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**MWT-1100
Portable
Surface
Roughness
Tester**

MOORE AND WRIGHT MWT-1100 Portable Surface Roughness Tester Instruction Manual

Contents

MOORE AND WRIGHT MWT-1100 Portable Surface Roughness Tester

Product Information

- The Moore and Wright MWT-1100 portable roughness tester is the latest generation of roughness testers.
- It is highly accurate with a wide measuring range, and simple operation with the benefit of being small, hand-held, and portable.
- It can be used on a range of metal or nonmetallic surfaces.
- A stylus is automatically driven across the measured surface over a pre-configured distance.
- Any roughness in the surface causes the stylus to be displaced vertically, the physical displacement is transferred into an electrical signal.
- This signal is amplified and converted into a digital signal and processed into a value for display and saving to memory.

Product Usage Instructions

- Whenever the roughness tester is not in use, the stylus should be protected using the sliding cover built into the device.
- Press the power/start test button to start the device and enter the measurement state.
- The measurement parameters and sampling length will be set to the same values selected before the previous shutdown.
- Press the power/start test button for 2 seconds to turn it off.
- The device will also automatically shut down if there is no operation within 2 minutes.
- If the device freezes during measurement, press and hold the power/start test button to shut down and then press it again to restart.

- Before use, calibrate the instrument with the provided sample.
- Place the instrument in the positioning window of the sample block.
- After startup and measurement, press and hold the key until the screen displays CAL on the right side of the screen.

FAQ

- **Q:** How often should I calibrate the roughness tester?
- **A:** It is recommended to calibrate the roughness tester before each use to ensure accurate measurements.

Brief Introduction

- The Moore and Wright MWT-1100 portable roughness tester is the latest generation of roughness testers.
- It is highly accurate with a wide measuring range, and simple operation with the benefit of being small, hand-held, and portable.
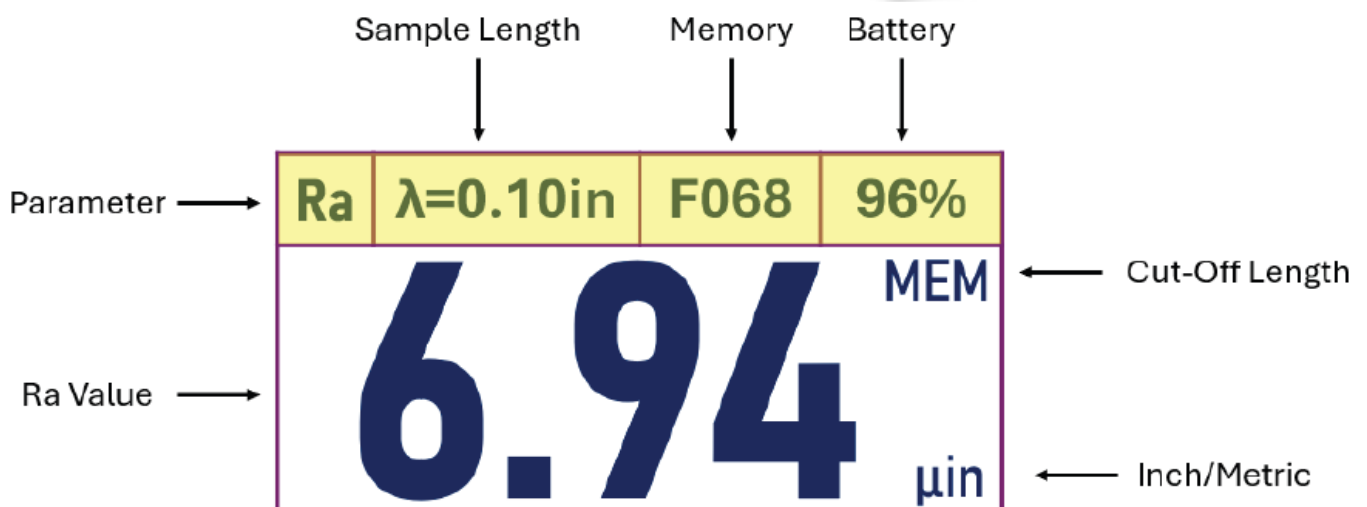- It can be used on a range of metal or nonmetallic surfaces.

