

	Guideline knurl spezifikation <small>File: RL-CS-012b-knurl-spezifikation</small>	RL-CS-012b gültig ab: 08.09.2004 Stand: A Seite 1 von 4
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1. Validity of this work instruction

This instruction is valid for all engraved parts as well as for drawings without any additional specifications according to the knurl specification.

1.1 The knurl function of IMS CS products

The knurls for our components do have another function than the „normal“ industrial knurls providing just a better grip.

Our components knurls have to assure the twist reliability on the one hand and on the other to ensure the interference fit of the parts.

In order to achieve this condition two requirements are important, the diameter and the knurl moulding.

Please find the specifications our knurls are being verified.

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2

2.1 Knurl peaks turned (knurl inside and outside)

The completely constructed RAA knurl relating to DIN-82, may be turned maximum one third (1/3) of its tooth high (Zh).

In order to verify the exact specification, it is necessary to measure the maximum ligament width = **W max.** of the turned knurl peaks.

Formula to calculate the following:

Tooth height $Zh = 0,5 \cdot t$

Maximum ligament width $W \text{ max.} = 0,334 \cdot t$

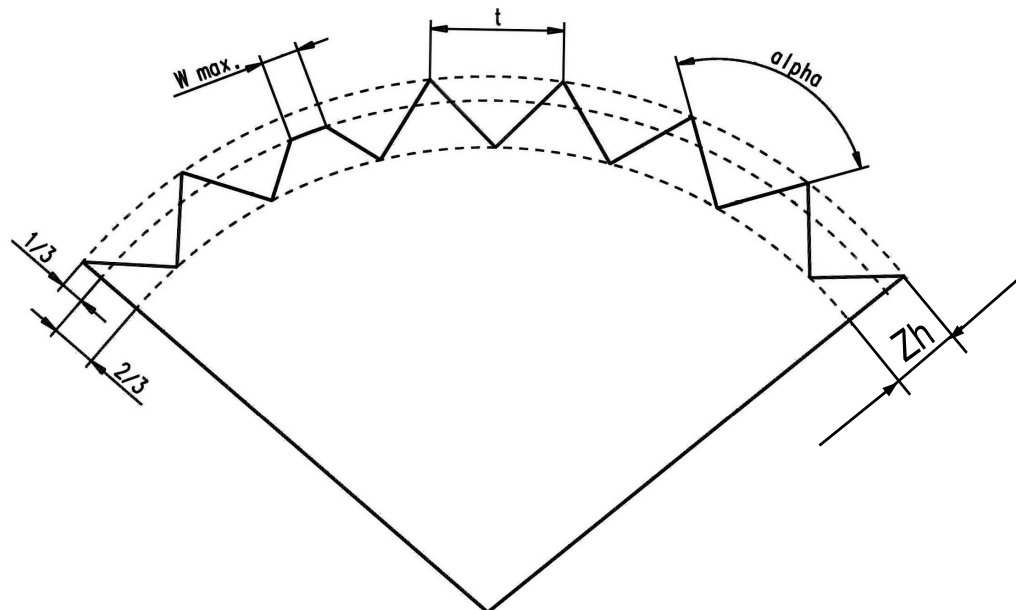
Example: (! ONLY VALID WHEN ALPHA = 90° !)

Knurl DIN 82-RAA 0,8 (0,8 = t in mm)

$W \text{ max.} = 0,334 \cdot 0,8 \text{ mm} = 0,267 \text{ mm}$

$Zh = 0,5 \cdot 0,8 \text{ mm} = 0,4 \text{ mm}$

Knurl tolerance zone -Ø and tolerance form :
 The knurl has to be **always** moulded at least **2/3!**
 AND the knurl-Ø = nominal-Ø **d₁** has to be always in the **1/3 range !**



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2.2 Finding the knurl diameter d_2 (knurl inside and outside)

Relating to the material displacement when knurling, the diameter of the component will increase. Meaning that the component has to be turned to a smaller diameter **before knurling** in order to get the required knurl nominal diameter!

The diameter indicated in the component drawing correspond to the nominal diameter d_1 in **table-1**.

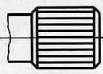
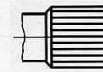
The deepness of penetration regarding the knurling into the material comply approximately with

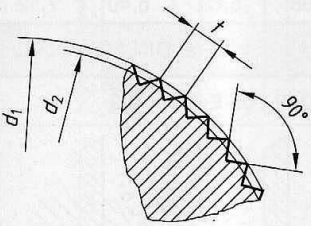
$$0,25 \cdot t = \text{halbe Zahnhöhe } Z_h$$

! These indications are just approximate values !

The diameter d_2 will always vary and has to be optimized by trials.

