity

Nama Perusahaan : PT MULTI DAYU TEKINDO
Company / Principal

Alamat : RUKO GOLDEN MADRID BLOK D No. 26, JL. LETNAN
Address SUTOPO, BSD CITY, SERPONG, KOTA TANGERANG

IDENTITAS STANDAR

Standard identity

Nama : DIGITAL STOPWATCH CASIO (SN:J004Q02)
Name

Ketelusuran : Tertelusur ke satuan SI melalui LK-032-IDN (Sertifikat No. S. 20 013 518)
Traceability

Diterbitkan Tanggal : 22 November 2024

Issuance date



Manajer Teknis Kalibrasi
Technical Manager of Calibration



H. Rosadi, M.Sc



Cert No : 04170TF24

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TAMBAHAN INFORMASI

Information Notes

NAMA ALAT : TIMER
Equipment
TEMPAT KALIBRASI : LAB. KAL. KELISTRIKAN DAN DIMENSI PT NAS
Location
TANGGAL KALIBRASI : 12 NOVEMBER 2024
Calibration date
SUHU RUANGAN : 21,0 °C ± 0,2 °C
Room temperature
KELEMBABAN : 57 %RH ± 2 %RH
Humidity

1. Ketertelusuran

a) Alat ini dikalibrasi oleh PT National Andalan Services (PT NAS) yang telah terakreditasi oleh Komite Akreditasi Nasional (KAN) berdasarkan SNI ISO/IEC 17025 : 2017 dengan nomor akreditasi : LK-208-IDN

b) Alat tersebut dikalibrasi dengan Standar DIGITAL STOPWATCH CASIO, tertelusur ke SI melalui LK-170-IDN (Sertifikat No. PTAB-CSS-273-ID-2021)

2. Metode Kalibrasi

a) Alat ini dikalibrasi mengikuti Instruksi Kerja WI-TF02-00/NAS-CAL/2018

b) Kalibrasi Timer ini dilakukan dengan cara perbandingan langsung dengan Standar DIGITAL STOPWATCH CASIO yang terkalibrasi oleh LK-170-IDN (Sertifikat No. PTAB-CSS-273-ID-2021)

3. Hasil Kalibrasi

a) Hasil Kalibrasi diperoleh dari hasil rata-rata pengukuran sebanyak 3 kali dengan yang teruang di lembar ke 3 pada sertifikat kalibrasi ini.

b) Hasil Kalibrasi yang dicantumkan dalam sertifikat kalibrasi ini adalah nilai koreksi dari nilai alat yang dikalibrasi (Timer) terhadap nilai alat standar (DIGITAL STOPWATCH CASIO), variasi maksimum, variasi temporal, variasi spasial serta nilai ketidakpastian pada tingkat kepercayaan 95% dengan faktor cakupan $k = 2$

4. Nilai Ketidakpastian Bertangan

Nilai Ketidakpastian bertangan dalam proses kalibrasi alat ini diperoleh dari sumber-sumber kesalahan tipe A dan tipe B sesuai dengan JCGM 100:2008 "Evaluation of Measurement Data - Guide to the Expression of Uncertainty in Measurement" yang dinyatakan pada tingkat kepercayaan 95% dengan faktor cakupan $k = 2$

1. Traceability

a) The Measuring Instrument was calibrated by PT National Andalan Services (PT NAS) that is accredited by National Accreditation Committee (KAN) based on SNI ISO/IEC 17025:2017 with accreditation No. LK-208-IDN

b) This Measuring Instrument was calibrated by using DIGITAL STOPWATCH CASIO, that is thoroughly traceable to SI unit to Calibration Laboratory LK-170-IDN (Sertifikat No. PTAB-CSS-273-ID-2021)

2. Calibration Method

a) This Measuring Instrument was calibrated by complying with work instruction No. WI-TF02-00 NAS-CAL 2018

b) The Calibration of this Timer carried out by directly comparing to DIGITAL STOPWATCH CASIO Standard that was calibrated by LK-170-IDN (Sertifikat No. PTAB-CSS-273-ID-2021)

3. Calibration Results

a) The calibration result was resulted in the average of measuring results of 5 repetition and written on page 3 within this calibration certificate

b) The calibration results within this certificate those are expressed by correction value between the calibrated (Timer) and the standard (DIGITAL STOPWATCH CASIO), results, maximum, of temperature variation, temporal variation, spatial variation and the uncertainty of measurement within confidence level 95% with coverage factor $k = 2$

4. The Expression of Expanded Uncertainty

The value Expanded Uncertainty of Calibration process was estimated from all error sources of Type A and Type B complying with JCGM 100:2008 "Evaluation of Measurement Data - Guide to the Expression of Uncertainty in Measurement" and expressed within confidence level 95% and coverage factor $k = 2$

Cert. No : 04170TF24

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LAPORAN HASIL KALIBRASI

Report of Calibration

NAMA ALAT : TIMER
Equipment
TEMPAT KALIBRASI : LAB. KAL. KELISTRIKAN DAN DIMENSI PT NAS
Location
TANGGAL KALIBRASI : 12 NOVEMBER 2024
Calibration date
SUHU RUANGAN : 21,0 ± 0,2 °C
Room temperature
KELEMBABAN : 57 ± 2 %RH
Humidity

HASIL KALIBRASI

Rentang Ukur	Satuan Rentang Ukur	Penunjukan Alat		Penunjukan Standar	
		Menit	Detik	Menit	Detik
10	Detik	0	10,21	0	10,237
15	Detik	0	15,25	0	15,232
30	Detik	0	30,22	0	30,199
1	Menit	1	00,28	1	00,288
5	Menit	5	00,31	5	00,313
10	Menit	10	00,28	10	00,312
15	Menit	15	00,44	15	00,412

Alat tersebut dikalibrasi dengan Standar DIGITAL STOPWATCH CASIO (SN_J004Q02), tertelusur ke Satuan SI melalui LK-032-IDN (Sertifikasi No. S. 20 013 518)

Metode kalibrasi : WI-TF01-01/NAS-CAL/2020

Ketidakpastian kalibrasi (U95) = 0,35 detik (k = 2,0)

Petugas Kalibrasi
Calibration Officer



Anisa Larasati