New Products

**Surftest (Desktop Surface Roughness Tester)**
SV-3200
Refer to page L-6 for details.

**Formtracer Extreme**
(CNC Surface Texture Measuring Instruments)
SV-C4500CNC HYBRID TYPE1
Refer to page L-15 for details.

**Roundtest Extreme**
(CNC Roundness/Cylindricity Measuring System)
RA-6000CNC
Refer to page L-22 for details.
Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.

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Surftest
Performs brilliantly in many situations such as in the quality control room, on the factory floor and on the production line.

Surftest SJ-210
SERIES 178 — On-site Surface Roughness Tester

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Standard drive unit</th>
<th>Retractable drive unit</th>
<th>Transverse tracing drive unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No.</td>
<td>SJ-210 (0.75 mN type)</td>
<td>SJ-210 (4 mN type)</td>
<td>SJ-210 (0.75 mN type)</td>
</tr>
<tr>
<td>inch/mm</td>
<td>178-560-01 178-560-02</td>
<td>178-562-01 178-562-02</td>
<td>178-564-01 178-564-02</td>
</tr>
<tr>
<td></td>
<td>SJ-210 (4 mN type)</td>
<td>SJ-210 (4 mN type)</td>
<td>SJ-210 (4 mN type)</td>
</tr>
<tr>
<td>inch/mm</td>
<td>178-561-01 178-561-02</td>
<td>178-563-01 178-563-02</td>
<td>178-565-01 178-565-02</td>
</tr>
</tbody>
</table>

Measuring ranges
- X-axis: 16.0 mm
- Detector Range: 360 µm (-200 µm to +160 µm)
- Range/Resolution: 360 µm / 0.02 µm, 100 µm / 0.006 µm, 25 µm / 0.002 µm

Measuring force / Stylus tip shape
- Depends on the Order No.: 0.75 mN/80°, 2 µmR (when the Order No. ends with "-01")
- 4 mN/90°, 5 µmR (when the Order No. ends with "-02")

Applicable standards

Assessed profile
- Primary profile, Roughness profile, DF profile, Roughness motif profile

Refer to the Surftest SJ-210 series Catalog (No. E4388) for more details.

Surftest SJ-310
SERIES 178 — On-site Surface Roughness Tester

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Standard drive unit</th>
<th>Retractable drive unit</th>
<th>Transverse tracing drive unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No.</td>
<td>SJ-310 (0.75 mN type)</td>
<td>SJ-310 (4 mN type)</td>
<td>SJ-310 (0.75 mN type)</td>
</tr>
<tr>
<td>inch/mm</td>
<td>178-570-01 178-570-02</td>
<td>178-572-01 178-572-02</td>
<td>178-574-01 178-574-02</td>
</tr>
<tr>
<td></td>
<td>SJ-310 (4 mN type)</td>
<td>SJ-310 (4 mN type)</td>
<td>SJ-310 (4 mN type)</td>
</tr>
<tr>
<td>inch/mm</td>
<td>178-571-01 178-571-02</td>
<td>178-573-01 178-573-02</td>
<td>178-575-01 178-575-02</td>
</tr>
</tbody>
</table>

Measuring ranges
- X-axis: 16.0 mm
- Detector Range: 360 µm (-200 µm to +160 µm)
- Range/Resolution: 360 µm / 0.02 µm, 100 µm / 0.006 µm, 25 µm / 0.002 µm

Measuring force / Stylus tip shape
- Depends on the Order No.: 0.75 mN/80°, 2 µmR (when the Order No. ends with "-01")
- 4 mN/90°, 5 µmR (when the Order No. ends with "-02")

Applicable standards

Assessed profile
- Primary profile, Roughness profile, DF profile, Roughness motif profile, Waviness motif profile

Refer to the Surftest SJ-310 series Catalog (No. E15013) for more details.
Optional Accessories for Surftest SJ-210/310

**Detector**

- **Small hole detectors**
  - Order No. | Measuring force | Stylus profiles* | Remarks
  - 178-383 | 0.75 mN | 2 µmR/60° | Minimum measurable hole diameter: ø4.5 mm
  - 178-392 | 4 mN | 5 µmR/90° | Dedicated to the transverse tracing drive unit
  - 178-384 | 0.75 mN | 2 µmR/60° | Minimum measurable hole diameter: ø2.8 mm
  - 178-393 | 4 mN | 5 µmR/90° | Dedicated to the transverse tracing drive unit

- **V-type adapter**
  - Order No. 12AAE644
  - Not applicable to upward measurement.
  - Dedicated to the transverse tracing drive unit.

