

# SURFACE ROUGHNESS

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(From JIS B 0601-1994)

Type	Code	Determination	Determination Example (Figure)
Arithmetical Mean Roughness	Ra	<p>Ra means the value obtained by the following formula and expressed in micrometer (<math>\mu\text{m}</math>) when sampling only the reference length from the roughness curve in the direction of the mean line, taking X-axis in the direction of mean line and Y-axis in the direction of longitudinal magnification of this sampled part and the roughness curve is expressed by <math>y=f(x)</math>:</p> $Ra = \frac{1}{\ell} \int_0^{\ell}  f(x)  dx$	
Maximum Height	Rz	<p>Rz shall be that only when the reference length is sampled from the roughness curve in the direction of the mean line, the distance between the top profile peak line and the bottom profile valley line on this sampled portion is measured in the longitudinal magnification direction of roughness curve and the obtained value is expressed in micrometer (<math>\mu\text{m}</math>).</p> <p>(Note) When finding Rz, a portion without an exceptionally high peak or low valley, which may be regarded as a flaw, is selected as the sampling length.</p> $Rz = R_p + R_v$	
Ten-Point Mean Roughness	RzJIS	<p>RzJIS shall be that only when the reference length is sampled from the roughness curve in the direction of its mean line, the sum of the average value of absolute values of the heights of five highest profile peaks (Yp) and the depths of five deepest profile valleys (Yv) measured in the vertical magnification direction from the mean line of this sampled portion and this sum is expressed in micrometer (<math>\mu\text{m}</math>).</p> $Rz_{JIS} = \frac{(Y_{p1} + Y_{p2} + Y_{p3} + Y_{p4} + Y_{p5}) + (Y_{v1} + Y_{v2} + Y_{v3} + Y_{v4} + Y_{v5})}{5}$	<p><math>Y_{p1}, Y_{p2}, Y_{p3}, Y_{p4}, Y_{p5}</math> : altitudes of the five highest profile peaks of the sampled portion corresponding to the reference length l.</p> <p><math>Y_{v1}, Y_{v2}, Y_{v3}, Y_{v4}, Y_{v5}</math> : altitudes of the five deepest profile valleys of the sampled portion corresponding to the reference length l.</p>

## RELATIONSHIP BETWEEN ARITHMETICAL MEAN (Ra) AND CONVENTIONAL DESIGNATION (REFERENCE DATA)

Arithmetical Mean Roughness Ra		Max. Height Rz	Ten-Point Mean Roughness RzJIS	Sampling Length for Rz • RzJIS l (mm)	Conventional Finish Mark	
Standard Series	Cutoff Value $\lambda_c$ (mm)	Standard Series				
0.012 a	0.08	0.05s	0.05z	0.08	▽▽▽▽	
0.025 a		0.1 s	0.1 z			
0.05 a	0.25	0.2 s	0.2 z	0.25		
0.1 a		0.4 s	0.4 z			
0.2 a		0.8 s	0.8 z			
0.4 a	0.8	1.6 s	1.6 z	0.8	▽▽▽	
0.8 a		3.2 s	3.2 z			
1.6 a		6.3 s	6.3 z		2.5	▽▽
3.2 a		12.5 s	12.5 z			
6.3 a	2.5	25 s	25 z	2.5	▽	
12.5 a		50 s	50 z			
25 a		8	100 s		100 z	8
50 a	200 s		200 z			
100 a	-		400 s	400 z		

\*The correlation among the three is shown for convenience and is not exact.

\*Ra: The evaluation length of Rz and RzJIS is the cutoff value and sampling length multiplied by 5, respectively.