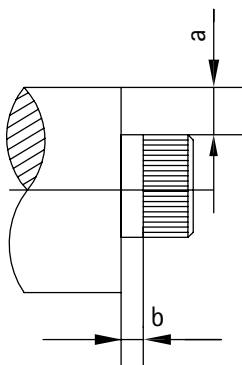


Influencing factors



Clearance dimensions/plunge cut for cut knurling

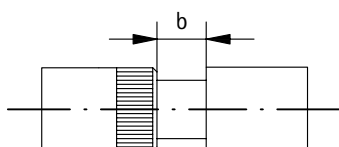


■ Clearance dimension for cut knurling – workpiece collar

Due to the design-related inclination (30°) of the knurling head and the overhang of the cover plate, knurling up to a collar is not possible with a cut knurling tool.

Dimension a corresponds to the increase in the step (mm).
Dimension b corresponds to the minimum clearance for the respective knurling wheel (Ø specified in mm).

Dimension "a" [mm]	b 10 x 3 x 6 mm	b 15 x 4 x 8 mm	b 25 x 6 x 8 mm	b 42 x 13 x 16 mm
1	1.3	1.5	2	3
3	2.7	4.2	3.2	5
5	3	4.9	4.5	7
7	3	5.2	5.5	9
10	3	5.2	6.7	12
12	3	5.2	7	12



■ Minimum width of the plunge cut – cut knurling

If knurling is to be applied in the middle of the workpiece, a "knurling undercut" is needed (the knurling wheel requires a chamfer for centring).
Depth of the plunge cut: at least 1/2 pitch + 0.3 mm.

Dimension Knurling wheels [mm]	10 x 3 x 6 mm	15 x 4 x 8 mm	25 x 6 x 8 mm	42 x 13 x 16 mm
Minimum width of plunge (b)	3 mm	4 mm	6.5 mm	14 mm

Influencing factors



Factors affecting quality and process reliability during knurling

Numerous factors must be taken into account and optimised in order to manufacture a high-quality and functional knurling profile.

The factors listed below are crucial for process reliability, quality, precision and surface quality and should be taken into account in order to optimise the application.

Tool properties	Quality and specification of the knurling wheel	Knurl width			
		Knurling wheel with chamfer			
		Material properties	Base material for the knurling wheel		
			Hardness of the knurling wheel		
			Reworking		PVD coating
		Precision			TENIFER®
			Run-out accuracy		
			Concentricity		
			Profile properties		Sharpness of tooth crest
					Radius in tooth gullet
					Flank angle
	Type of tool holder used	Type of knurling process	Form knurling	Plunge knurling	
				Feed knurling	
				Plunge/feed knurling	
			Cut knurling		
		Quality and condition of the axle pin/bearing bush			
		Stability/freedom from vibration			
		Precision			
Machine properties	Precision				
	Stability/freedom from vibration				
Properties of the material to be machined	Hardness				
	Strength				
	Cutting values			Feed rate	
	Plunge depth			Cutting speed	
	Cooling/lubrication				
	Clearance angle				
	Quality of teeth			Rough-turn diameter	
				Pitch/number of teeth	
				Material distortion	