- **Extension rod (50 mm)**
  - Order No. 12AAAA210
  - Not available for the transverse tracing drive unit.

- **Adapter for flat surface**
  - Order No. 12AAAA219
  - Not available for the transverse tracing drive unit.

- **Magnetic stand adapter**
  - Order No. 12AAAA221
  - Mounting spigot diameter is 8 mm.
  - Order No. 12AAAA220
  - Mounting spigot diameter is 9.5 mm.

- **Point-contact adapter**
  - Order No. 12AAE643
  - Dedicated to the transverse tracing drive unit.

- **Extension cable (1 m)**
  - Order No. 12BAAA303
  - For the connection between the calculation display unit and drive unit.

**Optional Accessories for Drive Units**

- **Nosepiece for flat surfaces**
  - Nosepiece for flat surfaces, No. 12AAAA217

- **Nosepiece for cylindrical surfaces**
  - Nosepiece for cylindrical surfaces, No. 12AAAA218

- **Deep groove detectors**
  - Order No. | Measuring force | Stylus profiles* | Remarks
  - 178-388 | 0.75 mN | 2 µmR/60° | Dedicated to the transverse tracing drive unit
  - 178-398 | 4 mN | 5 µmR/90° | Dedicated to the transverse tracing drive unit

- **Height gage adapter**
  - Suitable for a height gage holder designed for 9 mm x 9 mm section scribers.
  - Order No. 12AAAA222

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Surftest
Performs brilliantly in many situations such as in the quality control room, on the factory floor and on the production line.

Surftest SJ-410
SERIES 178 — Compact Surface Roughness Tester

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SJ-411</th>
<th>SJ-412</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No.</td>
<td>mm</td>
<td>inch</td>
</tr>
<tr>
<td>178-580-01</td>
<td>178-580-01</td>
<td></td>
</tr>
<tr>
<td>178-580-02</td>
<td>178-580-02</td>
<td></td>
</tr>
<tr>
<td>178-581-01</td>
<td>178-581-01</td>
<td></td>
</tr>
<tr>
<td>178-581-02</td>
<td>178-581-02</td>
<td></td>
</tr>
<tr>
<td>178-582-01</td>
<td>178-582-01</td>
<td></td>
</tr>
<tr>
<td>178-582-02</td>
<td>178-582-02</td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>25 mm</td>
<td>50 mm</td>
</tr>
<tr>
<td>Detector</td>
<td>Resolution</td>
<td>60µm / 2µm</td>
</tr>
<tr>
<td></td>
<td>Stylus tip shape (Angle/Radius)</td>
<td>60°/2µm</td>
</tr>
<tr>
<td></td>
<td>Measuring force</td>
<td>0.75 mN</td>
</tr>
<tr>
<td></td>
<td>Radius of skid curvature</td>
<td>40 mm</td>
</tr>
<tr>
<td></td>
<td>Measuring methods</td>
<td>Skidded / Skidded (switchable)</td>
</tr>
</tbody>
</table>


Surftest SJ-500/SV-2100
SERIES 178 — Dedicated Control Unit Type Surface Roughness Tester

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SJ-500</th>
<th>SV-2100M4</th>
<th>SV-2100S4</th>
<th>SV-2100H4</th>
<th>SV-2100W4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand type</td>
<td>(Optional)</td>
<td>Manual stand</td>
<td>Motorized stand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>Z1-axis (detector)</td>
<td>800 µm, 80 µm, 8 µm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X-axis</td>
<td>50 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Resolution</td>
<td>0.05 µm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z1-axis (detector)</td>
<td>0.01 µm (800 µm), 0.001 µm (80 µm), 0.0001 µm (8 µm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Z2-axis (column)</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessed profile</td>
<td>Primary profile, Roughness profile, Waviness profile, DF profile, Roughness motif profile, Waviness motif profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: While the appearance of the natural stone measuring table varies according to the source, the high stability for which this material is known can always be relied upon.

Note: Stand for SJ-500 is optional.

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Highly precise, high-performance surface roughness testers that use the advantages of sophisticated analysis software. The SJ-500P is a stand-alone instrument whereas the SV-2100M4 is a benchtop machine incorporating a precision column with manual drive.

- Simple setup for surface roughness measuring conditions.
- A simple input function is used to calculate according to ISO/JIS roughness standard drawing instruction symbols. Complicated measuring settings can easily be entered by selecting a drawing instruction symbol from the surface roughness menu.