Features

- A high-brightness LCD shows measurements and associated parameters.
- The strong aluminum die housing gives durability and resistance to any electromagnetic interference.
- A low-power ARM processor performs data processing and calculations to produce fast measurement results.
- 500 groups of measurement data can be stored and recalled from internal memory.
- Selectable measurement options for roughness, sample distance, and units of measurement.
- Battery status is displayed and an alert is given before it is depleted.

Working Theory

- A stylus is automatically driven across the measured surface over a pre-configured distance.
- Any roughness in the surface causes the stylus to be displaced vertically, the physical displacement is transferred into an electrical signal.
- This signal is amplified and converted into a digital signal and processed into a value for display and saving to memory.

Part Identification

Description			
1.	Power/Start Test Button	**5.**	Reference Standard
2.	Sample Length Selection /Up	**6.**	Stylus
3.	Roughness Method /Down	**7.**	Battery Compartment (1 AA battery)
4.	Stylus Protective Cover		

Sample Length	Memory	Battery

Parameter →	Ra	λ=0.10in	F068	96%

Ra Value → **6.94** MEM

MEM ← Cut-Off Length

μin ← Inch/Metric

Specifications

Description

- Parameter (μm) Ra, Rz, Rq, Rt
- Travel Length (mm) 5.6
- Sample Length (mm) 0.25,0.80,2.50
- Evaluation Length (mm) 1.25, 4.0
- Measuring Range (μm) Ra, Rq – 0.05 ~ 10.0 Rz, Rt – 0.1 ~ 50
- Display Error ±10%
- Stylus Radius and Angle Radius: 10 μm±1 μm Angle: 90˚ +5˚
- Measuring Force of Stylus ≤ 0.016N

- Sensor Guide Pressure ≤ 0.5N
- Battery 1x 1.5V AA battery
- Size 73 mm×62mm×28 mm
- Weight 165g
- Working Condition
- Temperature: 0˚ C – 40˚C
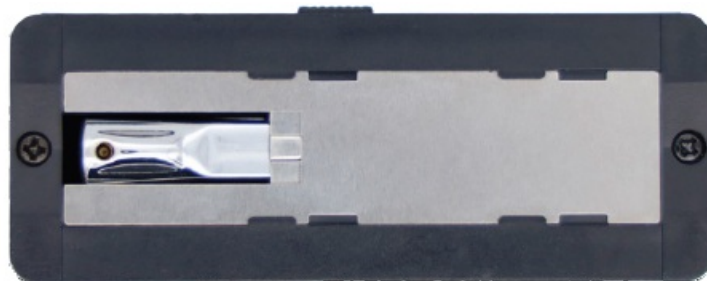- Relative Humidity: < 90%

Avoid vibration and corrosive materials

Operation

Preparation

- Whenever the roughness tester is not in use, the stylus should be protected using the sliding cover built into the device. (see figure below).
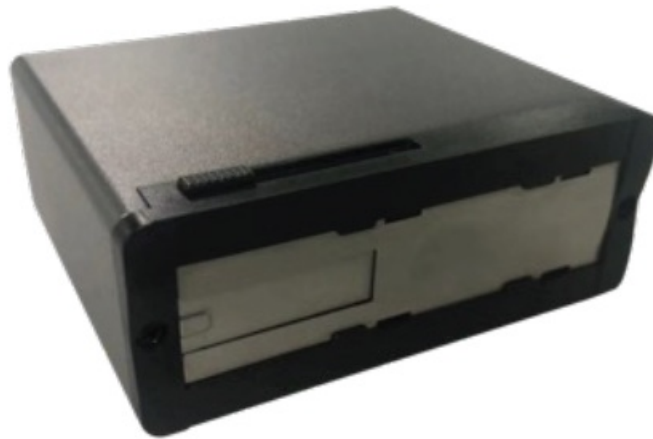
- Move the slider on the side of the housing to uncover the sensor stylus ready for measurement (as shown in the figure below)


Switch ON/OFF

- **Startup:** Press ▶ to start the device, and enter the measurement state. The measurement parameters and sampling length will be set to the same values selected before the previous shutdown.
- **Shutdown:** When the device is on, press ▶ for 2 seconds to turn it off, or the device will automatically shut

down if there is no operation within 2 minutes.

