

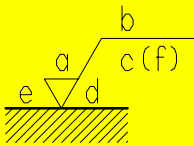
Maryland Metrics Technical Data Chart:

Surface Texture

1. Method of indicating surface texture on drawings acc. to DIN 1302

1.1 Symbols	
Symbol without additional indications. Basic symbol. The meaning must be explained by additional indications.	✓
Symbol with additional indications. Any production method, with specified roughness.	3.2/✓
Symbol without additional indications. Removal of material by machining, without specified roughness.	✓
Symbol with additional indications. Removal of material by machining, with specified roughness.	3.2/✓
Symbol without additional indications. Removal of material is not permitted (surface remains in state as supplied).	✓
Symbol with additional indications. Made without removal of material (non-cutting), with specified roughness.	3.2/✓

1.2 Position of the specifications of surface texture in the symbol



- a = Roughness value R_a in micrometres or microinches or roughness grade number N1 to N12
- b = Production method, surface treatment or coating
- c = Sampling length
- d = Direction of lay
- e = Machining allowance
- f = Other roughness values, e.g. R_z

Examples			Explanation
Production method			
Any	Material removing	Non-cutting	
0.8/✓ N6/✓	0.8/✓ N6/✓	0.8/✓ N6/✓	Centre line average height R_a : maximum value = 0.8 μm
$\sqrt{R_z 25}$	$\sqrt{R_z 25}$	$\sqrt{R_z 25}$	Mean peak-to-valley height R_z : maximum value = 25 μm
$\sqrt{0.25/R_z 1}$			Mean peak-to-valley height R_z : maximum value = 1 μm at cut-off = 0.25 mm

2. Explanation of the usual surface roughness parameters

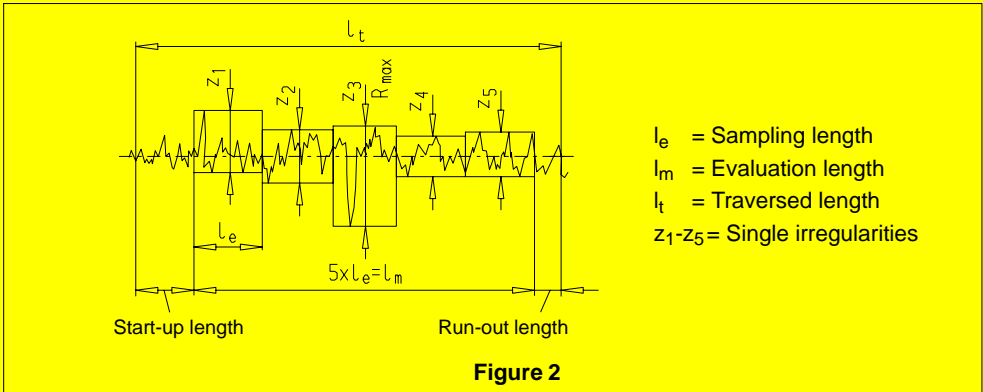
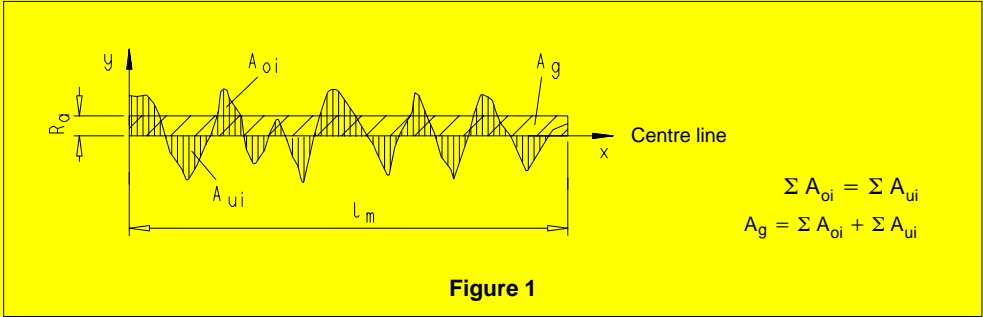
2.1 Centre line average height R_a acc. to DIN 4768

The centre line average height R_a is the arithmetic average of the absolute values of the distances

between the profile heights and the centre line within the measuring length. This is equivalent to the height of a rectangle (A_0) with a length equal to the evaluation length l_m and with an area equal to the sum of the areas enclosed between the roughness profile and the centre line (A_{oi} and A_{ui}) (see figure 1).

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2.2 Mean peak-to-valley height R_z acc. to DIN 4768

The mean peak-to-valley height R_z is the arithmetic average of the single irregularities of five consecutive sampling lengths (see figure 2).

Note:

An exact conversion of the peak-to-valley height R_z and the centre line average height R_a can neither be theoretically justified nor empirically proved. For surfaces which are generated by manufacturing methods of the group "metal cutting", a diagram for the conversion from R_a to R_z and vice versa is shown in supplement 1 to DIN 4768 Part 1, based on comparison measurements (see table "Comparison of roughness values").

2.3 Maximum roughness height R_{max} acc. to DIN 4768 (see figure 2)

The maximum roughness height R_{max} is the largest of the single irregularities z occurring over the evaluation length l_m (in figure 2: z_3). R_{max} is stated in cases where the largest single irregularity ("runaway") is to be recorded for reasons important for function.

2.4 Roughness grade numbers $N..$ acc. to DIN ISO 1302

In supplement 1 to DIN ISO 1302 it is recommended not to use roughness grade numbers. The N-grade numbers are most frequently used in America (see also table "Comparison of roughness values").

3. Comparison of roughness values

DIN ISO 1302	Roughness values R_a	μm	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
		μin	1	2	4	8	16	32	63	125	250	500	1000	2000
	Roughness grade number		N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12
Suppl. 1 to DIN 4768/1	Roughness values R_z in μm	from to	0.1	0.25	0.4	0.8	1.6	3.15	6.3	12.5	25	40	80	160
			0.8	1.6	2.5	4	6.3	12.5	20	31.5	63	100	160	250