Tabelle-1 / Table-1

Rändel		vgl. DIN 82 (01.73)			
Kurzzeichen	Darstellung	Benennung	Spitzenform	Ausgangsdurchmesser d_2	
RAA		Rändel mit achsparallelen Riefen	—	$d_2 = d_1 - 0,5 \cdot t$	
RAA		Knurl with axially parallel rills	—	$d_2 = d_1 - 0,5 \cdot t$	
			—		
Genormte Teilungen t : 0,5; 0,6; 0,8; 1,0; 1,2; 1,6 mm Standardised flank pitch t					



d_1 Nenndurchmesser
 d_2 Ausgangsdurchmesser
 t Teilung

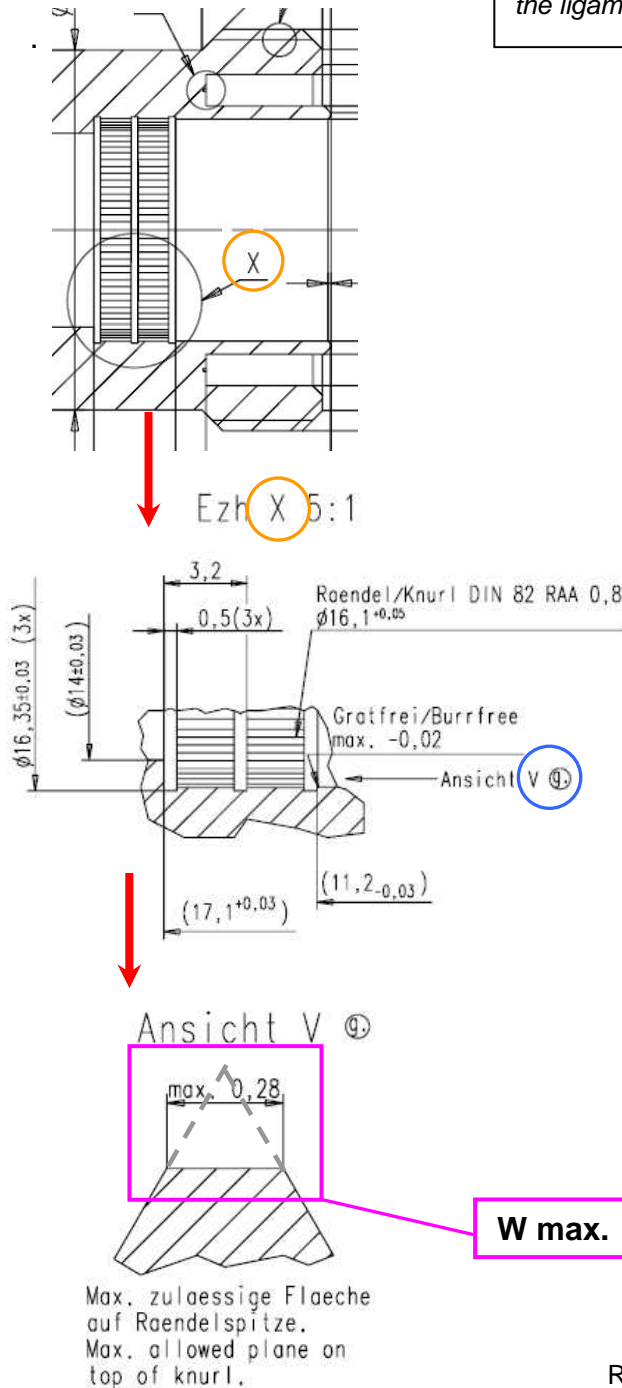
d_1 nominal diameter
 d_2 initial diameter
 t flank pitch

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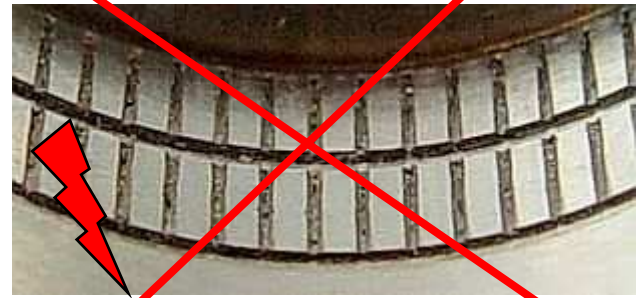
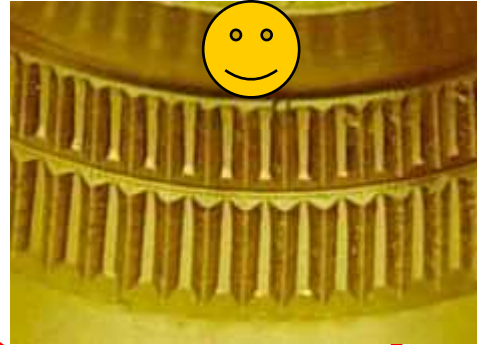
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Example for knurl with drawing indications (3261.)



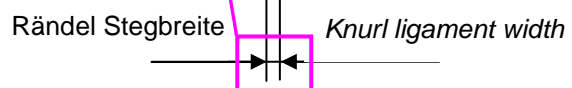
GUT: Der Rändel ist Gratfrei, der $\phi 16,1$ ist eingehalten, die Stegbreite **W max.** beträgt 0,12mm.

GOOD: The knurl is burrfree, the diameter is by $\phi 16,1$ and the ligament width **W max.** is by 0,12mm.



SCHLECHT: ϕ und Gratfreiheit ist gegeben, aber die Stegbreite **W max.** beträgt über 0,40mm !

BAD Knurl: Even when the diameter is correct and without burrs, but the ligament width **W max.** is greater then 0,40mm !



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