Measurement

After selecting the measurement parameters and sampling length, align the sensor of the instrument with the measurement area. The tester should always be placed gently onto surfaces to protect the sensor from damage.

Once the device is stable, press the ▶ key and the sensor will move to start the measurement. The LCD will display Measuring and the buttons will be locked from further action until this is completed. When Measuring disappears, the measured result will appear on the screen. This value will then blink twice to signal the measurement is complete and the buttons on the device will become active again.
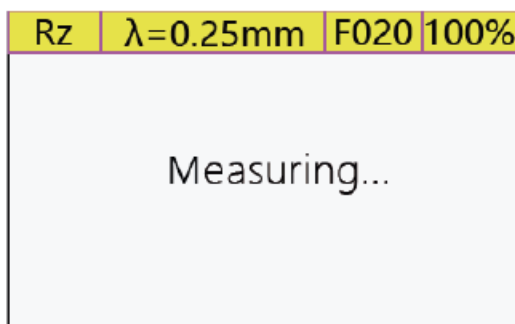

- If the device freezes during measurement, press and hold the play key to shut down and then press it again to restart.

Calibration

- Before use, the instrument should be calibrated with the sample provided. In this example, the value of the sample is 1.0.
- Place the instrument in the positioning window of the sample block. After startup and measurement, press and hold ▽ (R) key until the screen displays CAL on the right side of the screen, and the first digit of the measured value will be selected as shown below.
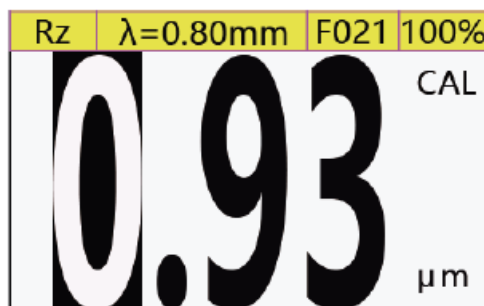
- When entering the calibration mode, press the ▶ button to adjust the display value to the digit that needs to be modified, and press the ▽ (R) or △ (λ) button to adjust the value to the correct roughness for the measured sample. The nominal value of this sample is 1.00, as shown in the following figure.
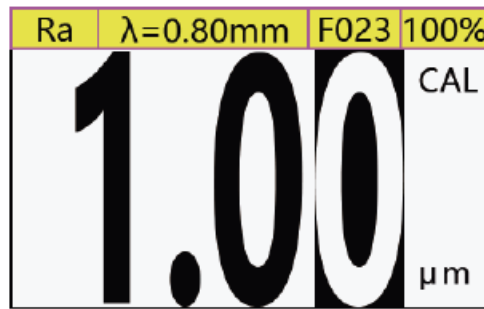
- After calibrating the measured values, press the ⟨R⟩ key for 3 seconds to save the calibration and exit the CAL indicator on the screen will disappear.

Selection of Roughness Parameters

- To select the required roughness parameters before measurement, press the ⟨R⟩ key to cycle between Ra, Rz, Rq, and Rt, see Section 7 of the manual for parameter definitions.

Selection of Sampling Length

- To select the required sampling length before measurement, press ⟨λ⟩ to cycle between 0.25mm, 0.8mm and 2.5mm.

Selection of Measurement Units

- The required measurement unit shown on the screen can be changed before or after measurement, press and hold ⟨λ⟩ to switch between μm (Metric) and μin (Imperial).

Storage Data Viewing

- This device can store 500 groups of measurement data. To view the stored measurement data, press ⟨λ⟩ and ⟨R⟩ at the same time until MEM is displayed on the right side of the screen.
- Then press ⟨λ⟩ and ⟨R⟩ to view the stored measurement values. (As shown in the following figure).

- Press and hold ⟨▶⟩ when viewing the stored data to delete all data.
- After viewing, press ⟨λ⟩ and ⟨R⟩ to exit the stored data, and the MEM on the right side of the screen will

disappear.

Replacement of Battery
When the display appears dim, or the device cannot be started, please replace the battery.
Unscrew the screws of the battery cover, remove the old battery, and replace it with a new AA battery in the correct orientation. Put the cover back over the battery and secure with the screws. If the instrument is not used for a long time, remove the battery.

PC Control and Data Transfer Software

- The roughness tester can be connected to a PC for data transfer and remote control. This is done using the supplied dongle and free software available to download from the Bowers Group website.

