



**GÜHRING**

***INOX***

High-performance tools for  
economical machining of stainless steel

# EXPERTS IN STAINLESS STEEL

## Our tool range for maximum efficiency in stainless steel machining

If you need to ensure corrosion- and acid resistance, then the answer is always stainless steel. Regardless of whether you're in the food, automotive, medical or energy technology sector – every industry relies on the high durability of the ISO M material group. However, their toughness and low thermal conductivity make them tricky materials to machine.

This is where you need specialists who have been precisely developed for machining stainless steels: Our new high-performance tools for stainless steel machining. Thanks to their special coatings, the tools can withstand high thermal loads for significantly longer, while their carbide substrate offers the perfect ratio of hardness-to-toughness. At the same time, the adapted geometry is able to deliver the highest cutting values, which ensure maximum economic efficiency, especially in medium and large-scale batch production.



### **shorter cycle times**

thanks to higher potential feed rates in the production of holes & threads



### **longer tool life**

with high and conventional cutting data, thanks to extra hard coatings



### **greater economic efficiency**

by reducing the cost-per-part for high quantities



### **maximum process reliability**

geometry prevents built-up edges & ensures the ideal chip flow



# SUCCESS STORY

## GÜHRING

Success is engraved in the story of this Gühring drill: The RT 100 InoxPro did what it was built to do in this material, delivering fantastic results where other drills have failed.

Daniel Schultes

Karsten Raßbach

Gühring

Kevin Schippers & Daniel Schultes

Recker Technik

Machining highly heat-resistant steels and stainless steels is the core business of Recker Technik GmbH. With 20 employees and a modern machinery at its site in Eschweiler, the contract supplier produces metal parts for various customers ranging from the food industry to mechanical engineering. For a long time, universal drills made by a competitor were used – until a check valve for a gas pipeline presented a challenge for the machining experts.

In the highly heat-resistant steel (1.4825), tool wear is immense, as production manager Daniel Schultes remembers: “After every single hole, the drill tip was blunt.” A material specialist was what was needed – and Gühring sales representative Karsten Raßbach had the ideal one in mind: “With this material, I immediately opted for the RT 100 InoxPro because I had already achieved very good results for other customers.”

The solid carbide drill also impressed Recker: One single drill can create 64 holes with a depth of 30 mm before it starts to show the first signs of wear. For Schultes, this was proof: “I’ve been in metalworking for 16 years and like any machining engineer in this field, I know: When it comes to drilling, Gühring is number one.”

Scan the QR code to read the full success story!



# CONTENTS

## **Micro drill InoxPro**

with maximum feeds for perfect micro drilling results

## **Solid carbide drill InoxPro**

70 % shorter cycle time in difficult-to-machine materials

## **High-performance tap Pionex**

with low torque for dimensionally stable threads

new

## **High-performance fluteless tap InoxPro**

50 % longer tool life for maximum process reliability





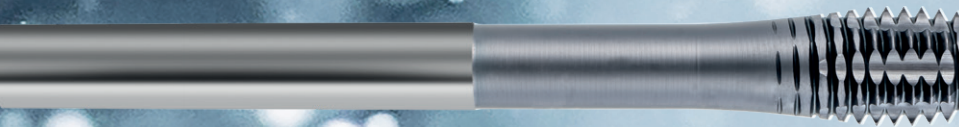
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A close-up photograph of a person wearing a white surgical glove, holding a pair of surgical forceps. The forceps are held over a metal tray containing several other surgical instruments. The background is a blurred blue and white, suggesting a sterile medical environment. A vertical yellow bar is positioned on the left side of the image, containing text.

Holes in the  
**handle**  
of a medical instrument

**Industry:**  
Medical technology

**Material:**  
1.4021/X20Cr13

**Target:**  
To reduce the machining time with  
absolute process reliability

## The challenge

Polished surfaces are a must-have for all medical devices. This is the only way to prevent bacteria and viruses from settling on the surface. So, this instrument for minimally invasive surgery is also made of martensitic, stainless chrome steel. The material is not only very easy to polish, but also resistant to chemicals and acids.

However, one problem is that high temperatures develop at the tool's cutting edge when drilling into this material, which can promote abrasive wear. This is particularly problematic in fully automated production, where high process reliability and therefore consistently high tool lives are required.

Micro drill InoxPro

# TOP-PERFORMANCE MICRO-PRECISION DRILL

## Tool solution

The RT 100 InoxPro Micro is our high-end micro drill for machining stainless steels, special alloys and titanium. The optimised geometry with a concave main cutting edge helps to deliver an aggressive cutting behaviour. In this way, the micro-precision drill produces short chips even in long-chipping materials, making it easier for the chips to be removed.

At the same time, the Perrox coating protects the tool from abrasive alloy components and prevents built-up edges. As a result, the micro drill achieves the highest feed rates with very long and reliable tool lives.

## TOOL PERFORMANCE REPORT

	Competitors' tool	RT 100 InoxPro micro
Number of cutting edges	2	2
Diameter ( $\varnothing$ )	2.00 mm	2.00 mm
Cutting speed ( $v_c$ )	60 m/min	80 m/min
Speed (n)	9,549 rev/min	12,732 rev/min
Feed (f)	0.03 mm/rev	0.05 mm/rev
Feed rate ( $v_f$ )	286 mm/min	637 mm/min
Drilling depth ( $a_p$ )	20.8 mm	20.8 mm
Machining time per hole	5.9 sec.	3.5 sec.

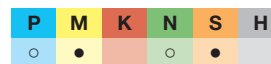
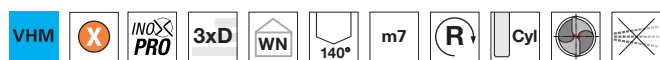
**40 %** shorter cycle time

**35 %** longer tool life

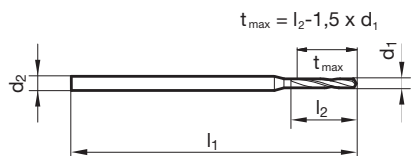
RT 100  
**INOXPRO**







Web thinning  $\geq \varnothing 0.500$  • facet point grind • main cutting edge is slightly concave • optimised cutting edge geometry

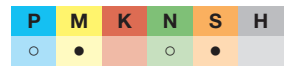
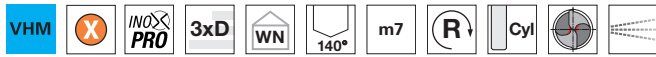


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0.550	3.0	38.0	3.1	6487 0.550	1.750	4.0	46.0	9.7	6487 1.750
0.600	3.0	38.0	3.3	6487 0.600	1.800	4.0	46.0	9.9	6487 1.800
0.650	3.0	38.0	3.6	6487 0.650	1.850	4.0	46.0	10.2	6487 1.850
0.660	3.0	38.0	3.7	6487 0.660	1.900	4.0	46.0	10.5	6487 1.900
0.700	3.0	38.0	3.9	6487 0.700	1.950	4.0	46.0	10.8	6487 1.950
0.740	3.0	38.0	4.1	6487 0.740	1.980	4.0	46.0	10.9	6487 1.980
0.750	3.0	38.0	4.2	6487 0.750	2.000	4.0	46.0	11.0	6487 2.000
0.790	3.0	38.0	4.4	6487 0.790	2.050	4.0	46.0	11.3	6487 2.050
0.800	3.0	38.0	4.4	6487 0.800	2.100	4.0	50.0	11.6	6487 2.100
0.820	3.0	38.0	4.6	6487 0.820	2.150	4.0	50.0	11.9	6487 2.150
0.850	3.0	38.0	4.7	6487 0.850	2.200	4.0	50.0	12.1	6487 2.200
0.900	3.0	38.0	5.0	6487 0.900	2.250	4.0	50.0	12.4	6487 2.250
0.950	3.0	38.0	5.3	6487 0.950	2.300	4.0	50.0	12.7	6487 2.300
1.000	3.0	38.0	5.5	6487 1.000	2.350	4.0	50.0	13.0	6487 2.350
1.020	3.0	38.0	5.7	6487 1.020	2.380	4.0	50.0	13.1	6487 2.380
1.050	3.0	38.0	5.8	6487 1.050	2.400	4.0	50.0	13.2	6487 2.400
1.100	3.0	38.0	6.1	6487 1.100	2.450	4.0	50.0	13.5	6487 2.450
1.150	3.0	38.0	6.4	6487 1.150	2.500	4.0	50.0	13.8	6487 2.500
1.180	3.0	38.0	6.5	6487 1.180	2.550	4.0	50.0	14.1	6487 2.550
1.190	3.0	38.0	6.6	6487 1.190	2.600	4.0	50.0	14.3	6487 2.600
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1.500	4.0	46.0	8.3	6487 1.500	3.000	4.0	50.0	16.5	6487 3.000
1.550	4.0	46.0	8.6	6487 1.550					
1.560	4.0	46.0	8.6	6487 1.560					
1.590	4.0	46.0	8.8	6487 1.590					
1.600	4.0	46.0	8.8	6487 1.600					
1.650	4.0	46.0	9.1	6487 1.650					
1.660	4.0	46.0	9.2	6487 1.660					

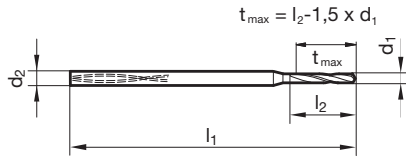


Micro-precision drills with coolant ducts

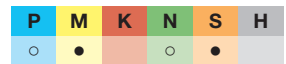
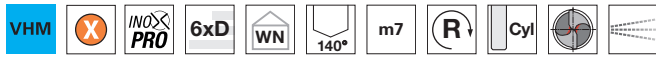
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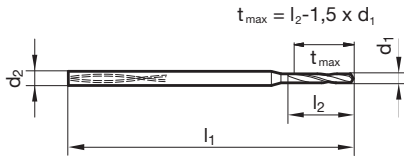
Web thinning  $\geq \varnothing 1.000$  • facet point grind • main cutting edge is slightly concave • optimised cutting edge geometry



Article no.				6488	Article no.				6488
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1.050	3.0	38.0	5.8	6488 1.050	2.150	4.0	50.0	11.9	6488 2.150
1.100	3.0	38.0	6.1	6488 1.100	2.200	4.0	50.0	12.1	6488 2.200
1.150	3.0	38.0	6.4	6488 1.150	2.250	4.0	50.0	12.4	6488 2.250
1.180	3.0	38.0	6.5	6488 1.180	2.300	4.0	50.0	12.7	6488 2.300
1.190	3.0	38.0	6.6	6488 1.190	2.350	4.0	50.0	13.0	6488 2.350
1.200	3.0	38.0	6.6	6488 1.200	2.380	4.0	50.0	13.1	6488 2.380
1.250	3.0	38.0	6.9	6488 1.250	2.400	4.0	50.0	13.2	6488 2.400
1.280	3.0	38.0	7.1	6488 1.280	2.450	4.0	50.0	13.5	6488 2.450
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1.350	3.0	38.0	7.5	6488 1.350	2.550	4.0	50.0	14.1	6488 2.550
1.400	4.0	46.0	7.7	6488 1.400	2.600	4.0	50.0	14.3	6488 2.600
1.450	4.0	46.0	8.0	6488 1.450	2.650	4.0	50.0	14.6	6488 2.650
1.460	4.0	46.0	8.1	6488 1.460	2.700	4.0	50.0	14.9	6488 2.700
1.500	4.0	46.0	8.3	6488 1.500	2.750	4.0	50.0	15.2	6488 2.750
1.550	4.0	46.0	8.6	6488 1.550	2.780	4.0	50.0	15.3	6488 2.780
1.560	4.0	46.0	8.6	6488 1.560	2.800	4.0	50.0	15.4	6488 2.800
1.590	4.0	46.0	8.8	6488 1.590	2.850	4.0	50.0	15.7	6488 2.850
1.600	4.0	46.0	8.8	6488 1.600	2.900	4.0	50.0	16.0	6488 2.900
1.650	4.0	46.0	9.1	6488 1.650	2.950	4.0	50.0	16.3	6488 2.950
1.660	4.0	46.0	9.2	6488 1.660	3.000	4.0	50.0	16.5	6488 3.000
1.700	4.0	46.0	9.4	6488 1.700					
1.750	4.0	46.0	9.7	6488 1.750					
1.800	4.0	46.0	9.9	6488 1.800					
1.850	4.0	46.0	10.2	6488 1.850					
1.900	4.0	46.0	10.5	6488 1.900					
1.950	4.0	46.0	10.8	6488 1.950					
1.980	4.0	46.0	10.9	6488 1.980					
2.000	4.0	46.0	11.0	6488 2.000					