An inspection certificate is supplied as standard. Refer to page X for details.

**Surftest SJ-500P/SV-2100M4**

**Data Processing Unit (PC) Surface Roughness Testers**

**FORMTRACEPAK: Best-selling Surface Roughness Analysis Program**

Best-selling dedicated software for surface roughness measurement and analysis. Features a flexible printer format and creation of an original inspection certificate.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Type of data processing unit</th>
<th>SJ-500P</th>
<th>SV-2100M4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevating shaft mechanism of stand</td>
<td>—*1</td>
<td>Manual operation only</td>
</tr>
<tr>
<td>Measuring range X-axis</td>
<td>50 mm</td>
<td>100 mm</td>
</tr>
<tr>
<td>Z1-axis (detector) travel range</td>
<td>0.05 µm</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>800 µm/80 µm/8 µm</td>
<td></td>
</tr>
<tr>
<td>Drive speed X-axis</td>
<td>0 to 20 mm/s or manual operation</td>
<td></td>
</tr>
<tr>
<td>Z2-axis (column) travel range</td>
<td>350 mm</td>
<td></td>
</tr>
<tr>
<td>Z2-axis (column)</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Drive speed Z2-axis (column)</td>
<td>Manual operation only</td>
<td></td>
</tr>
<tr>
<td>Assessed profile</td>
<td>Primary profile, Roughness profile, Waviness profile, Filtered waviness profile, Rolling circle waviness profile, Rolling circle center line waviness profile, Envelope residual profile, DIN4776 profile, Roughness motif profile, Waviness motif profile</td>
<td></td>
</tr>
</tbody>
</table>

*1: The simplified stand or manual column stand is available as an optional accessory.

**Surftest SV-3200 SERIES 178 — Desktop Surface Roughness Tester**

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SV-3200S4</th>
<th>SV-3200H4</th>
<th>SV-3200W4</th>
<th>SV-3200L4</th>
<th>SV-3200S8</th>
<th>SV-3200H8</th>
<th>SV-3200W8</th>
<th>SV-3200L8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1-axis</td>
<td>800 µm/0.01 µm, 80 µm/0.001 µm, 8 µm/0.0001 µm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel range of the X-axis</td>
<td>100 mm</td>
<td>200 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-axis straightness</td>
<td>(0.05+0.001L)µm (L: Measuring length (mm))</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring speed</td>
<td>0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20 mm/s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z2-axis (column)</td>
<td>300 mm (motorized)*1, 500 mm (motorized)*1, 700 mm (motorized)*1, 300 mm (motorized)*1, 500 mm (motorized)*1, 700 mm (motorized)*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive unit</td>
<td>500 mm (motorized)*1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessed profile</td>
<td>Primary profile, Roughness profile, Waviness profile, Filtered waviness profile, Rolling circle waviness profile, Rolling circle center line waviness profile, Envelope residual profile, DIN4776 profile, Roughness motif profile, Waviness motif profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: Manual operation is also available.

Note: While the appearance of the natural stone measuring table varies according to the source, the high stability for which this material is known can always be relied upon.

An inspection certificate is supplied as standard. Refer to page X for details.
Surftest
Performs brilliantly in many situations such as in the quality control room, on the factory floor and on the production line.

Surftest Extreme SV-3000CNC/SV-M3000CNC SERIES 178 — CNC Surface Roughness Testers