Connection

1. After the software is installed, insert the dongle into the PC's USB port. The dongle's LED will flash red.
2. Power on the roughness tester and a green LED will light to indicate the two are paired.
3. Open the application software and check if there is a COM port selected in the upper left corner of the software.
   This should automatically set to the port containing the dongle. If it does not, check that the tester is on and the LED is still green, then close and reopen the software.
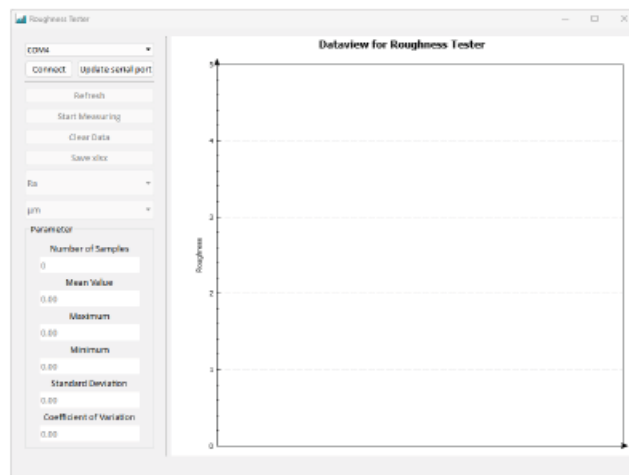
4. Once a port is shown, press Connect to start the connection with the tester. The display will show any previous measurements stored on the device and the buttons on the left menu will become active.
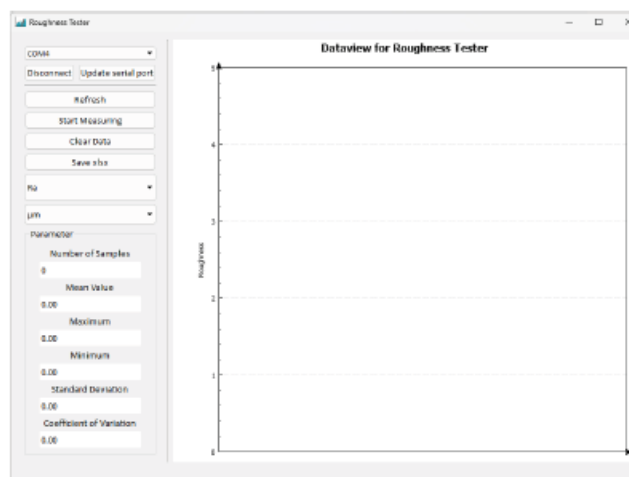
5. If any previous data is not needed, press Clear Data to delete all data from the roughness tester, this cannot be

restored. The software may need to be closed and re-opened if it does not automatically clear from the screen.