Web thinning  $\geq \varnothing 1.000$  • facet point grind • main cutting edge is slightly concave • optimised cutting edge geometry



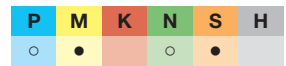
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1.100	3.0	48.0	9.9	6489 1.100	2.150	4.0	66.0	19.4	6489 2.150
1.150	3.0	48.0	10.4	6489 1.150	2.200	4.0	66.0	19.8	6489 2.200
1.190	3.0	48.0	10.8	6489 1.190	2.250	4.0	66.0	20.3	6489 2.250
1.200	3.0	51.0	10.8	6489 1.200	2.300	4.0	66.0	20.7	6489 2.300
1.250	3.0	51.0	11.3	6489 1.250	2.350	4.0	66.0	21.2	6489 2.350
1.300	3.0	51.0	11.7	6489 1.300	2.380	4.0	66.0	21.5	6489 2.380
1.350	3.0	51.0	12.2	6489 1.350	2.400	4.0	66.0	21.6	6489 2.400
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2.000	4.0	61.0	18.0	6489 2.000					



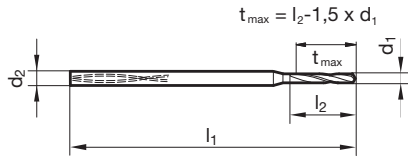


Micro-precision drills with coolant ducts

Article no. 6490



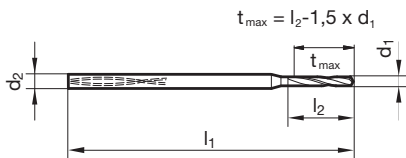
Web thinning  $\geq \varnothing 1.000$  • facet point grind • main cutting edge is slightly concave • optimised cutting edge geometry



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1.100	3.0	48.0	14.3	6490 1.100	2.150	4.0	66.0	28.0	6490 2.150
1.150	3.0	48.0	15.0	6490 1.150	2.200	4.0	66.0	28.6	6490 2.200
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1.200	3.0	51.0	15.6	6490 1.200	2.300	4.0	66.0	29.9	6490 2.300
1.250	3.0	51.0	16.3	6490 1.250	2.350	4.0	66.0	30.6	6490 2.350
1.300	3.0	51.0	16.9	6490 1.300	2.380	4.0	66.0	31.0	6490 2.380
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1.550	4.0	56.0	20.2	6490 1.550	2.600	4.0	71.0	33.8	6490 2.600
1.590	4.0	56.0	20.7	6490 1.590	2.650	4.0	71.0	34.5	6490 2.650
1.600	4.0	56.0	20.8	6490 1.600	2.700	4.0	71.0	35.1	6490 2.700
1.650	4.0	56.0	21.5	6490 1.650	2.750	4.0	71.0	35.8	6490 2.750
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1.750	4.0	61.0	22.8	6490 1.750	2.800	4.0	71.0	36.4	6490 2.800
1.800	4.0	61.0	23.4	6490 1.800	2.850	4.0	71.0	37.1	6490 2.850
1.850	4.0	61.0	24.1	6490 1.850	2.900	4.0	71.0	37.7	6490 2.900
1.900	4.0	61.0	24.7	6490 1.900	2.950	4.0	71.0	38.4	6490 2.950
1.950	4.0	61.0	25.4	6490 1.950	3.000	4.0	71.0	39.0	6490 3.000
1.980	4.0	61.0	25.8	6490 1.980					
2.000	4.0	61.0	26.0	6490 2.000					



Web thinning  $\geq \varnothing 1.000$  • facet point grind • main cutting edge is slightly concave • optimised cutting edge geometry



Article no. <b>6491</b>				Article no. <b>6491</b>					
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1.100	3.0	54.0	19.8	6491 1.100	2.150	4.0	79.0	38.7	6491 2.150
1.150	3.0	54.0	20.7	6491 1.150	2.200	4.0	79.0	39.6	6491 2.200
1.190	3.0	54.0	21.5	6491 1.190	2.250	4.0	79.0	40.5	6491 2.250
1.200	3.0	58.0	21.6	6491 1.200	2.300	4.0	79.0	41.4	6491 2.300
1.250	3.0	58.0	22.5	6491 1.250	2.350	4.0	79.0	42.3	6491 2.350
1.300	3.0	58.0	23.4	6491 1.300	2.380	4.0	79.0	42.9	6491 2.380
1.350	3.0	58.0	24.3	6491 1.350	2.400	4.0	79.0	43.2	6491 2.400
1.400	4.0	64.0	25.2	6491 1.400	2.450	4.0	79.0	44.1	6491 2.450
1.450	4.0	64.0	26.1	6491 1.450	2.500	4.0	79.0	45.0	6491 2.500
1.500	4.0	64.0	27.0	6491 1.500	2.550	4.0	79.0	45.9	6491 2.550
1.550	4.0	64.0	27.9	6491 1.550	2.600	4.0	87.0	46.8	6491 2.600
1.590	4.0	64.0	28.7	6491 1.590	2.650	4.0	87.0	47.7	6491 2.650
1.600	4.0	64.0	28.8	6491 1.600	2.700	4.0	87.0	48.6	6491 2.700
1.650	4.0	64.0	29.7	6491 1.650	2.750	4.0	87.0	49.5	6491 2.750
1.700	4.0	71.0	30.6	6491 1.700	2.780	4.0	87.0	50.1	6491 2.780
1.750	4.0	71.0	31.5	6491 1.750	2.800	4.0	87.0	50.4	6491 2.800
1.800	4.0	71.0	32.4	6491 1.800	2.850	4.0	87.0	51.3	6491 2.850
1.850	4.0	71.0	33.3	6491 1.850	2.900	4.0	87.0	52.2	6491 2.900
1.900	4.0	71.0	34.2	6491 1.900	2.950	4.0	87.0	53.1	6491 2.950
1.950	4.0	71.0	35.1	6491 1.950	3.000	4.0	87.0	54.0	6491 3.000
1.980	4.0	71.0	35.7	6491 1.980					
2.000	4.0	71.0	36.0	6491 2.000					



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OCI interface, data interface



Holes in a

## perforated plate

for a heat exchanger

**Industry:**

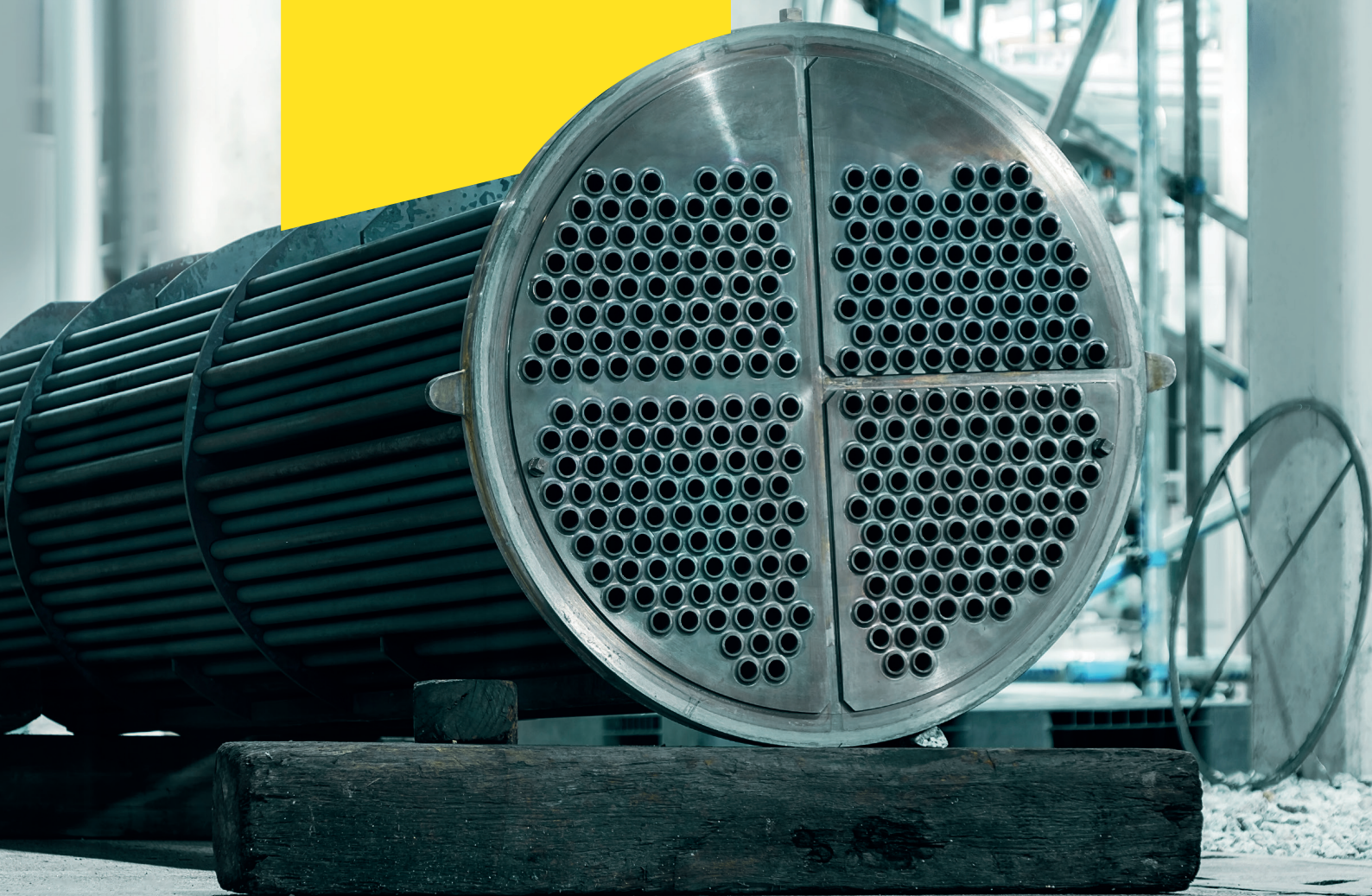
Power generation

**Material:**

SA 240 316L

**Target:**

Reduction of cycle time but with a constant tool life



### The challenge

In various energy technology systems, heat exchangers transport the heating medium through the pipes, which are consolidated by a perforated plate. Given these circumstances, this component has to be corrosion-resistant and able to withstand temperatures up to 550 °C as well as low temperatures – criteria that are all met by stainless steel.

But when it comes to machining, the material is challenging: When drilling, huge amounts of heat are generated, affecting the tool. In addition, long chips form in the tough material and wrap around the drill. If they stick to the tool's cutting edges, this can result in cutting edge chipping or even tool breakage.

