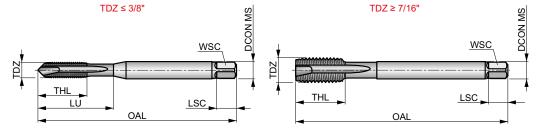
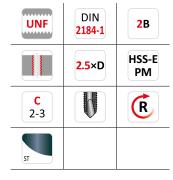


EP31

HSS-E-PM Spiral Point Machine Tap, UNF, DIN Standard Machine tap with spiral point suited for through holes only. Steam tempered surface acts to retain cutting fluid and prevent chip to tool welding.







							Workpiece material group suitability and starting values for cutting speed (m/min						
P1.1	P2.2	P2.3	P3.2	P3.3	P4.1	P4.2	<mark>M1.1</mark>	M1.2	<mark>M2.1</mark>	M2.2	M3.1	M3.2	M3.3
22	▶ 16	1 4	10	∠ 9	8	6	团 10	∎8	∠ 9	∠ 7	∠ 7	∠ 6	∠ 5
M4.1	K1.1	K1.2	K1.3	K2.1	K2.2	K3.1	K3.2	K4.1	K4.2	K5.1	K5.2		
∎4	∎13	▲ 10	∠ 7	∎16	∎13	∎14	⊿ 10	∎13	 9	∎15	∎11		
		TDZ	TPI	TD	OAL	THL	DCON	MS	WSC	LSC	NOF	PHD	LU
Product		TUL		ID	UNL		DCON	1415	WJC	LJC	NOT	THE	10
				[mm]	[mm]	[mm]	[mm]		[mm]	[mm]		[mm]	[mm]
EP318-36		8	36	4.166	63.0	12	4.50)	3.40	8	3	3.50	21.00
EP3110-32		10	32	4.826	70.0	13	6.0)	4.90	8	3	4.10	25.00
EP311/4		1/4	28	6.350	80.0	15	7.00)	5.50	8	3	5.50	30.00
EP315/16		5/16	24	7.938	90.0	18	8.00)	6.20	9	3	6.90	35.00
EP313/8		3/8	24	9.525	100.0	20	10.0	0	8.00	11	3	8.50	39.00
EP317/16		7/16	20	11.112	100.0	20	8.00)	6.20	9	3	9.90	-
EP311/2		1/2	20	12.700	110.0	23	9.00)	7.00	10	3	11.50	_
EP315/8		5/8	18	15.875	110.0	25	12.0	0	9.00	12	3	14.50	_
EP313/4		3/4	16	19.050	125.0	30	14.0	0	11.00	14	4	17.50	_
EP317/8		7/8	14	22.225	140.0	34	18.0	0	14.50	17	4	20.40	_
EP311		1″	12	25.400	160.0	38	18.0	0	14.50	17	4	23.25	-

WMG (WORK MATERIAL GROUP)

150 gi	roup	WM	G (Work Material Group)		Hardness (HB or HRC)	Ultimate Tensile Strength (MPa)
		P1.1		Sulfurized	< 240 HB	≤ 830
	P1	P1.2	Free machining steel	Sulfurized and phosphorized	< 180 HB	≤ 620
		P1.3	(carbon steels with increased machinability)	Sulfurized/phosphorized and leaded	< 180 HB	≤ 620
		P2.1				
			Plain carbon steel	Containing <0.25 % C	< 180 HB	≤ 620
	P2	P2.2	(steels comprised of mainly iron and carbon)	Containing <0.55 % C	< 240 HB	≤ 830
Ρ		P2.3		Containing >0.55 % C	< 300 HB	≤ 1030
Γ		P3.1		Annealed	< 180 HB	≤ 620
	P3	P3.2	Alloy steel		180 – 260 HB	> 620 ≤ 900
		P3.3	(carbon steels with an alloying content \leq 10%)	Hardened and tempered	260 - 360 HB	> 900 ≤ 1240
		P4.1		Annealed	< 26 HRC	≤ 900
	P4		Tool steel	26 – 39 HRC	> 900 ≤ 1240	
	r 4	P4.2	 (special alloy steel for tools, dies and molds) 	Hardened and tempered		
		P4.3			39 – 45 HRC	> 1240 ≤ 1450
	M1	M1.1	Ferritic stainless steel		< 160 HB	≤ 520