6. Take a roughness measurement on the device, then press refresh to load this data. The bar graph and the statistical parameters on the left of the window will be updated.
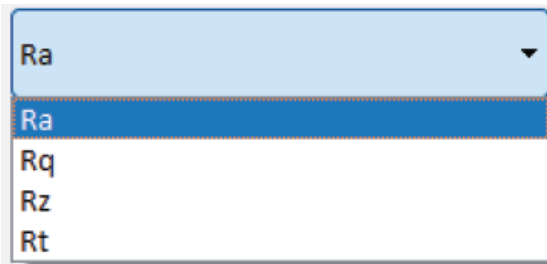
7. Continue taking measurements as required, press refresh at any time to see the full data set.
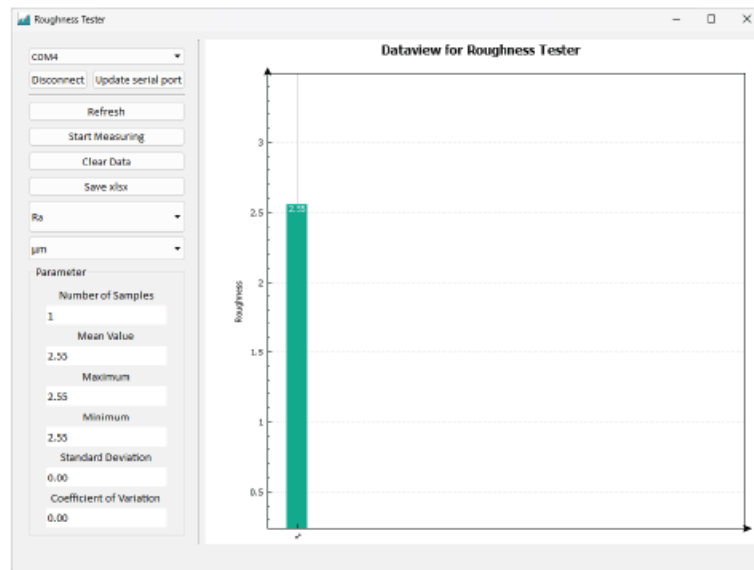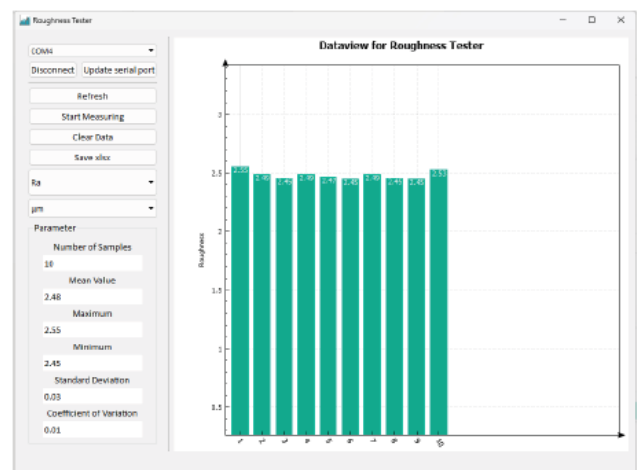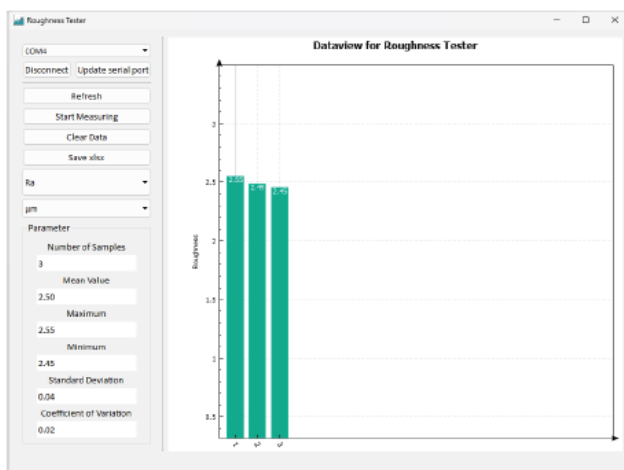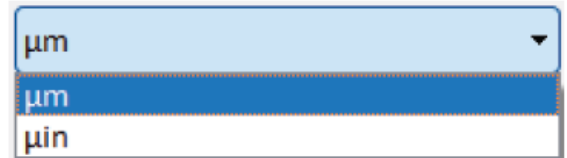

Control

- Press Refresh to sync to the roughness tester and collect any new data, this will update the bar graph and data parameters.
- Click on Start Measuring to initiate a new roughness measurement on the tester. This will have the same effect as pressing the Play button on the device and should start immediately.
- Clear data will delete all data from the roughness tester, this cannot be restored. The software may need to be closed and re-opened if it does not automatically clear from the screen.

- Save xlsx will create an Excel report which can be saved to any preferred location. This report shows statistical analyses of the saved data.

Roughness Tester Gauge Data Report

S.Dev: Standard Deviation				Date: 2024-10-07
C.V. : Coefficient of Variation				Unit: μm
	Ra	Rq	Rz	Rt
COUNT	10	10	10	10
AVG.	2.48	2.80	10.11	11.40
Max.	2.55	2.87	10.84	13.82
Min.	2.45	2.76	9.76	9.98
S.Dev	0.03	0.04	0.37	1.22
C.V.	0.01	0.01	0.04	0.11

NO.	Ra.	Rq.	Rz.	Rt.
1	2.55	2.87	10.33	11.90
2	2.49	2.80	9.85	10.75
3	2.45	2.76	9.76	10.49
4	2.49	2.83	10.72	13.44
5	2.47	2.77	9.95	10.62
6	2.45	2.76	9.98	10.88
7	2.49	2.83	10.84	13.82
8	2.45	2.78	9.89	10.75
9	2.45	2.76	10.01	11.39
10	2.53	2.84	9.76	9.98
			inspector_____	