Solid carbide drill InoxPro

# MAXIMISE PRODUCTIVITY WITH OUR DRILLING SPECIALIST

## Tool solution

Our solid carbide drilling specialist, the RT 100 InoxPro, solves the problem of machining in stainless steel: The new drill geometry with an optimised sickle-shaped cutting edge and the increased taper of the tool minimise the tendency towards jamming in stainless steel and ensure optimum chip control.

As well as the polished flutes, Gühring's own HiPIMS Perrox coating offers very high wear protection. An adapted carbide substrate also ensures that the blade does not break, even under high loads. The result: Maximum process reliability – even with large diameters and deep holes up to 7xD.

## TOOL PERFORMANCE REPORT

	Competitors' tool	RT 100 InoxPro
Number of cutting edges	2	2
Diameter (Ø)	12.2 mm	12.2 mm
Cutting speed ( $v_c$ )	42 m/min	85 m/min
Speed (n)	1,100 rev/min	2,200 rev/min
Feed (f)	0.11 mm/rev	0.2 mm/rev
Feed rate ( $v_f$ )	120 mm/min	440 mm/min
Drilling depth ( $a_p$ )	90.5 mm	90.5 mm
Tool life	35 m	35 m
Machining time per hole	45.3 sec.	12.5 sec.

**70 %** shorter cycle time with the same tool life

RT 100  
**INOXPRO**









Article no. 8512						Article no. 8512							
d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.
12.500		14.0	107.0	60.0	45.0	8512 12.500	15.900		16.0	115.0	65.0	48.0	8512 15.900
12.600		14.0	107.0	60.0	45.0	8512 12.600	16.000		16.0	115.0	65.0	48.0	8512 16.000
12.700	1/2	14.0	107.0	60.0	45.0	8512 12.700	16.270	41/64	18.0	123.0	73.0	48.0	8512 16.270
12.800		14.0	107.0	60.0	45.0	8512 12.800	16.300		18.0	123.0	73.0	48.0	8512 16.300
12.900		14.0	107.0	60.0	45.0	8512 12.900	16.500		18.0	123.0	73.0	48.0	8512 16.500
13.000		14.0	107.0	60.0	45.0	8512 13.000	16.670	21/32	18.0	123.0	73.0	48.0	8512 16.670
13.100	33/64	14.0	107.0	60.0	45.0	8512 13.100	16.700		18.0	123.0	73.0	48.0	8512 16.700
13.200		14.0	107.0	60.0	45.0	8512 13.200	16.900		18.0	123.0	73.0	48.0	8512 16.900
13.300		14.0	107.0	60.0	45.0	8512 13.300	17.000		18.0	123.0	73.0	48.0	8512 17.000
13.400		14.0	107.0	60.0	45.0	8512 13.400	17.070	43/64	18.0	123.0	73.0	48.0	8512 17.070
13.490	17/32	14.0	107.0	60.0	45.0	8512 13.490	17.460	11/16	18.0	123.0	73.0	48.0	8512 17.460
13.500		14.0	107.0	60.0	45.0	8512 13.500	17.500		18.0	123.0	73.0	48.0	8512 17.500
13.600		14.0	107.0	60.0	45.0	8512 13.600	17.550		18.0	123.0	73.0	48.0	8512 17.550
13.700		14.0	107.0	60.0	45.0	8512 13.700	17.700		18.0	123.0	73.0	48.0	8512 17.700
13.800		14.0	107.0	60.0	45.0	8512 13.800	17.860	45/64	18.0	123.0	73.0	48.0	8512 17.860
13.890	35/64	14.0	107.0	60.0	45.0	8512 13.890	18.000		18.0	123.0	73.0	48.0	8512 18.000
13.900		14.0	107.0	60.0	45.0	8512 13.900	18.260	23/32	20.0	131.0	79.0	50.0	8512 18.260
14.000		14.0	107.0	60.0	45.0	8512 14.000	18.500		20.0	131.0	79.0	50.0	8512 18.500
14.100		16.0	115.0	65.0	48.0	8512 14.100	18.700		20.0	131.0	79.0	50.0	8512 18.700
14.200		16.0	115.0	65.0	48.0	8512 14.200	18.900		20.0	131.0	79.0	50.0	8512 18.900
14.290	9/16	16.0	115.0	65.0	48.0	8512 14.290	19.000		20.0	131.0	79.0	50.0	8512 19.000
14.300		16.0	115.0	65.0	48.0	8512 14.300	19.050	3/4	20.0	131.0	79.0	50.0	8512 19.050
14.400		16.0	115.0	65.0	48.0	8512 14.400	19.250		20.0	131.0	79.0	50.0	8512 19.250
14.500		16.0	115.0	65.0	48.0	8512 14.500	19.300		20.0	131.0	79.0	50.0	8512 19.300
14.600		16.0	115.0	65.0	48.0	8512 14.600	19.450	49/64	20.0	131.0	79.0	50.0	8512 19.450
14.680	37/64	16.0	115.0	65.0	48.0	8512 14.680	19.500		20.0	131.0	79.0	50.0	8512 19.500
14.700		16.0	115.0	65.0	48.0	8512 14.700	19.550		20.0	131.0	79.0	50.0	8512 19.550
14.800		16.0	115.0	65.0	48.0	8512 14.800	19.700		20.0	131.0	79.0	50.0	8512 19.700
14.900		16.0	115.0	65.0	48.0	8512 14.900	19.800		20.0	131.0	79.0	50.0	8512 19.800
15.000		16.0	115.0	65.0	48.0	8512 15.000	19.840	25/32	20.0	131.0	79.0	50.0	8512 19.840
15.080	19/32	16.0	115.0	65.0	48.0	8512 15.080	20.000		20.0	131.0	79.0	50.0	8512 20.000
15.100		16.0	115.0	65.0	48.0	8512 15.100							
15.200		16.0	115.0	65.0	48.0	8512 15.200							
15.300		16.0	115.0	65.0	48.0	8512 15.300							
15.400		16.0	115.0	65.0	48.0	8512 15.400							
15.480	39/64	16.0	115.0	65.0	48.0	8512 15.480							
15.500		16.0	115.0	65.0	48.0	8512 15.500							
15.550		16.0	115.0	65.0	48.0	8512 15.550							
15.600		16.0	115.0	65.0	48.0	8512 15.600							
15.700		16.0	115.0	65.0	48.0	8512 15.700							
15.800		16.0	115.0	65.0	48.0	8512 15.800							
15.870	5/8	16.0	115.0	65.0	48.0	8512 15.870							







Article no. 8513						Article no. 8513							
d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.
12.500		14.0	124.0	77.0	45.0	8513 12.500	15.900		16.0	133.0	83.0	48.0	8513 15.900
12.600		14.0	124.0	77.0	45.0	8513 12.600	16.000		16.0	133.0	83.0	48.0	8513 16.000
12.700	1/2	14.0	124.0	77.0	45.0	8513 12.700	16.270	41/64	18.0	143.0	93.0	48.0	8513 16.270
12.800		14.0	124.0	77.0	45.0	8513 12.800	16.300		18.0	143.0	93.0	48.0	8513 16.300
12.900		14.0	124.0	77.0	45.0	8513 12.900	16.500		18.0	143.0	93.0	48.0	8513 16.500
13.000		14.0	124.0	77.0	45.0	8513 13.000	16.670	21/32	18.0	143.0	93.0	48.0	8513 16.670
13.100	33/64	14.0	124.0	77.0	45.0	8513 13.100	16.700		18.0	143.0	93.0	48.0	8513 16.700
13.200		14.0	124.0	77.0	45.0	8513 13.200	16.900		18.0	143.0	93.0	48.0	8513 16.900
13.300		14.0	124.0	77.0	45.0	8513 13.300	17.000		18.0	143.0	93.0	48.0	8513 17.000
13.400		14.0	124.0	77.0	45.0	8513 13.400	17.070	43/64	18.0	143.0	93.0	48.0	8513 17.070
13.490	17/32	14.0	124.0	77.0	45.0	8513 13.490	17.460	11/16	18.0	143.0	93.0	48.0	8513 17.460
13.500		14.0	124.0	77.0	45.0	8513 13.500	17.500		18.0	143.0	93.0	48.0	8513 17.500
13.600		14.0	124.0	77.0	45.0	8513 13.600	17.550		18.0	143.0	93.0	48.0	8513 17.550
13.700		14.0	124.0	77.0	45.0	8513 13.700	17.700		18.0	143.0	93.0	48.0	8513 17.700
13.800		14.0	124.0	77.0	45.0	8513 13.800	17.860	45/64	18.0	143.0	93.0	48.0	8513 17.860
13.890	35/64	14.0	124.0	77.0	45.0	8513 13.890	18.000		18.0	143.0	93.0	48.0	8513 18.000
13.900		14.0	124.0	77.0	45.0	8513 13.900	18.260	23/32	20.0	153.0	101.0	50.0	8513 18.260
14.000		14.0	124.0	77.0	45.0	8513 14.000	18.500		20.0	153.0	101.0	50.0	8513 18.500
14.100		16.0	133.0	83.0	48.0	8513 14.100	18.700		20.0	153.0	101.0	50.0	8513 18.700
14.200		16.0	133.0	83.0	48.0	8513 14.200	18.900		20.0	153.0	101.0	50.0	8513 18.900
14.290	9/16	16.0	133.0	83.0	48.0	8513 14.290	19.000		20.0	153.0	101.0	50.0	8513 19.000
14.300		16.0	133.0	83.0	48.0	8513 14.300	19.050	3/4	20.0	153.0	101.0	50.0	8513 19.050
14.400		16.0	133.0	83.0	48.0	8513 14.400	19.250		20.0	153.0	101.0	50.0	8513 19.250
14.500		16.0	133.0	83.0	48.0	8513 14.500	19.300		20.0	153.0	101.0	50.0	8513 19.300
14.600		16.0	133.0	83.0	48.0	8513 14.600	19.450	49/64	20.0	153.0	101.0	50.0	8513 19.450
14.680	37/64	16.0	133.0	83.0	48.0	8513 14.680	19.500		20.0	153.0	101.0	50.0	8513 19.500
14.700		16.0	133.0	83.0	48.0	8513 14.700	19.550		20.0	153.0	101.0	50.0	8513 19.550
14.800		16.0	133.0	83.0	48.0	8513 14.800	19.700		20.0	153.0	101.0	50.0	8513 19.700
14.900		16.0	133.0	83.0	48.0	8513 14.900	19.800		20.0	153.0	101.0	50.0	8513 19.800
15.000		16.0	133.0	83.0	48.0	8513 15.000	19.840	25/32	20.0	153.0	101.0	50.0	8513 19.840
15.080	19/32	16.0	133.0	83.0	48.0	8513 15.080	20.000		20.0	153.0	101.0	50.0	8513 20.000
15.100		16.0	133.0	83.0	48.0	8513 15.100							
15.200		16.0	133.0	83.0	48.0	8513 15.200							
15.300		16.0	133.0	83.0	48.0	8513 15.300							
15.400		16.0	133.0	83.0	48.0	8513 15.400							
15.480	39/64	16.0	133.0	83.0	48.0	8513 15.480							
15.500		16.0	133.0	83.0	48.0	8513 15.500							
15.550		16.0	133.0	83.0	48.0	8513 15.550							
15.600		16.0	133.0	83.0	48.0	8513 15.600							
15.700		16.0	133.0	83.0	48.0	8513 15.700							
15.800		16.0	133.0	83.0	48.0	8513 15.800							
15.870	5/8	16.0	133.0	83.0	48.0	8513 15.870							





