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SERVICE INSTRUCTIONS:

END KNURLING DIES HABEGGER

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1 GENERAL REMARKS

Habegger end knurling dies are used for straight or crossed knurling (30° or 45°).
They work without radial effort. No pressure is exerted on the workpiece, even with the smallest diameters. The three knurls forming the teeth assure a high quality of the job and the long life of the die.

Main advantages:

- No untrue workpiece after the knurling operation
- Very regular machining
- No radial effort exerted on the collet or guide bush
- Possibility to knurl diameters smaller than 1 mm
- Better knurling quality

2 KNURLING CONDITIONS

2.1 Diameter before knurling

Knurling is obtained by material deforming. Therefore, the diameter before knurling increases by 25 to 35 % of the pitch value, according to the machined material. These values are in direct relation with the material resistance.

Indicative values are:

Tough materials	:	25 %
Smooth materials	:	35 %

Example: stainless steel

Ø before knurling: 3.17 mm
pitch: 0.9 mm

Result: 25 % of 0.9 = 0.225

Ø before knurling + 0.225 = Ø after knurling

3.17 + 0.225 = Ø 3.395 mm

The user must perform tests by himself in order to determine the diameter before knurling. He may use the following formula:

d = diameter before knurling
D = diameter after knurling
P = pitch

$$d = D-(P/2)$$

The knurled profile obtained with this diameter will not be complete. Adjust by increasing progressively that diameter, until the wanted knurled diameter has effectively been obtained.

2.2 Peripheric speed

The peripheric speed of the workpiece must be about 20 m/min. This speed decreases when the material is very hard.

2.3 Feed

The indicative value for the feed is 0.2 to 0.3 mm/revolution.

2.4 Displacement of material

In order to avoid material being upset on the face of the workpiece, we recommend to machine an angle on the face.

2.5 Lubrication

We also recommend to lubricate very much. Do never stop machining during or towards the end of the knurling operation.

2.6 Required indication

The following information is <u>absolutely needed</u> when orders or enquiries are submitted:

a) the diameter after knurling (measured on the top of the teeth) with its mini and maxi tolerances.
b) the wanted pitch. It must be determined by the user.
c) the kind of material used.

2.7 Return of the knurling die

The return of the knurling dies must be done by "fast return". If the return spring is not strong enough, arrange for a forced fast return (cam machines).

2.8 Pitch

The three knurls must always have the same pitch. For crossed knurling, use two knurls type BL and one knurl BR.

2.9 Number of teeth

The number of teeth cannot be guaranteed

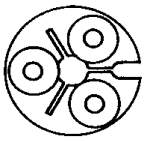
3 <u>DESCRIPTION</u>

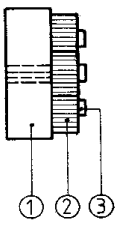
3.1 Name

These knurling dies are always supplied with indication of the diameter after knurling, measured on top of the teeth.

Part designation:

- 1 body (1)
- 3 knurls DIN 82 (2)
- 3 studs (3)





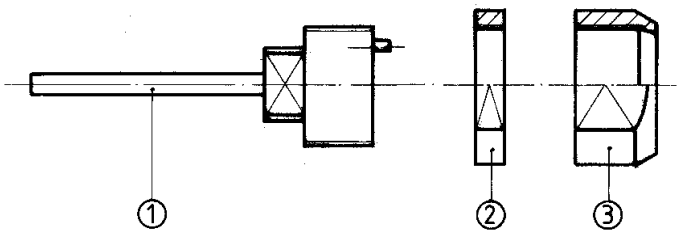
3.2 Mounting

Adjustable knurling dies are mounted on the machines with the help of die holders R (see general catalogue).

4 HABEGGER DIE HOLDER TYPE R

Part designation:

- 1 shaft body (1)
- 1 counter- nut (2)
- 1 nut (3)



Setting instructions:

a) Once the knurling die has been put on the die holder, tighten the nut (3) until it leans against the die. Then, loosen it slightly. Lock the counter-nut (2) so that the die remains free. Make sure that it is not too tight from the beginning.

b) The outside diameter will be adjusted by modifying the turned diameter.

c) The average diameter will be modified by adjusting the die.

d) Of course, by modifying the die adjustment, the outside diameter will also be altered. Both adjustments must be combined therefore.

5 SPARE PARTS

We supply some spare parts (knurls and studs) for this kind of knurling die, as the final adjustment will be made by the user.

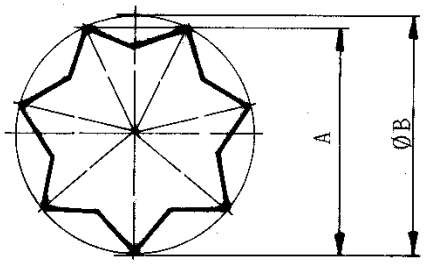
For spare parts orders and according to the goods, indicate the following points:

		Examples:
Knurling die:	- type of die	FM 2.00 x 0.60 DE 16 crossed knurling 30°
	- designation	1 set of knurls
Die holder:	- type of holder	die holder R 25-8
	- designation	1 nut

6 KNURLING WITH AN ODD NUMBER OF TEETH

Note:

Measuring the outside diameter of a knurled part with an odd number of teeth must be done by other means than the micrometer (for example by ring-gauges).



Nombre de dents sur le diamètre Anzahl Zähne auf dem Durchmesser Number of teeth on the diameter	ØB x . . . = A	A x . . . = ØB
5	0.90451	1.10557
7	0.95066	1.05190
9	0.96980	1.03114
11	0.97970	1.02072
13	0.98550	1.01471
15	0.98910	1.01102
17	0.99150	1.00857
19	0.99320	1.00684
21	0.99440	1.00563
23	0.99540	1.00462
25	0.99610	1.00391
27	0.99660	1.00341
29	0.99710	1.00290
31	0.99740	1.00260
33	0.99770	1.00230
35	0.99800	1.00200
37	0.99820	1.00180