- The dropdown menus control the roughness parameters and unit for the bar graph, these settings will not affect
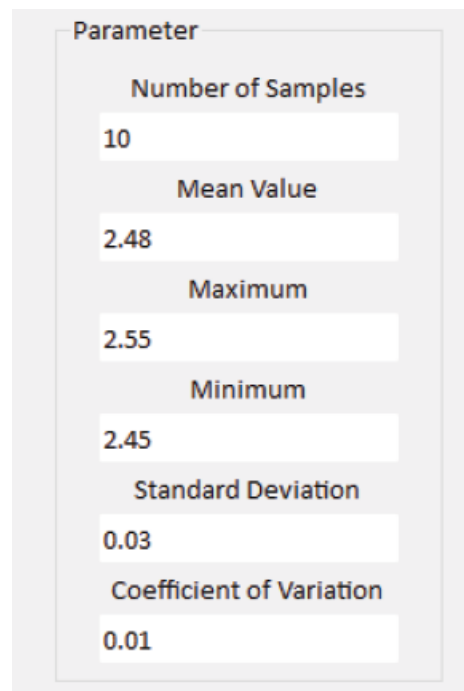
the display on the device.

Ra ▼
Ra
Rq
Rz
Rt

μm ▼
μm
μin

- Statistical information for the measured results can be found in the Parameter section, these will update as the data is received from the tester.

Parameter

Number of Samples

10

Mean Value

2.48

Maximum

2.55

Minimum

2.45

Standard Deviation

0.03

Coefficient of Variation

0.01

## Daily Maintenance

Maintenance

- Avoid subjecting the tester to shock, vibration, heavy dust, magnetic fields or oily environments.
- After each measurement, the power supply should be switched off to conserve the charge of the battery.
- After each use slide the protective cover over the sensor to protect it from damage.

Data Definition

- Calibration and test samples should be protected from abrasion.
- The instrument conforms to GB/T 3505 "Terminology, Definition and Parameters of Surface Structure Profile Method of Product Geometry Technical Specification".
- Surface roughness: refers to the micro-geometric characteristics of the machined surface with small spacing and valleys.
- Sampling length: The length of a reference line used to distinguish the surface roughness characteristics.
- Evaluation length: The length of a section necessary for assessing contours, which may include one or more

sampling lengths.

- Ra – Arithmetic mean deviation of contour: Arithmetic mean of contour offset in sampling length.
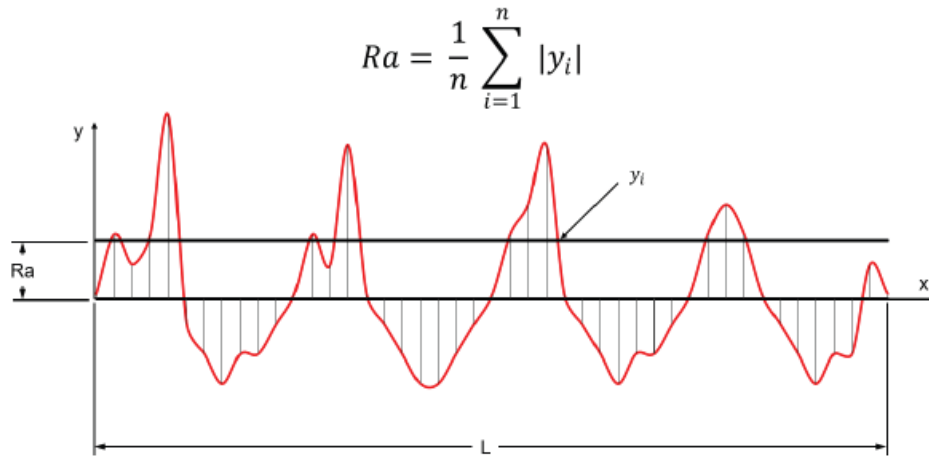
$$Ra = \frac{1}{n}\sum_{i=1}^{n}|y_i|$$

- Rq – RMS deviation of contour: RMS value of ordinate values within a sampling length

$$Rq = \left(\frac{1}{n}\sum_{i=1}^{n}y_i^2\right)^{\frac{1}{2}}$$

- Rz – Contour maximum height (ISO): The height of the sum of maximum contour peak height Rp and maximum contour Valley depth Rv within a sampling length.