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>SV-3000CNC</th>
<th>SV-M3000CNC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>X1 axis (drive unit)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>200 mm</td>
<td>200 mm</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.05 μm</td>
<td>0.05 μm</td>
</tr>
<tr>
<td>Scale type</td>
<td>Reflective-type linear encoder</td>
<td>Reflective-type linear encoder</td>
</tr>
<tr>
<td>Drive speed</td>
<td>CNC mode: Max. 200 mm/s</td>
<td>CNC mode: Max. 200 mm/s</td>
</tr>
<tr>
<td>Measuring speed</td>
<td>0 to 50 mm/s</td>
<td>0 to 50 mm/s</td>
</tr>
<tr>
<td>Straightness</td>
<td>0.5 μm/200 mm</td>
<td>0.5 μm/200 mm</td>
</tr>
<tr>
<td>Measuring direction</td>
<td>Backward</td>
<td>Backward</td>
</tr>
<tr>
<td><strong>Y-axis (table)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>200 mm</td>
<td>200 mm</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.05 μm</td>
<td>0.05 μm</td>
</tr>
<tr>
<td>Drive speed</td>
<td>CNC mode: Max. 200 mm/s</td>
<td>CNC mode: Max. 200 mm/s</td>
</tr>
<tr>
<td>Maximum table loading</td>
<td>20 kg</td>
<td>20 kg</td>
</tr>
<tr>
<td><strong>Z2-axis (column)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel range</td>
<td>ZZ-axis (column, type S): 300 mm</td>
<td>ZZ-axis (column, type H): 500 mm</td>
</tr>
<tr>
<td>Scale type</td>
<td>Reflective-type linear encoder</td>
<td>Reflective-type linear encoder</td>
</tr>
<tr>
<td>Drive speed</td>
<td>CNC mode: Max. 200 mm/s</td>
<td>CNC mode: Max. 200 mm/s</td>
</tr>
<tr>
<td></td>
<td>Joystick mode: 0 to 50 mm/s</td>
<td>Joystick mode: 0 to 50 mm/s</td>
</tr>
<tr>
<td><strong>Base unit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base size (width x depth)</td>
<td>750 x 600 mm</td>
<td>600 x 1500 mm</td>
</tr>
<tr>
<td>Base material</td>
<td>Gabbro</td>
<td>Steel</td>
</tr>
</tbody>
</table>

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FORMTRACEPAK functions offer total support for controlling the measurement system, surface roughness analysis, contour analysis, contour tolerancing, and inspection report creation.

Surface Roughness/Contour Analysis Program

**FORMTRACEPAK**

**Contour measurement**

- Contour analysis
  
  A wide variety of commands, which form the basic elements for analysis, are provided, including those for points (10 types), lines (6 types) and circles (6 types). A rich set of commands that combine these elements to calculate angles, pitches and distances as well as performing contour tolerancing and design value generation are also provided as standard features. These functions, combined with the function that enables you to customize the calculation command buttons by hiding less frequently used commands, help you to tailor the window according to the user’s environment.

- Contour-tolerancing as a standard feature
- Design value generation
- Data combination
- Simple pitch calculation

**Surface roughness measurement**

- Surface roughness analysis
  
  FORMTRACEPAK can perform surface roughness analyses that conform to various standards such as ISO, JIS, ANSI and VDA. For comparing measurement values with the tolerance limits, you can use the 16% rule or the maximum value rule. Furthermore, since FORMTRACEPAK comes with parameter calculation functions as well as a rich set of graphic analysis functions, it can be widely utilized for everything from routine quality control to R&D applications. It also includes many other functions such as the function for eliminating (compensating) shapes, such as slopes and radiused surfaces (R-surfaces), and data deletion.

- Micro contour analysis
- Simple input using drawing symbols
- Multiple-point measurement
- Analysis using multiple-point measurements
- Reference length dialog box
- Analysis condition modification with preview
- R-surface automatic measurement
Quick Guide to Precision Measuring Instruments

**Surftest (Surface Roughness Testers)**

- **ISO 1302:2002 Geometrical Product Specifications (GPS) – Indication of surface texture in technical product documentation**
- **ISO 4287:1997 Geometrical Product Specifications (GPS) - Surface Texture: Profile method - Terms, definitions, and surface texture parameters**
- **ISO 4288:1996 Geometrical Product Specifications (GPS) - Surface Texture: Profile method - Rules and procedures for the assessment of surface texture**
- **ISO 3274:1996 Geometrical Product Specifications (GPS) - Surface Texture: Profile method - Nominal characteristics of contact (stylus) instruments**

**Elements of Contact Type Surface Roughness Measuring Instruments**

- **Surface Shape**

  A typical shape for a stylus is conical with a spherical tip.

  - Tip radius: \( \text{rtip} = 2 \mu m, 5 \mu m \) or \( 10 \mu m \)
  - Cone angle: \( 60^\circ, 90^\circ \)

  In typical surface roughness testers, the conical angle of the stylus end is \( 60^\circ \) unless otherwise specified.

- **Static Measuring Force**

<table>
<thead>
<tr>
<th>Nominal radius of stylus tip (( \mu m ))</th>
<th>Static measuring force at stylus tip (( \mu )N)</th>
<th>Tolerance on static measuring force variation (( \mu )N)</th>
<th>Nominal stylus (( \mu m ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.75</td>
<td>0.05</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>0.75 (0.05)</td>
<td>0.2</td>
<td>10</td>
</tr>
</tbody>
</table>

  *Note 1: The maximum value of static measuring force at the average position of a stylus is to be 0.05 N for a general class of probe including a tip stylus.*

- **Metrological Characterization of Phase Correct Filters**

  A probe filter is a phase-correct filter without phase delay (cause of profile distortion dependent on wavelength).

