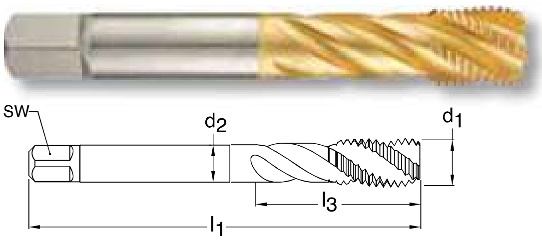
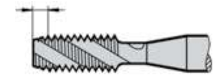
HSS-E 8-Pitch Taps

NEW

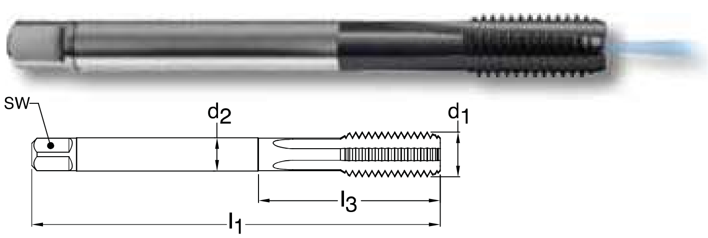


Series	**4289**
Standard	**DIN/ANSI**
Tool Material	**HSS-E**
Spiral Flute	**40° Helix**
Chamfer Form C • 2-3	
Class of Fit	**2B**

Blind holes | (S) **TiN coated** | **External cooling**

d1 - P	D Limits	Tap Drill Range inch	Number of Flutes	d2 inch	SW inch	l1 inch	l3 inch	Order Code	EDP Number	Stock
1- 8	H6	0.865 - 0.890	4	0.800	0.600	6.299	N/A	25.400	9042890254000	●
1 1/8- 8	H7	0.990 - 1.015	4	0.896	0.672	7.087	N/A	28.575	9042890285750	●
1 1/4- 8	H7	1.115 - 1.140	4	1.021	0.766	7.087	N/A	31.750	9042890317500	●
1 3/8- 8	H7	1.240 - 1.265	4	1.108	0.831	7.874	N/A	34.925	9042890349250	●
1 1/2- 8	H7	1.365 - 1.390	6	1.233	0.925	7.874	N/A	38.100	9042890381000	●
1 5/8- 8	H7	1.490 - 1.515	6	1.305	0.979	7.874	N/A	41.275	9042890412750	●
1 3/4- 8	H7	1.615 - 1.640	6	1.430	1.072	7.874	N/A	44.450	9042890444500	●
2- 8	H7	1.865 - 1.890	6	1.644	1.233	8.858	N/A	50.800	9042890508000	●
2 1/4- 8	H8	2.115 - 2.140	6	1.894	1.420	9.843	N/A	57.150	9042890571500	●

METRIC

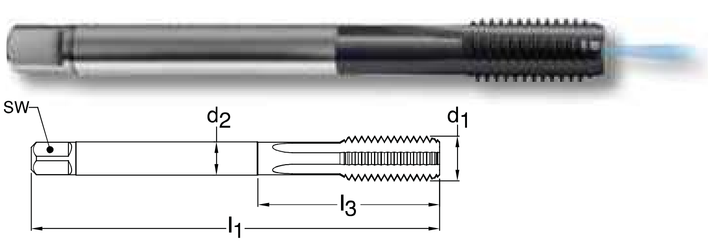


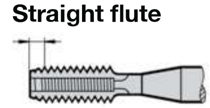
Series	**778**
Standard	**DIN 376**
Tool Material	**HSS-E (Cobalt)**
Flute	**Straight flute**
Chamfer Form C • 2-3	
Class of Fit	**6HX**