Article no. 8514						Article no. 8514							
d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.	d1 mm	inch	d2 h6 mm	l1 mm	l2 mm	l3 mm	Order no.
12.500		14.0	182.0	133.0	45.0	8514 12.500	15.900		16.0	204.0	152.0	48.0	8514 15.900
12.600		14.0	182.0	133.0	45.0	8514 12.600	16.000		16.0	204.0	152.0	48.0	8514 16.000
12.700	1/2	14.0	182.0	133.0	45.0	8514 12.700	16.270	41/64	18.0	223.0	171.0	48.0	8514 16.270
12.800		14.0	182.0	133.0	45.0	8514 12.800	16.300		18.0	223.0	171.0	48.0	8514 16.300
12.900		14.0	182.0	133.0	45.0	8514 12.900	16.500		18.0	223.0	171.0	48.0	8514 16.500
13.000		14.0	182.0	133.0	45.0	8514 13.000	16.670	21/32	18.0	223.0	171.0	48.0	8514 16.670
13.100	33/64	14.0	182.0	133.0	45.0	8514 13.100	16.700		18.0	223.0	171.0	48.0	8514 16.700
13.200		14.0	182.0	133.0	45.0	8514 13.200	16.900		18.0	223.0	171.0	48.0	8514 16.900
13.300		14.0	182.0	133.0	45.0	8514 13.300	17.000		18.0	223.0	171.0	48.0	8514 17.000
13.400		14.0	182.0	133.0	45.0	8514 13.400	17.070	43/64	18.0	223.0	171.0	48.0	8514 17.070
13.490	17/32	14.0	182.0	133.0	45.0	8514 13.490	17.460	11/16	18.0	223.0	171.0	48.0	8514 17.460
13.500		14.0	182.0	133.0	45.0	8514 13.500	17.500		18.0	223.0	171.0	48.0	8514 17.500
13.600		14.0	182.0	133.0	45.0	8514 13.600	17.550		18.0	223.0	171.0	48.0	8514 17.550
13.700		14.0	182.0	133.0	45.0	8514 13.700	17.700		18.0	223.0	171.0	48.0	8514 17.700
13.800		14.0	182.0	133.0	45.0	8514 13.800	17.860	45/64	18.0	223.0	171.0	48.0	8514 17.860
13.890	35/64	14.0	182.0	133.0	45.0	8514 13.890	18.000		18.0	223.0	171.0	48.0	8514 18.000
13.900		14.0	182.0	133.0	45.0	8514 13.900	18.260	23/32	20.0	244.0	190.0	50.0	8514 18.260
14.000		14.0	182.0	133.0	45.0	8514 14.000	18.500		20.0	244.0	190.0	50.0	8514 18.500
14.100		16.0	204.0	152.0	48.0	8514 14.100	18.700		20.0	244.0	190.0	50.0	8514 18.700
14.200		16.0	204.0	152.0	48.0	8514 14.200	18.900		20.0	244.0	190.0	50.0	8514 18.900
14.290	9/16	16.0	204.0	152.0	48.0	8514 14.290	19.000		20.0	244.0	190.0	50.0	8514 19.000
14.300		16.0	204.0	152.0	48.0	8514 14.300	19.050	3/4	20.0	244.0	190.0	50.0	8514 19.050
14.400		16.0	204.0	152.0	48.0	8514 14.400	19.250		20.0	244.0	190.0	50.0	8514 19.250
14.500		16.0	204.0	152.0	48.0	8514 14.500	19.300		20.0	244.0	190.0	50.0	8514 19.300
14.600		16.0	204.0	152.0	48.0	8514 14.600	19.450	49/64	20.0	244.0	190.0	50.0	8514 19.450
14.680	37/64	16.0	204.0	152.0	48.0	8514 14.680	19.500		20.0	244.0	190.0	50.0	8514 19.500
14.700		16.0	204.0	152.0	48.0	8514 14.700	19.550		20.0	244.0	190.0	50.0	8514 19.550
14.800		16.0	204.0	152.0	48.0	8514 14.800	19.700		20.0	244.0	190.0	50.0	8514 19.700
14.900		16.0	204.0	152.0	48.0	8514 14.900	19.800		20.0	244.0	190.0	50.0	8514 19.800
15.000		16.0	204.0	152.0	48.0	8514 15.000	19.840	25/32	20.0	244.0	190.0	50.0	8514 19.840
15.080	19/32	16.0	204.0	152.0	48.0	8514 15.080	20.000		20.0	244.0	190.0	50.0	8514 20.000
15.100		16.0	204.0	152.0	48.0	8514 15.100							
15.200		16.0	204.0	152.0	48.0	8514 15.200							
15.300		16.0	204.0	152.0	48.0	8514 15.300							
15.400		16.0	204.0	152.0	48.0	8514 15.400							
15.480	39/64	16.0	204.0	152.0	48.0	8514 15.480							
15.500		16.0	204.0	152.0	48.0	8514 15.500							
15.550		16.0	204.0	152.0	48.0	8514 15.550							
15.600		16.0	204.0	152.0	48.0	8514 15.600							
15.700		16.0	204.0	152.0	48.0	8514 15.700							
15.800		16.0	204.0	152.0	48.0	8514 15.800							
15.870	5/8	16.0	204.0	152.0	48.0	8514 15.870							





Through-thread in the  
**housing**  
for a turbocharger

**Industry:**  
Automotive industry

**Material:**  
1.4826 / X15CrNiSi20-12

**Target:**  
Reduce tool costs through  
longer tool lives

## The challenge

An important component in a turbocharger, this housing is responsible for transporting hot exhaust gases. High-temperature components like this are often made from this special stainless steel, which is resistant to temperatures up to 1000°C and offers extra tensile strength.

However, during machining, the material tends to form hard carbides on tool surfaces. Especially on the tap's cutting edges, these lead to increased wear and micro-chipping, which negatively affects the cutting performance and tool life.

Tap Pionex

# HIGH PERFORMANCE FOR YOUR THREADS

## Tool solution

The Pionex is our high-performance tap for blind hole machining in stainless steels. The tool is characterised by an increased helical pitch and its optimised flute geometry. Both ensure better chip removal and increase the tool life.

At the same time, an advanced TiAlN coating system reduces friction during thread tapping. In addition to stainless steels, Pionex is also ideal for use in stainless steels as well as low and high alloy steels.

## TOOL PERFORMANCE REPORT

	Competitors' tool	Tap Pionex
Thread dimension	M6	M6
Cutting speed ( $v_c$ )	2.5 m/min	2.5 m/min
Speed (n)	133 1/rev/min	133 1/rev/min
Feed rate ( $v_f$ )	133 mm/min	133 mm/min
Thread depth ( $a_p$ )	16 mm	16 mm
Tool life (number of threads)	50	70
Machining time per hole	16 sec.	16 sec.

**40 %** longer tool life under otherwise identical conditions

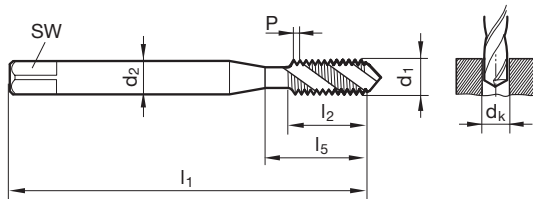
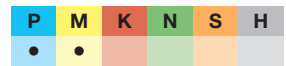
**Pionex**





## Taps for ISO metric threads

Article no. **393**



Standard **DIN 371/DIN 376**  
Article no. **393**

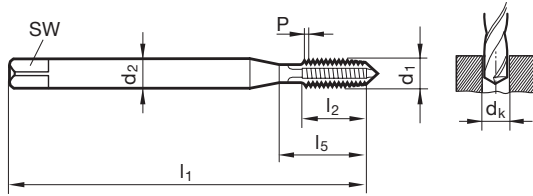
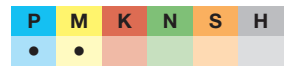
d1	P mm	d2 mm	SW mm	dk mm	l1 mm	l2 mm	l5 mm	Standard	Order no.
M2	0.400	2.80	2.10	1.60	45.00	4.50	13.50	DIN 371	393 2.000
M2,5	0.450	2.80	2.10	2.05	50.00	5.00	14.50	DIN 371	393 2.500
M3	0.500	3.50	2.70	2.50	56.00	6.00	18.00	DIN 371	393 3.000
M3,5	0.600	4.00	3.00	2.90	56.00	7.00	20.00	DIN 371	393 3.500
M4	0.700	4.50	3.40	3.30	63.00	7.50	21.00	DIN 371	393 4.000
M4,5	0.750	6.00	4.90	3.70	70.00	8.50	25.00	DIN 371	393 4.500
M5	0.800	6.00	4.90	4.20	70.00	8.50	25.00	DIN 371	393 5.000
M6	1.000	6.00	4.90	5.00	80.00	11.00	30.00	DIN 371	393 6.000
M7	1.000	7.00	5.50	6.00	80.00	11.00	30.00	DIN 371	393 7.000
M8	1.250	8.00	6.20	6.80	90.00	14.00	35.00	DIN 371	393 8.000
M9	1.250	9.00	7.00	7.80	90.00	14.00	35.00	DIN 371	393 9.000
M10	1.500	10.00	8.00	8.50	100.00	16.00	39.00	DIN 371	393 10.000
M11	1.500	8.00	6.20	9.50	100.00	16.00	42.00	DIN 376	393 11.000
M12	1.750	9.00	7.00	10.20	110.00	18.50	49.00	DIN 376	393 12.000
M14	2.000	11.00	9.00	12.00	110.00	20.00	53.00	DIN 376	393 14.000
M16	2.000	12.00	9.00	14.00	110.00	20.00	54.00	DIN 376	393 16.000
M18	2.500	14.00	11.00	15.50	125.00	25.00	62.00	DIN 376	393 18.000
M20	2.500	16.00	12.00	17.50	140.00	25.00	62.00	DIN 376	393 20.000
M22	2.500	18.00	14.50	19.50	140.00	27.00	62.00	DIN 376	393 22.000
M24	3.000	18.00	14.50	21.00	160.00	30.00	73.00	DIN 376	393 24.000
M27	3.000	20.00	16.00	24.00	160.00	30.00	73.00	DIN 376	393 27.000
M30	3.500	22.00	18.00	26.50	180.00	35.00	85.00	DIN 376	393 30.000
M33	3.500	25.00	20.00	29.50	180.00	40.00	91.00	DIN 376	393 33.000
M36	4.000	28.00	22.00	32.00	200.00	40.00	102.00	DIN 376	393 36.000
M39	4.000	32.00	24.00	35.00	200.00	50.00	107.00	DIN 376	393 39.000
M42	4.500	32.00	24.00	37.50	200.00	45.00	112.00	DIN 376	393 42.000





