Surface Roughness Gauges – 09-0702

This set contains surface roughness standards for the six most common manufacturing methods, made in accordance to **JJF1099-2018**. **Surface roughness average (Ra)**, also known as arithmetic average (AA), is the profile height deviation recorded within the evaluation length and measured from the mean line. Surface roughness average is expressed in **micro inches (µ"Ra)** and its metric equivalent in **micro meters (µmRa)**. Ry, also known as Rt in some standards, is the vertical distance between the highest peak and deepest valley within a single sampling length of the profile surface. The **ratio**, **Ry/AA**, provides a comprehensive assessment of surface texture by combining both average and extreme roughness characteristics. Typically, between 4 and 12, the Ry/AA ratio will vary due to the natural distribution of surface features and may deviate by ±30% from actual values. Depending on application, Ra may be required to ensure smoothness, while other instances will focus on Ry to avoid issues related to large surface irregularities. Together, these parameters aid in tailoring the surface properties to specific functional needs. The use of triangles in surface roughness specifications originate from graphical symbols defined by standards like ASME Y14.36M and ISO 1302 to indicate the type of surface that is required or achieved. The number of triangles and their orientation provide specific information used to classify the surface finish. **Roughness grade values (N#)** are numerical designations that range from N1 to N12, with each value corresponding to a specific Ra range. The mean value of the readings shall be between 83% and 112% with the exception of flat lapping which will vary between 75% and 120% of the nominal value, excluding instrumentation errors.

Surface Roughness (Ra)	µ"Ra	500	250	125	63	32	16	8	4	2
	µmRa	12.5	6.3	3.2	1.6	0.8	0.4	0.2	0.1	0.05
Horizontal Milling Vertical Milling Turning	µ"Ry	2000	1250	630	320	160	100			
	µmRy	50	32	16	8.0	4.0	2.5			
Ratio	Ry/AA	4	5	5	5	5	6.25			
Flat Lapping Reaming Grinding	µ"Ry				400	240	120	63	40	22
	µmRy				10	6.0	3.0	1.6	1.0	0.55
Ratio	Ry/AA				6.4	7.5	7.5	7.9	10	11

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µmRa	µ"Ra	Roughness Grade Number	Roughness Grade Symbol
50	2000	N12	
25	1000	N11	
12.5	500	N10	
6.3	250	N9	
3.2	125	N8	
1.6	63	N7	
0.8	32	N6	
0.4	16	N5	
0.2	8	N4	
0.1	4	N3	
0.05	2	N2	
0.025	1	N1	