	- Mil	M1.2	(straight chromium non-hardenable alloys)		160 – 220 HB	> 520 ≤ 700
		M2.1		Annealed	< 200 HB	≤ 670
	M2	M2.2	Martensitic stainless steel	200 – 280 HB	> 670 ≤ 950	
		M2.3	(straight chromium hardenable alloys)	Quenched and tempered Precipitation-hardened	280 – 380 HB	> 950 ≤ 1300
Μ				recipitation nurdened	< 200 HB	≤ 750
		M3.1	Austenitic stainless steel			
	M3	M3.2	(chromium-nickel and chromium-nickel-manganese alloys)	200 – 260 HB	> 750 ≤ 870	
		M3.3			260 – 300 HB	> 870 ≤ 1040
		M4.1	Austenitic-ferritic (DUPLEX) or super-austenitic stainless steel		< 300 HB	≤ 990
	M4	M4.2	Precipitation hardening austenitic stainless steel		300 – 380 HB	≤ 1320
		K1.1		Ferritic or ferritic-pearlitic	< 180 HB	≤ 190
	1/1		Gray iron or Automotive Gray iron (GG)	· · · · · · · · · · · · · · · · · · ·		
	K1	K1.2	(iron-carbon castings with a lamellar graphite microstructure)	Ferritic-pearlictic or pearlitic	180 – 240 HB	> 190 ≤ 310
		K1.3		Pearlitic	240 – 280 HB	> 310 ≤ 390
		K2.1	Malleable iron (GTS/GTW)	Ferritic	< 160 HB	≤ 400
	K2	K2.2	(iron-carbon castings with a graphite-free microstructure)	Ferritic or pearlitic	160 – 200 HB	> 400 ≤ 550
		K2.3	(non-carbon castings with a graphice-free microstructure)	Pearlitic	200 – 240 HB	> 550 ≤ 660
		K3.1		Ferritic	< 180 HB	≤ 560
	K3	K3.2	Ductile iron (GGG)	Ferritic or pearlitic	180 – 220 HB	> 560 ≤ 680
	K.S		(iron-carbon castings with a nodular graphite microstructure)			
		K3.3		Pearlitic	220 – 260 HB	> 680 ≤ 800
K		K4.1	Austenitic gray iron (ASTM A436) (iron-carbon alloy castings with an austenitic lamellar graphite microstructure)		< 180 HB	≤ 190
	K4	K4.2	Austenitic ductile iron (ASTM A439 or ASTM A571) (iron-carbon alloy castings with an austenitic nodular graphite microstructure)		< 240 HB	≤ 740
		K4.3		< 280 HB	> 840 ≤ 980	
		K4.4	Austempered ductile iron (ASTM A897)	280 – 320 HB	> 980 ≤ 1130	
		K4.5	(iron-carbon alloy castings with an ausferrite microstructure)	320 – 360 HB	> 1130 ≤ 1280	
				Ferritic		
		K5.1	Compacted graphite iron CGI (ASTM A842)		< 180 HB	≤ 400
	K5	K5.2	(iron-carbon castings with a vermicular graphite structure)	Ferritic-pearlitic	180 – 220 HB	> 400 ≤ 450
		K5.3		Pearlitic	220 – 260 HB	> 450 ≤ 500
		N1.1	Commercially pure wrought aluminium		< 60 HB	≤ 240
	N1	N1.2	Weinstein Leither Heine	Half hard tempered	60 - 100 HB	> 240 ≤ 400
		N1.3	Wrought aluminium alloys	Full hard tempered	100 – 150 HB	> 400 ≤ 590
		N2.1			< 75 HB	≤ 240