Taps for ISO metric threads

Article no. 4218



Standard **DIN 371/DIN 376**  
Article no. **4218**

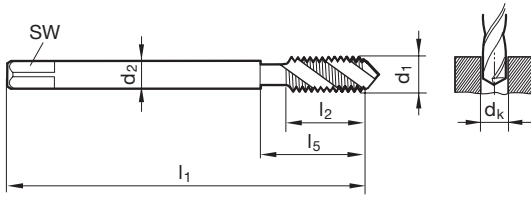
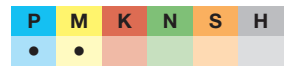
d1	P mm	d2 mm	SW mm	dk mm	l1 mm	l2 mm	l5 mm	Standard	Order no.
M2	0.400	2.80	2.10	1.60	45.00	8.00	13.50	DIN 371	4218 2.000
M2,5	0.450	2.80	2.10	2.05	50.00	9.00	14.50	DIN 371	4218 2.500
M3	0.500	3.50	2.70	2.50	56.00	10.00	18.00	DIN 371	4218 3.000
M4	0.700	4.50	3.40	3.30	63.00	12.00	21.00	DIN 371	4218 4.000
M4,5	0.750	6.00	4.90	3.70	70.00	14.00	25.00	DIN 371	4218 4.500
M5	0.800	6.00	4.90	4.20	70.00	14.00	25.00	DIN 371	4218 5.000
M6	1.000	6.00	4.90	5.00	80.00	16.00	30.00	DIN 371	4218 6.000
M7	1.000	7.00	5.50	6.00	80.00	16.00	30.00	DIN 371	4218 7.000
M8	1.250	8.00	6.20	6.80	90.00	17.00	35.00	DIN 371	4218 8.000
M9	1.250	9.00	7.00	7.80	90.00	17.00	35.00	DIN 371	4218 9.000
M10	1.500	10.00	8.00	8.50	100.00	20.00	39.00	DIN 371	4218 10.000
M11	1.500	8.00	6.20	9.50	100.00	20.00	42.00	DIN 376	4218 11.000
M12	1.750	9.00	7.00	10.20	110.00	24.00	49.00	DIN 376	4218 12.000
M14	2.000	11.00	9.00	12.00	110.00	26.00	53.00	DIN 376	4218 14.000
M16	2.000	12.00	9.00	14.00	110.00	26.00	54.00	DIN 376	4218 16.000
M18	2.500	14.00	11.00	15.50	125.00	30.00	62.00	DIN 376	4218 18.000
M20	2.500	16.00	12.00	17.50	140.00	32.00	62.00	DIN 376	4218 20.000
M22	2.500	18.00	14.50	19.50	140.00	32.00	62.00	DIN 376	4218 22.000
M24	3.000	18.00	14.50	21.00	160.00	36.00	73.00	DIN 376	4218 24.000
M27	3.000	20.00	16.00	24.00	160.00	36.00	73.00	DIN 376	4218 27.000
M30	3.500	22.00	18.00	26.50	180.00	40.00	85.00	DIN 376	4218 30.000
M33	3.500	25.00	20.00	29.50	180.00	40.00	91.00	DIN 376	4218 33.000
M36	4.000	28.00	22.00	32.00	200.00	50.00	102.00	DIN 376	4218 36.000
M39	4.000	32.00	24.00	35.00	200.00	50.00	107.00	DIN 376	4218 39.000
M42	4.500	32.00	24.00	37.50	200.00	56.00	112.00	DIN 376	4218 42.000





## Taps for ISO metric fine threads

Article no. **394**



Standard

**DIN 374**

Article no.

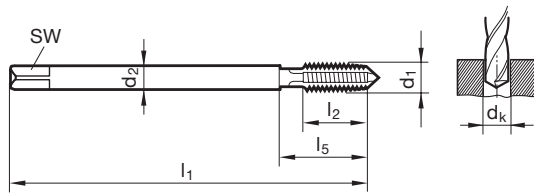
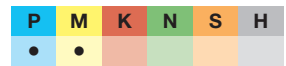
**394**

d1	d2 mm	SW mm	dk mm	l1 mm	l2 mm	l5 mm	Order no.
M3 x 0,35	2.20	1.80	2.65	56.00	4.00	18.00	394 3.002
M4 x 0,35	2.80	2.10	3.65	63.00	5.00	21.00	394 4.002
M4 x 0,5	2.80	2.10	3.50	63.00	5.00	21.00	394 4.003
M5 x 0,5	3.50	2.70	4.50	70.00	5.00	25.00	394 5.003
M6 x 0,5	4.50	3.40	5.50	80.00	5.00	30.00	394 6.003
M6 x 0,75	4.50	3.40	5.20	80.00	8.00	30.00	394 6.004
M8 x 0,75	6.00	4.90	7.20	80.00	8.00	30.00	394 8.004
M8 x 1	6.00	4.90	7.00	90.00	11.00	35.00	394 8.005
M9 x 1	7.00	5.50	8.00	90.00	11.00	35.00	394 9.005
M10 x 0,75	7.00	5.50	9.20	90.00	11.00	35.00	394 10.004
M10 x 1	7.00	5.50	9.00	90.00	11.00	35.00	394 10.005
M10 x 1,25	7.00	5.50	8.80	100.00	14.00	39.00	394 10.006
M11 x 1	8.00	6.20	10.00	90.00	11.00	33.00	394 11.005
M12 x 1	9.00	7.00	11.00	100.00	11.00	40.00	394 12.005
M12 x 1,25	9.00	7.00	10.80	100.00	15.00	40.00	394 12.006
M12 x 1,5	9.00	7.00	10.50	100.00	15.00	40.00	394 12.007
M14 x 1	11.00	9.00	13.00	100.00	11.00	40.00	394 14.005
M14 x 1,25	11.00	9.00	12.80	100.00	15.00	40.00	394 14.006
M14 x 1,5	11.00	9.00	12.50	100.00	15.00	40.00	394 14.007
M16 x 1	12.00	9.00	15.00	100.00	11.00	44.00	394 16.005
M16 x 1,5	12.00	9.00	14.50	100.00	15.00	44.00	394 16.007
M18 x 1	14.00	11.00	17.00	110.00	12.00	44.00	394 18.005
M18 x 1,5	14.00	11.00	16.50	110.00	16.00	44.00	394 18.007
M18 x 2	14.00	11.00	16.00	125.00	20.00	58.00	394 18.008
M20 x 1	16.00	12.00	19.00	125.00	12.00	44.00	394 20.005
M20 x 1,5	16.00	12.00	18.50	125.00	16.00	44.00	394 20.007
M20 x 2	16.00	12.00	18.00	140.00	20.00	60.00	394 20.008
M22 x 1	18.00	14.50	21.00	125.00	12.00	44.00	394 22.005
M22 x 1,5	18.00	14.50	20.50	125.00	16.00	44.00	394 22.007
M22 x 2	18.00	14.50	20.00	140.00	22.00	62.00	394 22.008
M24 x 1	18.00	14.50	23.00	140.00	15.00	48.00	394 24.005
M24 x 1,5	18.00	14.50	22.50	140.00	16.00	48.00	394 24.007
M24 x 2	18.00	14.50	22.00	140.00	22.00	48.00	394 24.008



Taps for ISO metric fine threads

Article no. 4219



Standard

DIN 374

Article no.

4219

d1	d2 mm	SW mm	dk mm	l1 mm	l2 mm	l5 mm	Order no.
M3 x 0,35	2.20	1.80	2.65	56.00	7.00	18.00	4219 3.002
M4 x 0,35	2.80	2.10	3.65	63.00	8.00	21.00	4219 4.002
M4 x 0,5	2.80	2.10	3.50	63.00	8.00	21.00	4219 4.003
M5 x 0,5	3.50	2.70	4.50	70.00	10.00	25.00	4219 5.003
M6 x 0,5	4.50	3.40	5.50	80.00	13.00	30.00	4219 6.003
M6 x 0,75	4.50	3.40	5.20	80.00	13.00	30.00	4219 6.004
M8 x 0,75	6.00	4.90	7.20	80.00	14.00	30.00	4219 8.004
M8 x 1	6.00	4.90	7.00	90.00	17.00	35.00	4219 8.005
M9 x 1	7.00	5.50	8.00	90.00	16.00	35.00	4219 9.005
M10 x 0,75	7.00	5.50	9.20	90.00	16.00	35.00	4219 10.004
M10 x 1	7.00	5.50	9.00	90.00	16.00	35.00	4219 10.005
M10 x 1,25	7.00	5.50	8.80	100.00	20.00	39.00	4219 10.006
M11 x 1	8.00	6.20	10.00	90.00	20.00	33.00	4219 11.005
M12 x 1	9.00	7.00	11.00	100.00	20.00	40.00	4219 12.005
M12 x 1,25	9.00	7.00	10.80	100.00	20.00	40.00	4219 12.006
M12 x 1,5	9.00	7.00	10.50	100.00	20.00	40.00	4219 12.007
M14 x 1	11.00	9.00	13.00	100.00	20.00	40.00	4219 14.005
M14 x 1,25	11.00	9.00	12.80	100.00	20.00	40.00	4219 14.006
M14 x 1,5	11.00	9.00	12.50	100.00	20.00	40.00	4219 14.007
M16 x 1	12.00	9.00	15.00	100.00	22.00	44.00	4219 16.005
M16 x 1,5	12.00	9.00	14.50	100.00	22.00	44.00	4219 16.007
M18 x 1	14.00	11.00	17.00	110.00	25.00	44.00	4219 18.005
M18 x 1,5	14.00	11.00	16.50	110.00	25.00	44.00	4219 18.007
M18 x 2	14.00	11.00	16.00	125.00	30.00	58.00	4219 18.008
M20 x 1	16.00	12.00	19.00	125.00	25.00	44.00	4219 20.005
M20 x 1,5	16.00	12.00	18.50	125.00	25.00	44.00	4219 20.007
M20 x 2	16.00	12.00	18.00	140.00	32.00	60.00	4219 20.008
M22 x 1	18.00	14.50	21.00	125.00	25.00	44.00	4219 22.005
M22 x 1,5	18.00	14.50	20.50	125.00	25.00	44.00	4219 22.007
M22 x 2	18.00	14.50	20.00	140.00	32.00	62.00	4219 22.008
M24 x 1	18.00	14.50	23.00	140.00	28.00	48.00	4219 24.005
M24 x 1,5	18.00	14.50	22.50	140.00	28.00	48.00	4219 24.007
M24 x 2	18.00	14.50	22.00	140.00	28.00	48.00	4219 24.008

Blind hole thread in a  
**valve body**  
for cooling lubricants

**Industry:**  
Fluid technology

**Material:**  
1.4301 / X5CrNi18-10

**Target:**  
maximum tool life in large-scale  
batch production

## The challenge

The valve body is used to control liquids, which is why the manufacturer relies on the excellent corrosion resistance of the chrome-nickel steel. However, the stainless austenitic high-grade steel has a high toughness and hardness, which makes deformation more difficult.

Tool wear during thread production in this material is as high as you would anticipate: The hard particles damage the fluteless tap's tool surfaces and the quality of the thread also suffers under the material's high strength. Even tool breakage is not uncommon, as only a few fluteless taps can withstand the extremely high elongation.

# Fluteless tap InoxPro

## PERFECT DIMENSIONAL ACCURACY

### Tool solution

The new fluteless tap InoxPro succeeds where many conventional fluteless taps fail: its perfectly synced macro and micro geometry with an optimised lubricating flute geometry and polygon shape ensure reliable fluteless tapping in stainless steels.

To minimise tool wear, we also rely on a particularly smooth and temperature-resistant HiPIMS AlCrN coating. You can also rest assured that you'll enjoy the highest tool life and perfect dimensional accuracy for your threads in combination with water-mixed emulsions.

### TOOL PERFORMANCE REPORT

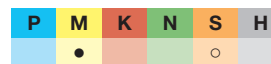
	Werkzeug Wettbewerber	Fluteless tap InoxPro
Thread dimension	M8	M8
Cutting speed ( $v_c$ )	6 m/min	6 m/min
Speed (n)	238 rev/min	238 rev/min
Feed rate ( $v_f$ )	298 mm/min	298 mm/min
Thread depth ( $a_p$ )	20 mm	20 mm
Tool life	20 min	30 min

**50 %** longer tool life under otherwise identical conditions

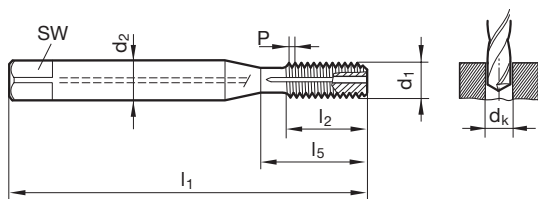
Fluteless tap  
**INOXPRO**







with internal cooling  $\geq$  M5 • • maximum process reliability



Standard  
Article no.