$$Rz = \frac{\sum_{i=1}^{5}y_{pi} - \sum_{i=1}^{5}y_{vi}}{5}$$
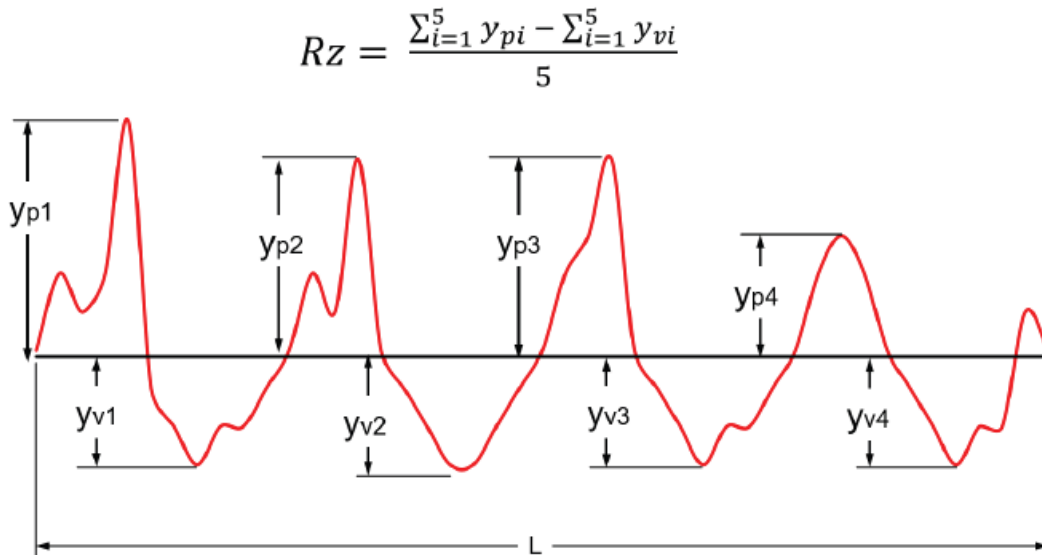
- Rt – Total height of contour peak and valley: The sum of maximum contour peak height and maximum contour Valley depth in the evaluation length.
- Rp – Maximum contour peak height: The distance from the top line of the contour peak to the middle line within the sampling length.
- Rv – Contour maximum Valley depth: The distance from the bottom to the middle of the contour valley within the sampling length.

Sample Length Chart

Ra (µm)	Rz (µm)	Sample Length (mm)
>40-80	>160-320	
>20-40	>80-160	8
>10-20	>40-80	
>5-10	>20-40	2.5
>2.5-5	>10-20	
>1.25-2.5	>6.3-10	
>0.63-1.25	>3.2-6.3	0.8
>0.32-0.63	>1.6-3.2	
>0.25-0.32	>1.25-1.6	
>0.2-0.25	>1.0-1.25	
>0.16-0.20	>0.8-1.0	0.25
>0.125-0.16	>0.63-0.8	
>0.1-0.125	>0.5-0.63	
>0.08-0.1	>0.4-0.5	
>0.0063-0.08	>0.32-0.4	
>0.05-0.063	>0.25-0.32	
>0.04-0.05	>0.2-0.25	0.25
>0.032-0.04	>0.16-0.2	
>0.025-0.032	>0.125-0.16	
>0.02-0.025	>0.1-0.125	
>0.016-0.02	>0.08-0.1	
>0.0125-0.016	>0.063-0.08	
>0.01-0.0125	>0.05-0.063	0.08
>0.008-0.01	>0.04-0.05	
>0.0063-0.008	>0.032-0.04	
≤0.063	≤0.032	

CONTACT

- Bowers Group
- **sales@bowersgroup.co.uk**
- **www.bowersgroup.co.uk**

Documents / Resources

MOORE AND WRIGHT MWT-1100 Portable Surface Roughness Tester [pdf] Instruction Manual
MWT-1100, MWT-1100 Portable Surface Roughness Tester, MWT-1100, Portable Surface Roughness Tester, Surface Roughness Tester, Roughness Tester, Tester

References

- **Homepage - Bowers Group**
- **User Manual**