Blind holes | (C) **TiCN coated** | **Axial coolant**

d1 - P	D Limits	Tap Drill Range mm	Number of Flutes	d2 mm	SW mm	l1 mm	l3 mm	Order Code	EDP Number	Stock
M16 X 2.00	D7/D8	13.835 - 14.210	4	12.00	9.00	110.00	N/A	16.000	9007780160000	●
M20 X 2.50	D7/D8	17.294 - 17.744	4	16.00	12.00	140.00	N/A	20.000	9007780200000	○
M24 X 3.00	D8/D9	20.752 - 21.252	5	18.00	14.50	160.00	N/A	24.000	9007780240000	●
M27 X 3.00	D8/D9	23.752 - 24.252	5	20.00	16.00	160.00	N/A	27.000	9007780270000	○
M30 X 3.50	D9/D10	26.211 - 26.771	5	22.00	18.00	180.00	N/A	30.000	9007780300000	●
M33 X 3.50	D9/D10	31.376 - 31.676	6	25.00	20.00	180.00	N/A	33.000	9007780330000	○
M36 X 4.00	D9/D10	31.670 - 32.270	6	28.00	22.00	200.00	N/A	36.000	9007780360000	○
M39 X 4.00	D10/D11	34.690 - 35.780	6	32.00	24.00	200.00	N/A	39.000	9007780390000	○

METRIC - EXTENDED LENGTH



Series	**779**
Standard	**~DIN 376**
Tool Material	**HSS-E (Cobalt)**
Flute	**Straight flute**
Chamfer Form C • 2-3	
Class of Fit	**6HX**

Blind holes | (C) **TiCN coated** | **Axial coolant**

d1 - P	D Limits	Tap Drill Range mm	Number of Flutes	d2 mm	SW mm	l1 mm	l3 mm	Order Code	EDP Number	Stock
M16 X 2.00	D7/D8	13.835 - 14.210	3	12.00	9.00	160.00	N/A	16.000	9007790160000	○
M20 X 2.50	D7/D8	17.294 - 17.744	3	16.00	12.00	180.00	N/A	20.000	9007790200000	○
M24 X 3.00	D8/D9	20.752 - 21.252	4	18.00	14.50	200.00	N/A	24.000	9007790240000	○
M27 X 3.00	D8/D9	23.752 - 24.252	4	20.00	16.00	225.00	N/A	27.000	9007790270000	○
M30 X 3.50	D9/D10	26.211 - 26.711	4	22.00	18.00	250.00	N/A	30.000	9007790300000	○
M33 X 3.50	D9/D10	29.211 - 29.711	4	25.00	20.00	275.00	N/A	33.000	9007790330000	○
M36 X 4.00	D9/D10	31.670 - 32.270	5	28.00	22.00	300.00	N/A	36.000	9007790360000	○
M39 X 4.00	D11/D12	34.690 - 35.780	5	32.00	24.00	325.00	N/A	39.000	9007790390000	○

"Tap drill Range" given is per the Class of Fit shown per Series #

Additional Tap Drill sizes & percent of thread engagement can be found on pages 229-237.