~DIN 371

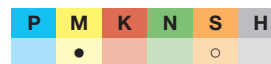
**8100**

d1	P	d2	SW	dk	l1	l2	l5	Order no.
M2	0.400	2.80	2.10	1.85	45.00	3.20	13.50	8100 2.000
M2,5	0.450	2.80	2.10	2.30	50.00	3.60	14.50	8100 2.500
M3	0.500	3.50	2.70	2.80	56.00	4.80	18.00	8100 3.000
M4	0.700	4.50	3.40	3.70	63.00	6.40	21.00	8100 4.000
M5	0.800	6.00	4.90	4.65	70.00	6.40	25.00	8100 5.000
M6	1.000	6.00	4.90	5.55	80.00	8.00	30.00	8100 6.000
M8	1.250	8.00	6.20	7.40	90.00	11.20	35.00	8100 8.000
M10	1.500	10.00	8.00	9.30	100.00	12.00	39.00	8100 10.000
M12	1.750	9.00	7.00	11.20	110.00	14.00	49.00	8100 12.000

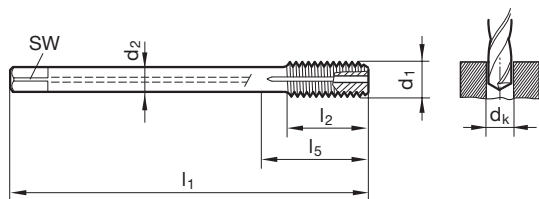


Fluteless taps with coolant ducts for ISO metric fine threads

Article no. 8101



• maximum process reliability



Standard  
Article no.

~DIN 371  
8101

d1	P	d2	SW	dk	l1	l2	l5	Order no.
M6 x 0,75	0.750	6.00	4.90	5.65	80.00	8.00	30.00	8101 6.004
M8 x 0,75	0.750	8.00	6.20	7.65	90.00	11.20	30.00	8101 8.004
M8 x 1	1.000	8.00	6.20	7.55	90.00	11.20	35.00	8101 8.005
M10 x 1	1.000	10.00	8.00	9.55	100.00	12.00	35.00	8101 10.005
M10 x 1,25	1.250	10.00	8.00	9.40	100.00	12.00	39.00	8101 10.006
M12 x 1	1.000	9.00	7.00	11.55	100.00	12.00	49.00	8101 12.005
M12 x 1,5	1.500	9.00	7.00	11.30	100.00	12.00	49.00	8101 12.007
M14 x 1,5	1.500	11.00	9.00	13.30	100.00	12.00	53.00	8101 14.007
M16 x 1,5	1.500	12.00	9.00	15.30	100.00	12.00	54.00	8101 16.007
M18 x 1,5	1.500	14.00	11.00	17.30	110.00	12.00	62.00	8101 18.007
M20 x 1,5	1.500	16.00	12.00	19.30	125.00	12.00	62.00	8101 20.007



## Micro-precision drills without coolant ducts, 3xD



Machining group		f (mm/rev) with nom. Ø								
			0,5	0,8	1	1,2	1,5	2	2,5	3
	v <sub>c</sub> (m/min)									
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB		90	0,0400	0,0640	0,0800	0,0960	0,1200	0,1600	0,2000	0,2400
P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB		80	0,0360	0,0575	0,0720	0,0865	0,1080	0,1440	0,1800	0,2160
P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB		80	0,0360	0,0575	0,0720	0,0865	0,1080	0,1440	0,1800	0,2160
P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB		75	0,0340	0,0545	0,0680	0,0815	0,1020	0,1360	0,1700	0,2040
P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm <sup>2</sup> , 250 HB		75	0,0340	0,0545	0,0680	0,0815	0,1020	0,1360	0,1700	0,2040
P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm <sup>2</sup> , 270 HB		70	0,0320	0,0510	0,0640	0,0770	0,0960	0,1280	0,1600	0,1920
P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm <sup>2</sup> , 300 HB		70	0,0300	0,0480	0,0600	0,0720	0,0900	0,1200	0,1500	0,1800
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm <sup>2</sup> , 180 HB		80	0,0350	0,0560	0,0700	0,0840	0,1050	0,1400	0,1750	0,2100
P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm <sup>2</sup> , 275 HB		80	0,0350	0,0560	0,0700	0,0840	0,1050	0,1400	0,1750	0,2100
P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm <sup>2</sup> , 300 HB		70	0,0300	0,0475	0,0595	0,0715	0,0895	0,1190	0,1490	0,1785
P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm <sup>2</sup> , 350 HB		60	0,0265	0,0420	0,0525	0,0630	0,0790	0,1050	0,1315	0,1575
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB		60	0,0350	0,0560	0,0700	0,0840	0,1050	0,1400	0,1750	0,2100
P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm <sup>2</sup> , 325 HB		50	0,0300	0,0475	0,0595	0,0715	0,0895	0,1190	0,1490	0,1785
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives		40	0,0125	0,0200	0,0250	0,0300	0,0375	0,0500	0,0625	0,0750
M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB		35	0,0115	0,0180	0,0225	0,0270	0,0340	0,0450	0,0565	0,0675
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm <sup>2</sup> , 240 HB		35	0,0105	0,0170	0,0215	0,0255	0,0320	0,0425	0,0530	0,0640
M2.1.1 Stainless steel, austenitic, quenched, 180 HB		25	0,0075	0,0120	0,0150	0,0180	0,0225	0,0300	0,0375	0,0450
M2.2.1 Duplex steel, high-strength stainless steels		20	0,0065	0,0100	0,0130	0,0155	0,0190	0,0255	0,0320	0,0385
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB										
K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB										
K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB										
K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB										
K1.3.1 Malleable cast iron, ferritic, 130 HB										
K1.3.2 Malleable cast iron, pearlitic, 230 HB										
K2.1.1 Vermicular graphite cast iron (GJV)										
K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)										
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB		270	0,0300	0,0480	0,0600	0,0720	0,0900	0,1200	0,1500	0,1800
N1.1.2 Wrought aluminium alloys, hardened, 100 HB		270	0,0300	0,0480	0,0600	0,0720	0,0900	0,1200	0,1500	0,1800
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB		180	0,0400	0,0640	0,0800	0,0960	0,1200	0,1600	0,2000	0,2400
N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB		180	0,0400	0,0640	0,0800	0,0960	0,1200	0,1600	0,2000	0,2400
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB		155	0,0340	0,0545	0,0680	0,0815	0,1020	0,1360	0,1700	0,2040
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 %		125	0,0300	0,0480	0,0600	0,0720	0,0900	0,1200	0,1500	0,1800
N3.1.2 Copper and copper alloys: CuZn, CuSnZn		105	0,0255	0,0410	0,0510	0,0610	0,0765	0,1020	0,1275	0,1530
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte		100	0,0240	0,0385	0,0480	0,0575	0,0720	0,0960	0,1200	0,1440
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics										
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.										
N4.1.3 Non-metallic materials: Graphite										
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB		30	0,0100	0,0160	0,0200	0,0240	0,0300	0,0400	0,0500	0,0600
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB		25	0,0080	0,0130	0,0160	0,0190	0,0240	0,0320	0,0400	0,0480
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB		25	0,0100	0,0160	0,0200	0,0240	0,0300	0,0400	0,0500	0,0600
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB		15	0,0070	0,0110	0,0140	0,0170	0,0210	0,0280	0,0350	0,0420
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB		20	0,0070	0,0110	0,0140	0,0170	0,0210	0,0280	0,0350	0,0420
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm <sup>2</sup>		25	0,0075	0,0120	0,0150	0,0180	0,0225	0,0300	0,0375	0,0450
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm <sup>2</sup>		15	0,0060	0,0095	0,0120	0,0145	0,0180	0,0240	0,0300	0,0360
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC										
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC										
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC										
H2.1.1 Chilled cast iron, 400 HB										
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC										



Micro-precision drills with coolant ducts, ≤ 6xD



Machining group		f (mm/rev) with nom. Ø								
			1	1,2	1,5	1,8	2	2,2	2,5	3
	v <sub>c</sub> (m/min)									
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB		100	0,0500	0,0600	0,0750	0,0900	0,1000	0,1100	0,1250	0,1500
P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB		90	0,0450	0,0540	0,0675	0,0810	0,0900	0,0990	0,1125	0,1350
P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB		90	0,0450	0,0540	0,0675	0,0810	0,0900	0,0990	0,1125	0,1350
P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB		85	0,0425	0,0510	0,0640	0,0765	0,0850	0,0935	0,1065	0,1275
P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm <sup>2</sup> , 250 HB		85	0,0425	0,0510	0,0640	0,0765	0,0850	0,0935	0,1065	0,1275
P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm <sup>2</sup> , 270 HB		80	0,0400	0,0480	0,0600	0,0720	0,0800	0,0880	0,1000	0,1200
P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm <sup>2</sup> , 300 HB		75	0,0375	0,0450	0,0565	0,0675	0,0750	0,0825	0,0940	0,1125
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm <sup>2</sup> , 180 HB		90	0,0500	0,0600	0,0750	0,0900	0,1000	0,1100	0,1250	0,1500
P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm <sup>2</sup> , 275 HB		90	0,0500	0,0600	0,0750	0,0900	0,1000	0,1100	0,1250	0,1500
P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm <sup>2</sup> , 300 HB		75	0,0425	0,0510	0,0640	0,0765	0,0850	0,0935	0,1065	0,1275
P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm <sup>2</sup> , 350 HB		70	0,0375	0,0450	0,0565	0,0675	0,0750	0,0825	0,0940	0,1125
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB		70	0,0500	0,0600	0,0750	0,0900	0,1000	0,1100	0,1250	0,1500
P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm <sup>2</sup> , 325 HB		60	0,0425	0,0510	0,0640	0,0765	0,0850	0,0935	0,1065	0,1275
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives		100	0,0370	0,0445	0,0555	0,0665	0,0740	0,0815	0,0925	0,1110
M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB		90	0,0335	0,0400	0,0500	0,0600	0,0665	0,0735	0,0830	0,1000
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm <sup>2</sup> , 240 HB		85	0,0315	0,0375	0,0470	0,0565	0,0630	0,0690	0,0785	0,0945
M2.1.1 Stainless steel, austenitic, quenched, 180 HB		80	0,0300	0,0360	0,0450	0,0540	0,0600	0,0660	0,0750	0,0900
M2.2.1 Duplex steel, high-strength stainless steels		70	0,0255	0,0305	0,0385	0,0460	0,0510	0,0560	0,0640	0,0765
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB										
K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB										
K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB										
K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB										
K1.3.1 Malleable cast iron, ferritic, 130 HB										
K1.3.2 Malleable cast iron, pearlitic, 230 HB										
K2.1.1 Vermicular graphite cast iron (GJV)										
K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)										
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB		300	0,0600	0,0720	0,0900	0,1080	0,1200	0,1320	0,1500	0,1800
N1.1.2 Wrought aluminium alloys, hardened, 100 HB		300	0,0600	0,0720	0,0900	0,1080	0,1200	0,1320	0,1500	0,1800
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB		200	0,0800	0,0960	0,1200	0,1440	0,1600	0,1760	0,2000	0,2400
N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB		200	0,0800	0,0960	0,1200	0,1440	0,1600	0,1760	0,2000	0,2400
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB		170	0,0680	0,0815	0,1020	0,1225	0,1360	0,1495	0,1700	0,2040
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 %		150	0,0500	0,0600	0,0750	0,0900	0,1000	0,1100	0,1250	0,1500
N3.1.2 Copper and copper alloys: CuZn, CuSnZn		130	0,0425	0,0510	0,0640	0,0765	0,0850	0,0935	0,1065	0,1275
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte		120	0,0400	0,0480	0,0600	0,0720	0,0800	0,0880	0,1000	0,1200
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics										
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.										
N4.1.3 Non-metallic materials: Graphite										
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB		50	0,0200	0,0240	0,0300	0,0360	0,0400	0,0440	0,0500	0,0600
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB		40	0,0160	0,0190	0,0240	0,0290	0,0320	0,0350	0,0400	0,0480
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB		45	0,0200	0,0240	0,0300	0,0360	0,0400	0,0440	0,0500	0,0600
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB		30	0,0140	0,0170	0,0210	0,0250	0,0280	0,0310	0,0350	0,0420
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB		30	0,0140	0,0170	0,0210	0,0250	0,0280	0,0310	0,0350	0,0420
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm <sup>2</sup>		45	0,0150	0,0180	0,0225	0,0270	0,0300	0,0330	0,0375	0,0450
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm <sup>2</sup>		35	0,0120	0,0145	0,0180	0,0215	0,0240	0,0265	0,0300	0,0360
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC										
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC										
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC										
H2.1.1 Chilled cast iron, 400 HB										
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC										