N	ND		Cast aluminium allour		75 – 90 HB	> 240 ≤ 270
	N2	N2.2	Cast aluminium alloys			
		N2.3			90 – 140 HB	> 270 ≤ 440
		N3.1	Free-cutting copper-alloys materials with excellent machining properties	-	-	
	N3	N3.2	Short-chip copper-alloys with good to moderate machining properties	-	-	
		N3.3	Electrolytic copper and long-chip copper-alloys with moderate to poor machining proper	-	-	
		N4.1	Thermoplastic polymers		-	-
	N4	N4.2	Thermosetting polymers		-	-
		N4.3	Reinforced polymers or composites		_	_
	114		Graphite		_	_
					< 200 HB	_ ≤ 660
	N5	N5.1				
	N5	N5.1 S1.1				
		N5.1 S1.1 S1.2	Titanium or titanium alloys		200 – 280 HB	> 660 ≤ 950
	N5	N5.1 S1.1 S1.2 S1.3			200 – 280 HB 280 – 360 HB	> 660 ≤ 950 > 950 ≤ 1200
	N5 S1	N5.1 S1.1 S1.2 S1.3 S2.1	Titanium or titanium alloys		200 – 280 HB 280 – 360 HB < 200 HB	> 660 ≤ 950
ς	N5	N5.1 S1.1 S1.2 S1.3			200 – 280 HB 280 – 360 HB	> 660 ≤ 950 > 950 ≤ 1200
S	N5 S1 S2	N5.1 S1.1 S1.2 S1.3 S2.1 S2.2	Titanium or titanium alloys Fe-based high-temperature alloys		200 – 280 HB 280 – 360 HB < 200 HB	$> 660 \le 950$ $> 950 \le 1200$ ≤ 690
S	N5 S1	N5.1 S1.1 S1.2 S1.3 S2.1 S2.2 S3.1	Titanium or titanium alloys		200 – 280 HB 280 – 360 HB < 200 HB 200 – 280 HB < 280 HB	$> 660 \le 950$ > 950 \le 1200 \$\le 690\$ > 690 \le 970 \$\le 940\$
S	N5 S1 S2 S3	N5.1 S1.2 S1.3 S2.1 S2.2 S3.1 S3.2	Titanium or titanium alloys Fe-based high-temperature alloys		200 – 280 HB 280 – 360 HB < 200 HB 200 – 280 HB < 280 HB 280 – 360 HB	$> 660 \le 950$ $> 950 \le 1200$ ≤ 690 $> 690 \le 970$ ≤ 940 $> 940 \le 1200$
S	N5 S1 S2	N5.1 51.2 51.3 52.1 52.2 53.1 53.2 54.1	Titanium or titanium alloys Fe-based high-temperature alloys		200 - 280 HB 280 - 360 HB 200 - 280 HB 200 - 280 HB 280 - 360 HB 280 - 360 HB < 240 HB	$> 660 \le 950$ > 950 \le 1200 \$\le 690\$ > 690 \le 970 \$\le 940\$ > 940 \le 1200 \$\le 800\$
S	N5 S1 S2 S3 S4	N5.1 S1.1 S1.2 S1.3 S2.1 S2.2 S3.1 S3.2 S4.1 S4.2	Titanium or titanium alloys Fe-based high-temperature alloys Ni-based high-temperature alloys Co-based high-temperature alloys		200 - 280 HB 280 - 360 HB 200 - 280 HB 200 - 280 HB 280 - 360 HB 280 - 360 HB 240 - 320 HB	$> 660 \le 950$ $> 950 \le 1200$ ≤ 690 $> 690 \le 970$ ≤ 940 $> 940 \le 1200$ ≤ 800 $> 800 \le 1070$
S	N5 S1 S2 S3	N5.1 51.2 51.3 52.1 52.2 53.1 53.2 54.1 54.2 H1.1	Titanium or titanium alloys Fe-based high-temperature alloys Ni-based high-temperature alloys		200 - 280 HB 280 - 360 HB 200 - 280 HB 200 - 280 HB 280 - 360 HB 280 - 360 HB 240 - 320 HB 240 - 320 HB	$> 660 \le 950$ > 950 \le 1200 \$\le 690\$ > 690 \le 970 \$\le 940\$ > 940 \le 1200 \$\le 800\$