Technical Information

Cutting rate recommendations for **CUT** taps

Material group	Approximate Rc	Approximate HB	Recommended SFM					
			HSS-E		HSS-E-PM		Solid carbide	
			bright finish	hard coated	bright finish	hard coated	bright finish	hard coated
Structural steels, free-cutting steels		<180	30-50	40-70	50-70	55-95	-	-
Unalloyed case hardened steels	<20	<230	20-40	30-70	40-65	40-80	-	-
Unalloyed heat-treatable steels	<25	<250	15-35	25-50	30-60	35-75	-	-
Structural steels, free-cutting steels	<20	<230	40-50	40-75	40-65	40-80	-	-
Case hardened steels, heat-treatable steels	<25	<250	30-45	30-65	30-60	35-75	-	-
Nitriding steels, spheroidal graphite iron	<30	<280	20-30	30-55	30-50	35-65	-	-
	<35	<320	15-25	20-35	25-45	30-60	-	-
	<38	<380	10-25	20-40	20-45	30-55	-	-
Stainless- and acid-resistant steels, sulphured		<180	25-35	40-55	30-55	35-70	-	-
austenitic	<25	<250	20-30	30-40	30-50	35-60	-	-
martensitic	<30	<280	20-30	25-40	25-45	30-50	-	-
	<35	<320	10-20	20-30	20-35	25-50	-	-
Alloyed case hardened steels	<25	<250	10-20	30-40	30-50	35-70	-	-
Alloyed heat-treatable steels	<30	<280	25-35	30-50	25-45	35-65	-	-
Alloyed tool steels	<35	<320	15-30	20-40	20-45	30-60	-	-
High speed tool steels	<38	<380	8-15	10-30	15-35	25-55	-	-
	<44	<415	-	-	4-10	8-15	4-8	8-16
	<60		-	-	-	4-10	3-6	6-12
Cast iron		<180	50-70	60-90	55-85	65-110	70-100	80-130
Spheroidal graphite iron	<25	<250	30-50	45-85	40-70	60-100	70-100	80-130
Malleable cast iron	<35	<320	15-35	20-40	25-45	35-55	60-110	70-120
Aluminum and Al-alloys	SILICON CONTENT	WROUGHT AIUMINUM						
	< 6%	n/a	30-50	50-75	50-70	65-80	80-140	90-165
Al cast alloys	6-10%	n/a	25-35	40-50	40-65	65-80	80-140	90-165
	>10%	n/a	-	25-35	40-65	65-80	60-130	80-140
Al wrought alloys	n/a	30-80	50-65	65-100	-	-	-	-
	n/a	75-150	35-60	50-65	-	-	-	-
Titanium and Ti-alloys		140-275	-	-	12-25	20-30	-	-
		300-380	-	-	6-12	10-18	-	-
Nickel and Ni-alloys		200-300	-	-	6-12	10-18	-	-
		>300	-	-	3-6	6-12	-	-
Plastics			15-30	-	20-40	-	30-60	-
Magnesium-alloys			90-140	-	-	-	110-180	-
Brass, short-chipping			30-45	-	45-60	-	80-100	-
long-chipping			30-45	-	45-60	-	80-100	-

Tapping Formulas and Calculations

RPM for UNC/UNF Taps

$$\textbf{RPM} = \text{(revolution / minute)} = \frac{\text{cutting speed (SFM)} \times 3.82}{\text{tap diameter}}$$

Feed Rate for UNC/UNF Taps

$$\textbf{IPR} = \text{(inch / revolution)} = \frac{\text{1 inch}}{\text{threads per inch (TPI)}}$$

$$\textbf{IPM} = \text{(inch / minute)} = \frac{\text{RPM}}{\text{threads per inch (TPI)}}$$

RPM for M/MF Taps

$$\textbf{RPM} = \text{(revolution / minute)} = \frac{\text{cutting speed (SFM)} \times 97.028}{\text{tap diameter (mm)}}$$

Feed Rate for M/MF Taps

$$\textbf{IPR} = \text{(inch / revolution)} = \text{pitch (mm)} \times 0.03937$$

$$\textbf{IPM} = \text{(inch / minute)} = \text{RPM} \times \text{pitch (mm)} \times 0.03937$$

To calculate Tap Drill Size

UNC/UNF and M/MF Cut Taps – General Requirements

$$\textbf{Tap Drill Size} = \text{Tap basic major diameter} - \text{pitch}$$

UNC/UNF Cut Taps – Special Percentage of Thread Requirements

$$\textbf{Drill Size} = \text{Basic major diameter} - \frac{0.01299 \times \text{desired percentage of thread}^{*}}{\text{threads per inch (TPI)}}$$

M/MF Cut Taps – Special Percentage of Thread Requirements

$$\textbf{Drill Size (mm)} = \text{Basic major diameter} - \frac{\text{desired percentage of thread}^{*} \times \text{pitch (mm)}}{76.98}$$

UNC/UNF and M/MF Form Taps – General Requirements

$$\textbf{Tap Drill Size} = \text{Basic major diameter} - \frac{\text{pitch}}{2}$$

UNC/UNF Form Taps – Special Percentage of Thread Requirements

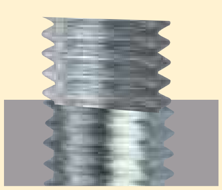
$$\textbf{Drill Size} = \text{Basic major diameter} - \frac{0.0068 \times \text{desired percentage of thread}^{*}}{\text{threads per inch (TPI)}}$$

M/MF Form Taps – Special Percentage of Thread Requirements

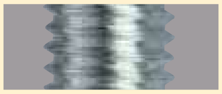
$$\textbf{Drill Size (mm)} = \text{Basic major diameter} - \frac{\text{desired percentage of thread}^{*} \times \text{pitch (mm)}}{147.06}$$