## Micro-precision drills with coolant ducts, > 6xD



Machining group		f (mm/rev) with nom. Ø								
			1	1,2	1,5	1,8	2	2,2	2,5	3
	$v_c$ (m/min)									
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB		100	0,0300	0,0360	0,0450	0,0540	0,0600	0,0660	0,0750	0,0900
P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB		90	0,0270	0,0325	0,0405	0,0485	0,0540	0,0595	0,0675	0,0810
P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB		90	0,0270	0,0325	0,0405	0,0485	0,0540	0,0595	0,0675	0,0810
P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB		85	0,0255	0,0305	0,0385	0,0460	0,0510	0,0560	0,0640	0,0765
P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm <sup>2</sup> , 250 HB		85	0,0255	0,0305	0,0385	0,0460	0,0510	0,0560	0,0640	0,0765
P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm <sup>2</sup> , 270 HB		80	0,0240	0,0290	0,0360	0,0430	0,0480	0,0530	0,0600	0,0720
P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm <sup>2</sup> , 300 HB		75	0,0225	0,0270	0,0340	0,0405	0,0450	0,0495	0,0560	0,0675
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm <sup>2</sup> , 180 HB		90	0,0300	0,0360	0,0450	0,0540	0,0600	0,0660	0,0750	0,0900
P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm <sup>2</sup> , 275 HB		90	0,0300	0,0360	0,0450	0,0540	0,0600	0,0660	0,0750	0,0900
P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm <sup>2</sup> , 300 HB		75	0,0255	0,0305	0,0385	0,0460	0,0510	0,0560	0,0640	0,0765
P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm <sup>2</sup> , 350 HB		70	0,0225	0,0270	0,0340	0,0405	0,0450	0,0495	0,0560	0,0675
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB		70	0,0300	0,0360	0,0450	0,0540	0,0600	0,0660	0,0750	0,0900
P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm <sup>2</sup> , 325 HB		60	0,0255	0,0305	0,0385	0,0460	0,0510	0,0560	0,0640	0,0765
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives		100	0,0370	0,0445	0,0555	0,0665	0,0740	0,0815	0,0925	0,1110
M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB		90	0,0335	0,0400	0,0500	0,0600	0,0665	0,0735	0,0830	0,1000
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm <sup>2</sup> , 240 HB		85	0,0315	0,0375	0,0470	0,0565	0,0630	0,0690	0,0785	0,0945
M2.1.1 Stainless steel, austenitic, quenched, 180 HB		80	0,0300	0,0360	0,0450	0,0540	0,0600	0,0660	0,0750	0,0900
M2.2.1 Duplex steel, high-strength stainless steels		70	0,0255	0,0305	0,0385	0,0460	0,0510	0,0560	0,0640	0,0765
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB										
K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB										
K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB										
K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB										
K1.3.1 Malleable cast iron, ferritic, 130 HB										
K1.3.2 Malleable cast iron, pearlitic, 230 HB										
K2.1.1 Vermicular graphite cast iron (GJV)										
K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)										
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB		300	0,0400	0,0480	0,0600	0,0720	0,0800	0,0880	0,1000	0,1200
N1.1.2 Wrought aluminium alloys, hardened, 100 HB		300	0,0400	0,0480	0,0600	0,0720	0,0800	0,0880	0,1000	0,1200
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB		200	0,0600	0,0720	0,0900	0,1080	0,1200	0,1320	0,1500	0,1800
N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB		200	0,0600	0,0720	0,0900	0,1080	0,1200	0,1320	0,1500	0,1800
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB		170	0,0510	0,0610	0,0765	0,0920	0,1020	0,1120	0,1275	0,1530
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 %		150	0,0300	0,0360	0,0450	0,0540	0,0600	0,0660	0,0750	0,0900
N3.1.2 Copper and copper alloys: CuZn, CuSnZn		130	0,0255	0,0305	0,0385	0,0460	0,0510	0,0560	0,0640	0,0765
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte		120	0,0240	0,0290	0,0360	0,0430	0,0480	0,0530	0,0600	0,0720
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics										
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.										
N4.1.3 Non-metallic materials: Graphite										
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB		50	0,0200	0,0240	0,0300	0,0360	0,0400	0,0440	0,0500	0,0600
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB		40	0,0160	0,0190	0,0240	0,0290	0,0320	0,0350	0,0400	0,0480
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB		45	0,0200	0,0240	0,0300	0,0360	0,0400	0,0440	0,0500	0,0600
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB		30	0,0140	0,0170	0,0210	0,0250	0,0280	0,0310	0,0350	0,0420
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB		30	0,0140	0,0170	0,0210	0,0250	0,0280	0,0310	0,0350	0,0420
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm <sup>2</sup>		40	0,0120	0,0145	0,0180	0,0215	0,0240	0,0265	0,0300	0,0360
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm <sup>2</sup>		30	0,0095	0,0115	0,0145	0,0175	0,0190	0,0210	0,0240	0,0290
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC										
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC										
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC										
H2.1.1 Chilled cast iron, 400 HB										
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC										



## Ratio drills with coolant ducts, RT 100 InoxPro, 3xD und 5xD



Machining group		f (mm/rev) with nom. Ø								
	v <sub>c</sub> (m/min)	3	4	6	8	10	12	14	16	20
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB	140	0,155	0,190	0,260	0,325	0,385	0,440	0,495	0,550	0,650
P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB	125	0,140	0,170	0,235	0,290	0,345	0,395	0,445	0,495	0,585
P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB	125	0,140	0,170	0,235	0,290	0,345	0,395	0,445	0,495	0,585
P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB	120	0,130	0,165	0,220	0,275	0,325	0,375	0,420	0,465	0,555
P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm <sup>2</sup> , 250 HB	120	0,130	0,165	0,220	0,275	0,325	0,375	0,420	0,465	0,555
P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm <sup>2</sup> , 270 HB	110	0,125	0,155	0,210	0,260	0,305	0,355	0,395	0,440	0,520
P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm <sup>2</sup> , 300 HB	105	0,115	0,145	0,195	0,245	0,290	0,330	0,370	0,410	0,490
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm <sup>2</sup> , 180 HB	115	0,125	0,155	0,210	0,260	0,305	0,355	0,395	0,440	0,520
P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm <sup>2</sup> , 275 HB	115	0,125	0,155	0,210	0,260	0,305	0,355	0,395	0,440	0,520
P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm <sup>2</sup> , 300 HB	100	0,105	0,130	0,175	0,220	0,260	0,300	0,335	0,375	0,440
P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm <sup>2</sup> , 350 HB	85	0,090	0,115	0,155	0,195	0,230	0,265	0,295	0,330	0,390
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB	75	0,095	0,120	0,165	0,205	0,240	0,275	0,310	0,345	0,405
P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm <sup>2</sup> , 325 HB	65	0,080	0,100	0,140	0,170	0,205	0,235	0,265	0,290	0,345
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives	105	0,095	0,120	0,165	0,205	0,240	0,275	0,310	0,345	0,405
M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB	95	0,085	0,110	0,145	0,180	0,215	0,250	0,280	0,310	0,365
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm <sup>2</sup> , 240 HB	90	0,080	0,100	0,140	0,170	0,205	0,235	0,265	0,290	0,345
M2.1.1 Stainless steel, austenitic, quenched, 180 HB	85	0,075	0,095	0,130	0,160	0,190	0,220	0,250	0,275	0,325
M2.2.1 Duplex steel, high-strength stainless steels	70	0,065	0,080	0,110	0,140	0,165	0,185	0,210	0,235	0,275
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB										
K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB										
K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB										
K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB										
K1.3.1 Malleable cast iron, ferritic, 130 HB										
K1.3.2 Malleable cast iron, pearlitic, 230 HB										
K2.1.1 Vermicular graphite cast iron (GJV)										
K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)										
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB										
N1.1.2 Wrought aluminium alloys, hardened, 100 HB										
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB										
N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB										
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB										
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 %										
N3.1.2 Copper and copper alloys: CuZn, CuSnZn										
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte										
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics										
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.										
N4.1.3 Non-metallic materials: Graphite										
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB	60	0,060	0,075	0,105	0,130	0,155	0,175	0,200	0,220	0,260
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB	50	0,050	0,060	0,085	0,105	0,120	0,140	0,160	0,175	0,205
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB	50	0,060	0,075	0,105	0,130	0,155	0,175	0,200	0,220	0,260
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB	35	0,045	0,055	0,075	0,090	0,105	0,125	0,140	0,155	0,180
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB	35	0,045	0,055	0,075	0,090	0,105	0,125	0,140	0,155	0,180
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm <sup>2</sup>	60	0,060	0,075	0,105	0,130	0,155	0,175	0,200	0,220	0,260
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm <sup>2</sup>	45	0,050	0,060	0,085	0,105	0,120	0,140	0,160	0,175	0,205
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC										
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC										
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC										
H2.1.1 Chilled cast iron, 400 HB										
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC										