  The weight function of a phase-correct filter shows a normal (Gaussian) distribution of which the amplitude transmission is 50% at the cutoff wavelength.

- **Data Processing Flow**

  - **Surface profile on the real surface**
  - **Trend profile**
  - **Taper profile**
  - **Profile parameter**
    - **High-pass filter of cutoff value \( \lambda_c \)**
    - **Band-pass filter that passes wavelengths between cutoff values \( \lambda_s \) and \( \lambda_c \)**
  - **Roughness profile**
  - **Waviness profile**

- **Definition of Parameters**

  **Amplitude Parameters (peak and valley)**

  - Maximum peak height of the primary profile \( P_h \)
  - Maximum peak height of the roughness profile \( R_p \)
  - Maximum peak height of the waviness profile \( W_p \)

  - Largest profile valley depth \( Z_v \) within a sampling length

  **Surface Profiles**

  - **Primary profile**
    - Profile obtained from the measured profile by applying a low-pass filter with cutoff value \( \lambda_c \)
  - **Roughness profile**
    - Profile obtained by applying a high-pass filter to the primary profile to remove the longer wavelengths above \( \lambda_c \) and the shorter wavelengths below \( \lambda_s \).
  - **Waviness profile**
    - Profile obtained by applying a band-pass filter to the primary profile to remove the longer wavelengths above \( \lambda_c \) and the shorter wavelengths below \( \lambda_s \).

  *Notes:* For a surface with \( \lambda > 3 \mu m \), a significant error will not usually occur in a measurement even if \( \text{rtip} = 5 \mu m \).

  Mitutoyo reserves the right to change any or all aspects of any product specification, including prices, designs and service content, without notice.
Amplitude Parameters (average of ordinates) 
Arithmetical mean deviation of the profile Rz
Arithmetical mean deviation of the waviness profile Rω
Arithmetical mean deviation of the roughness profile Rq
Root mean square deviation of the primary profile Rpk
Root mean square deviation of the waviness profile Rw
Root mean square deviation of the roughness profile Rw

Curves, Probability Density Function, and Related Parameters 
Material ratio curve of the profile (Abbott-Firestone curve)
Curve representing the material ratio of the profile as a function of section level c

Mean Line

The above equation defines Rpk. Rpk and RAw are defined in a similar manner. Rpk, RAw, and RAw are measures of the asymmetry of the probability density function of the ordinate values.

Kurtosis of the primary profile Rkd
Kurtosis of the roughness profile Rkd
Kurtosis of the waviness profile Rkd
Quotient of the mean quartic value of the ordinate values Z(x) and the fourth power of Rpk, RAw, and RAw, respectively, within a sampling length

The above equation defines Rkd. Rkd and Rkd are defined in a similar manner. Rkd, Rkd, and Rkd are measures of the sharpness of the probability density function of the ordinate values.

Spacing Parameters
Mean width of the primary profile elements l
Mean width of the roughness profile elements l
Mean width of the waviness profile elements l
Mean value of the profile element widths l within a sampling length

Hybrid Parameters
Root mean square slope of the primary profile Rsk
Root mean square slope of the waviness profile Rsk
Root mean square slope of the roughness profile Rsk

Roughness sampling length for non-periodic profiles

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Material ratio curve</th>
<th>Probability density function, and related parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rz</td>
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<td>Rω</td>
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<td>Rsk</td>
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</tbody>
</table>

Procedure for determining a sampling length if it is not specified

1. Estimate Rz, Rω, Rq, or Rk according to recorded waviness, visual inspection, etc.
2. Estimate the sampling length from an estimated value and Table 1 to 3.
3. Measure Rz, Rω, Rq, or Rk according to the estimated value of the sampling length.
4. Does each measured value meet the condition Table 2 or 3?
5. Change to a longer or shorter sampling length.
6. Measure the parameter according to the final sampling length.
7. Does the measured value meet the condition Table 2 or 3?
8. Measure Rz from a measured roughness profile.
9. Does the measured value meet the condition Table 3?
10. Change the sampling length to meet the condition of Table 3.
11. Measure Rz according to the estimated value of the sampling length.