** Actual percentage will vary from desired percentage due to runout of drilling operation.*

Troubleshooting - Application problems with new taps

Problem	Possible causes	Solution
1 Thread produced is too large 	incorrect tap, tap geometry not suitable for the application	apply correct tap for the material to be machined
	tapping size hole too small	observe tapping size hole table in the technical section. Note different tapping size hole diameters for fluteless taps.
	alignment error of tapping size hole or position	- check for correct tool clamping - apply floating tap holder - check core drill
	machine spindle axially restricted	- use mechanical feed - apply tension/compression tap chuck
	cold welding at the flank of the tap	- apply new tap - apply coated tap - optimize lubrication
	lead of tap unsatisfactory due to insufficient thread depth	- tap with forced feed - apply tap with modified lead
	cutting speed too high	- reduce cutting speed - improve lubrication
	insufficient lubrication or coolant supply	ensure sufficient and suitable coolant supply and check concentration
	tolerance specification on tap does not correspond to specifications on drawing and/or thread gauge	apply correct tap for required tolerances
2 Thread axially miscut 	spiral-fluted taps, corresponding to our design, are applied with too much pressure for initial tapping	with spiral-fluted taps only light pressure required for initial tapping. The tap should immediately be applied within the tension/compression range
	initial tapping pressure too low for taps with spiral point corresponding to our form "B"	taps with spiral point or left hand spiral require higher axial pressure. Ensure tap operates within the tension/compression range
3 Thread produced is too small 	tolerance specification on tap does not correspond to specifications on drawing and/or thread gauge	apply correct tap for required tolerance
	incorrect tap	apply correct tap for the material to be machined
	tap does not cut accurately (thread plug gauge)	avoid strong axial forces during the cutting process
	machine spindle is axially too rigid	apply tension/compression chuck

Troubleshooting - Application problems with new taps

Problem	Possible causes	Solution
4 Thread surface not according to requirements 	cutting edge geometry not suitable for the application	apply "correct" tap for the material to be machined
	cutting speed too high	- reduce cutting speed - optimize lubrication
	insufficient coolant (concentration and supply)	ensure suitable coolant and sufficient volume
	chip congestion	apply suitable tap type
	tapping size hole too small	observe tapping size hole diameter specifications to DIN 336 or respective standards. Observe table for fluteless taps
	with tough, hard materials loading on tool too much or pitch too steep	apply hand tap sets
	built-up edge	apply coated tap
	cold welding	improve coolant supply
5 Tool life insufficient	surface hardening of tapping size hole	- check drill (cutting edge) for wear - heat or surface treatment following thread production
	reasons listed under: "thread surface not according to requirements"	reasons listed under: thread surface "not according to requirements"
	chip congestion	apply correct tap
6 Tool breakage during advance or return 	tapping size hole too small	observe tapping size hole dia. acc. to DIN 336 or respective standards
	teeth of chamfer lead overloaded	- longer chamfer lead (blind or through hole) - increase no. of teeth of chamfer lead by increasing no. of flutes - apply tap sets
	tap hits bottom of tapping size hole	- check hole depth - apply tension/compression tap chuck
	- lack of or incorrect chamfer of tapping size hole - position or angle error of tapping size hole	- correct chamfer angle of tapping size hole - ensure correct tool clamping - apply floating tap holder - check core drill
	- tool hardness not suitable for the application - cutting edge geometry not suitable for the application	apply suitable tap for the individual application

TAPS FOR THE ENERGY INDUSTRY

Oil and Gas, Wind Generators, and other applications

Material group	Approximate Rc	Approximate HB	Recommended SFM			
			HSS-E		HSS-E-PM	
			bright finish	hard coated	bright finish	hard coated
Structural steels	<25	<250	--	25 - 50	--	35 - 60
Alloyed and heat-treatable steels	<30	<280	--	20 - 40	--	30 - 50
Stainless steels	<35	<320	--	15 - 30	--	25 - 45
	<38	<380	--	6 - 10	--	8 - 15