## Ratio drills with coolant ducts, RT 100 InoxPro, 7xD



Machining group		f (mm/rev) with nom. Ø									
			3	4	6	8	10	12	14	16	20
	$v_c$ (m/min)										
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB		140	0,125	0,155	0,210	0,260	0,305	0,355	0,395	0,440	0,520
P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB		125	0,110	0,140	0,185	0,235	0,275	0,315	0,355	0,395	0,470
P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB		125	0,110	0,140	0,185	0,235	0,275	0,315	0,355	0,395	0,470
P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB		120	0,105	0,130	0,175	0,220	0,260	0,300	0,335	0,375	0,440
P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm <sup>2</sup> , 250 HB		120	0,105	0,130	0,175	0,220	0,260	0,300	0,335	0,375	0,440
P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm <sup>2</sup> , 270 HB		110	0,100	0,120	0,165	0,205	0,245	0,280	0,315	0,350	0,415
P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm <sup>2</sup> , 300 HB		105	0,090	0,115	0,155	0,195	0,230	0,265	0,295	0,330	0,390
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm <sup>2</sup> , 180 HB		115	0,095	0,120	0,165	0,205	0,240	0,275	0,310	0,345	0,405
P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm <sup>2</sup> , 275 HB		115	0,095	0,120	0,165	0,205	0,240	0,275	0,310	0,345	0,405
P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm <sup>2</sup> , 300 HB		100	0,080	0,100	0,140	0,170	0,205	0,235	0,265	0,290	0,345
P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm <sup>2</sup> , 350 HB		85	0,070	0,090	0,120	0,150	0,180	0,205	0,230	0,255	0,305
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB		75	0,075	0,095	0,130	0,160	0,190	0,220	0,250	0,275	0,325
P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm <sup>2</sup> , 325 HB		65	0,065	0,080	0,110	0,140	0,165	0,185	0,210	0,235	0,275
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives		100	0,075	0,095	0,130	0,160	0,190	0,220	0,250	0,275	0,325
M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB		90	0,070	0,085	0,115	0,145	0,175	0,200	0,225	0,245	0,295
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm <sup>2</sup> , 240 HB		85	0,065	0,080	0,110	0,140	0,165	0,185	0,210	0,235	0,275
M2.1.1 Stainless steel, austenitic, quenched, 180 HB		80	0,060	0,075	0,105	0,130	0,155	0,175	0,200	0,220	0,260
M2.2.1 Duplex steel, high-strength stainless steels		70	0,050	0,065	0,090	0,110	0,130	0,150	0,170	0,185	0,220
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB											
K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB											
K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB											
K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB											
K1.3.1 Malleable cast iron, ferritic, 130 HB											
K1.3.2 Malleable cast iron, pearlitic, 230 HB											
K2.1.1 Vermicular graphite cast iron (GJV)											
K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)											
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB											
N1.1.2 Wrought aluminium alloys, hardened, 100 HB											
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB											
N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB											
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB											
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 %											
N3.1.2 Copper and copper alloys: CuZn, CuSnZn											
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte											
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics											
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.											
N4.1.3 Non-metallic materials: Graphite											
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB		45	0,050	0,060	0,080	0,100	0,120	0,140	0,155	0,175	0,205
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB		35	0,040	0,050	0,065	0,080	0,095	0,110	0,125	0,140	0,165
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB		40	0,050	0,060	0,080	0,100	0,120	0,140	0,155	0,175	0,205
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB		25	0,035	0,040	0,055	0,070	0,085	0,095	0,110	0,120	0,145
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB		25	0,035	0,040	0,055	0,070	0,085	0,095	0,110	0,120	0,145
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm <sup>2</sup>		45	0,050	0,060	0,080	0,100	0,120	0,140	0,155	0,175	0,205
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm <sup>2</sup>		35	0,040	0,050	0,065	0,080	0,095	0,110	0,125	0,140	0,165
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC											
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC											
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC											
H2.1.1 Chilled cast iron, 400 HB											
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC											



High-performance taps and fluteless taps Pionex



Machining group	Taps				Fluteless taps
	Blind holes		Through-holes		
	HSS-E	HSS-E-PM	HSS-E	HSS-E-PM	HSS-E-PM
	A	A	S	S	C
v <sub>c</sub> (m/min)					
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB	18	23	20	26	27
P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB	18	23	20	26	27
P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB	18	23	20	26	27
P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB	18	23	20	26	27
P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm <sup>2</sup> , 250 HB	18	23	20	26	27
P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm <sup>2</sup> , 270 HB	15	20	17	22	27
P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm <sup>2</sup> , 300 HB	13	16	14	18	27
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm <sup>2</sup> , 180 HB	18	23	20	26	22
P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm <sup>2</sup> , 275 HB	15	20	17	22	22
P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm <sup>2</sup> , 300 HB	13	16	14	18	22
P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm <sup>2</sup> , 350 HB	11	14	12	15	22
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB	11	14	12	15	16
P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm <sup>2</sup> , 325 HB	11	14	12	15	16
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives	11	14	12	15	11
M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB	11	14	12	15	11
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm <sup>2</sup> , 240 HB	6	8	7	9	8
M2.1.1 Stainless steel, austenitic, quenched, 180 HB	4	5	4	5	7
M2.2.1 Duplex steel, high-strength stainless steels	3	4	3	4	
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB	14	19	16	21	
K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB	14	19	16	21	
K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB	14	19	16	21	27
K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB	14	19	16	21	27
K1.3.1 Malleable cast iron, ferritic, 130 HB	14	19	16	21	27
K1.3.2 Malleable cast iron, pearlitic, 230 HB	14	19	16	21	27
K2.1.1 Vermicular graphite cast iron (GJV)	9	11	10	12	22
K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)	9	11	10	12	22
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB	25	33	28	36	17
N1.1.2 Wrought aluminium alloys, hardened, 100 HB	25	33	28	36	17
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB	20	26	22	29	33
N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB	20	26	22	29	33
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB	15	20	17	22	27
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 %					
N3.1.2 Copper and copper alloys: CuZn, CuSnZn					
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte					
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics					
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.					
N4.1.3 Non-metallic materials: Graphite					
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB	2	2	2	2	4
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB	2	2	2	2	4
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB	2	2	2	2	4
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB	2	2	2	2	4
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB	2	2	2	2	4
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm <sup>2</sup>	2	2	2	2	4
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm <sup>2</sup>	2	2	2	2	4
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC					
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC					
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC					
H2.1.1 Chilled cast iron, 400 HB					
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC					





## Fluteless taps InoxPro



Machining group	Through-, blind holes
	HSS-E
	$v_c$ (m/min)
P1.1.1 Unalloyed steel, annealed, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB	
P1.1.2 Unalloyed steel, heat-treated, 0.15 % C, Rm 420 N/mm <sup>2</sup> , 125 HB	
P1.1.3 Unalloyed steel, annealed, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB	
P1.1.4 Unalloyed steel, heat-treated, 0.45 % C, Rm 640 N/mm <sup>2</sup> , 190 HB	
P1.1.5 Unalloyed steel, heat-treated, 0.45 % C, Rm 850 N/mm <sup>2</sup> , 250 HB	
P1.1.6 Unalloyed steel, annealed, 0.75 % C, Rm 915 N/mm <sup>2</sup> , 270 HB	
P1.1.7 Unalloyed steel, heat-treated, 0.75 % C, Rm 1020 N/mm <sup>2</sup> , 300 HB	
P2.1.1 Low-alloy steel, annealed, Rm 610 N/mm <sup>2</sup> , 180 HB	
P2.1.2 Low-alloy steel, heat-treated, Rm 930 N/mm <sup>2</sup> , 275 HB	
P2.1.3 Low-alloy steel, heat-treated, Rm 1020 N/mm <sup>2</sup> , 300 HB	
P2.1.4 Low-alloy steel, heat-treated, Rm 1190 N/mm <sup>2</sup> , 350 HB	
P3.1.1 High-alloy steel and tool steel, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB	
P3.1.2 High-alloy steel and tool steel, hardened and tempered, Rm 1100 N/mm <sup>2</sup> , 325 HB	
M1.1.1 Stainless steel, ferritic/martensitic, with machining additives	10
M1.1.2 Stainless steel, ferritic/martensitic, annealed, Rm 680 N/mm <sup>2</sup> , 200 HB	10
M1.1.3 Stainless steel, ferritic/martensitic, heat-treated, Rm 810 N/mm <sup>2</sup> , 240 HB	7
M2.1.1 Stainless steel, austenitic, quenched, 180 HB	6
M2.2.1 Duplex steel, high-strength stainless steels	6
K1.1.1 Grey cast iron, pearlitic/ferritic, 180 HB	
K1.1.2 Grey cast iron, pearlitic/martensitic, 260 HB	
K1.2.1 Cast iron with spheroidal graphite, ferritic, 160 HB	
K1.2.2 Cast iron with spheroidal graphite, pearlitic, 250 HB	
K1.3.1 Malleable cast iron, ferritic, 130 HB	
K1.3.2 Malleable cast iron, pearlitic, 230 HB	
K2.1.1 Vermicular graphite cast iron (GJV)	
K2.2.1 Austenitic-ferritic spheroidal graphite cast iron (ADI)	
N1.1.1 Wrought aluminium alloys, non-hardened, 60 HB	
N1.1.2 Wrought aluminium alloys, hardened, 100 HB	
N2.1.1 Aluminium casting alloys, non-hardened, ≤ 12 % Si, 75 HB	
N2.1.2 Aluminium casting alloys, hardened, ≤ 12 % Si, 90 HB	
N2.1.3 Aluminium casting alloys, non-hardened, > 12 % Si, 130 HB	
N3.1.1 Copper and copper alloys: Free-machining alloy, Pb > 1 %	
N3.1.2 Copper and copper alloys: CuZn, CuSnZn	
N3.1.3 Copper and copper alloys: CuSn, lead-free copper and copper electrolyte	
N4.1.1 Non-metallic materials: Duroplastics, fibre-reinforced plastics	
N4.1.2 Non-metallic materials: Hard rubber, wood, etc.	
N4.1.3 Non-metallic materials: Graphite	
S1.1.1 Heat-resistant alloys, Fe-based, annealed, 200 HB	
S1.1.2 Heat-resistant alloys, Fe-based, hardened, 280 HB	
S1.1.3 Heat-resistant alloys, Ni- or Co-based, annealed, 250 HB	
S1.1.4 Heat-resistant alloys, Ni- or Co-based, hardened, 350 HB	
S1.1.5 Heat-resistant alloys, Ni- or Co-based, cast, 320 HB	
S2.1.1 Titanium alloys, pure titanium, Rm 400 N/mm <sup>2</sup>	3
S2.1.2 Titanium alloys, Alpha and Beta alloys, hardened, Rm 1050 N/mm <sup>2</sup>	3
H1.1.1 Hardened steel, hardened and tempered, < 55 HRC	
H1.1.2 Hardened steel, hardened and tempered, < 60 HRC	
H1.1.3 Hardened steel, hardened and tempered, > 60 HRC	
H2.1.1 Chilled cast iron, 400 HB	
H2.1.2 Chilled cast iron, hardened and tempered, < 55 HRC	










# ISO-code

<b>P</b>	Steel, high-alloy steel
<b>M</b>	Stainless steel
<b>K</b>	Grey cast, spheroidal graphite iron and malleable cast iron
<b>N</b>	Aluminium and other non-ferrous metals
<b>S</b>	Special, super and titanium alloys
<b>H</b>	Hardened steel and chilled cast iron
<b>O</b>	Fibre-reinforced plastics (FRP), graphite

Tool recommendations regarding the suitability for application groups or specifications of max. tensile strength and hardness can be found on the product and cutting value pages.

- Ideally suitable
- Suitable under certain conditions

# Pictograms

<b>Cutting material</b>	<b>VHM</b> Solid carbide	<b>HSS-E</b> High-speed steel				
<b>Machining depth</b>	<b>3xD</b>	<b>6xD</b>	<b>5xD</b>	<b>7xD</b>	<b>10xD</b>	<b>15xD</b>
<b>Tolerance on Ø</b>	<b>m7</b>	<b>h7</b>	<b>6HX</b>			
<b>Shank form</b>	<b>HA</b> to DIN 6535	<b>Cyl</b> cylindrical				
<b>Standard</b>	<b>DIN 6537 K</b> to DIN	<b>DIN 6537 L</b>	<b>WN</b> According to Gühring standards			
<b>Type</b>	<b>INOX PRO</b>	<b>VA</b>	<b>VA R45</b>			
<b>Internal cooling</b>	 with internal coolant	 without internal coolant				
<b>Cutting direction</b>	 Right-hand					
<b>Web thinning</b>						
<b>Hole type</b>	 Through-hole	 Blind hole	 Through-, blind holes			
<b>Form</b>	<b>B</b>	<b>C</b>				
<b>Cutting edge form</b>	 135°	 140°				

# Surfaces





**INOX**

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