S	N5 S1 S2 S3 S4 H1	N5.1 51.2 51.3 52.2 53.1 53.2 54.1 54.2 H1.1 H2.1	Titanium or titanium alloys Fe-based high-temperature alloys Ni-based high-temperature alloys Co-based high-temperature alloys Chilled cast iron		200 - 280 HB 280 - 360 HB 200 - 280 HB 200 - 280 HB 280 - 360 HB 280 - 360 HB 240 - 320 HB	$> 660 \le 950$ $> 950 \le 1200$ ≤ 690 $> 690 \le 970$ ≤ 940 $> 940 \le 1200$ ≤ 800 $> 800 \le 1070$
S	N5 S1 S2 S3 S4	N5.1 51.2 51.3 52.1 52.2 53.1 53.2 54.1 54.2 H1.1	Titanium or titanium alloys Fe-based high-temperature alloys Ni-based high-temperature alloys Co-based high-temperature alloys		200 - 280 HB 280 - 360 HB 200 - 280 HB 200 - 280 HB 280 - 360 HB 280 - 360 HB 240 - 320 HB 240 - 320 HB	$> 660 \le 950$ $> 950 \le 1200$ ≤ 690 $> 690 \le 970$ ≤ 940 $> 940 \le 1200$ ≤ 800 $> 800 \le 1070$ -
S	N5 S1 S2 S3 S4 H1 H2	N5.1 51.2 51.3 52.1 52.2 53.1 53.2 54.1 54.2 H1.1 H2.1 H2.2	Titanium or titanium alloys Fe-based high-temperature alloys Ni-based high-temperature alloys Co-based high-temperature alloys Chilled cast iron Hardened cast iron		200 - 280 HB 280 - 360 HB < 200 HB 200 - 280 HB < 280 HB 280 - 360 HB 280 - 360 HB 240 HB 240 - 320 HB < 440 HB < 55 HRC > 55 HRC	$> 660 \le 950$ $> 950 \le 1200$ ≤ 690 $> 690 \le 970$ ≤ 940 $> 940 \le 1200$ ≤ 800 $> 800 \le 1070$ $-$
S H	N5 S1 S2 S3 S4 H1	N5.1 S1.2 S1.3 S2.1 S2.2 S3.1 S3.2 S4.1 S4.2 H1.1 H2.1 H2.2 H3.1	Titanium or titanium alloys Fe-based high-temperature alloys Ni-based high-temperature alloys Co-based high-temperature alloys Chilled cast iron		200 - 280 HB 280 - 360 HB < 200 HB 200 - 280 HB 280 - 360 HB 280 - 360 HB 240 - 320 HB 240 - 320 HB < 55 HRC > 55 HRC < 51 HRC	$> 660 \le 950$ $> 950 \le 1200$ ≤ 690 $> 690 \le 970$ ≤ 940 $> 940 \le 1200$ ≤ 800 $> 800 \le 1070$ - - -
S H	N5 S1 S2 S3 S4 H1 H2	N5.1 51.2 51.3 52.1 52.2 53.1 53.2 54.1 54.2 H1.1 H2.1 H2.2	Titanium or titanium alloys Fe-based high-temperature alloys Ni-based high-temperature alloys Co-based high-temperature alloys Chilled cast iron Hardened cast iron		200 - 280 HB 280 - 360 HB < 200 HB 200 - 280 HB < 280 HB 280 - 360 HB 280 - 360 HB 240 HB 240 - 320 HB < 440 HB < 55 HRC > 55 HRC	$> 660 \le 950$ $> 950 \le 1200$ ≤ 690 $> 690 \le 970$ ≤ 940 $> 940 \le 1200$ ≤ 800 $> 800 \le 1070$ - - - -