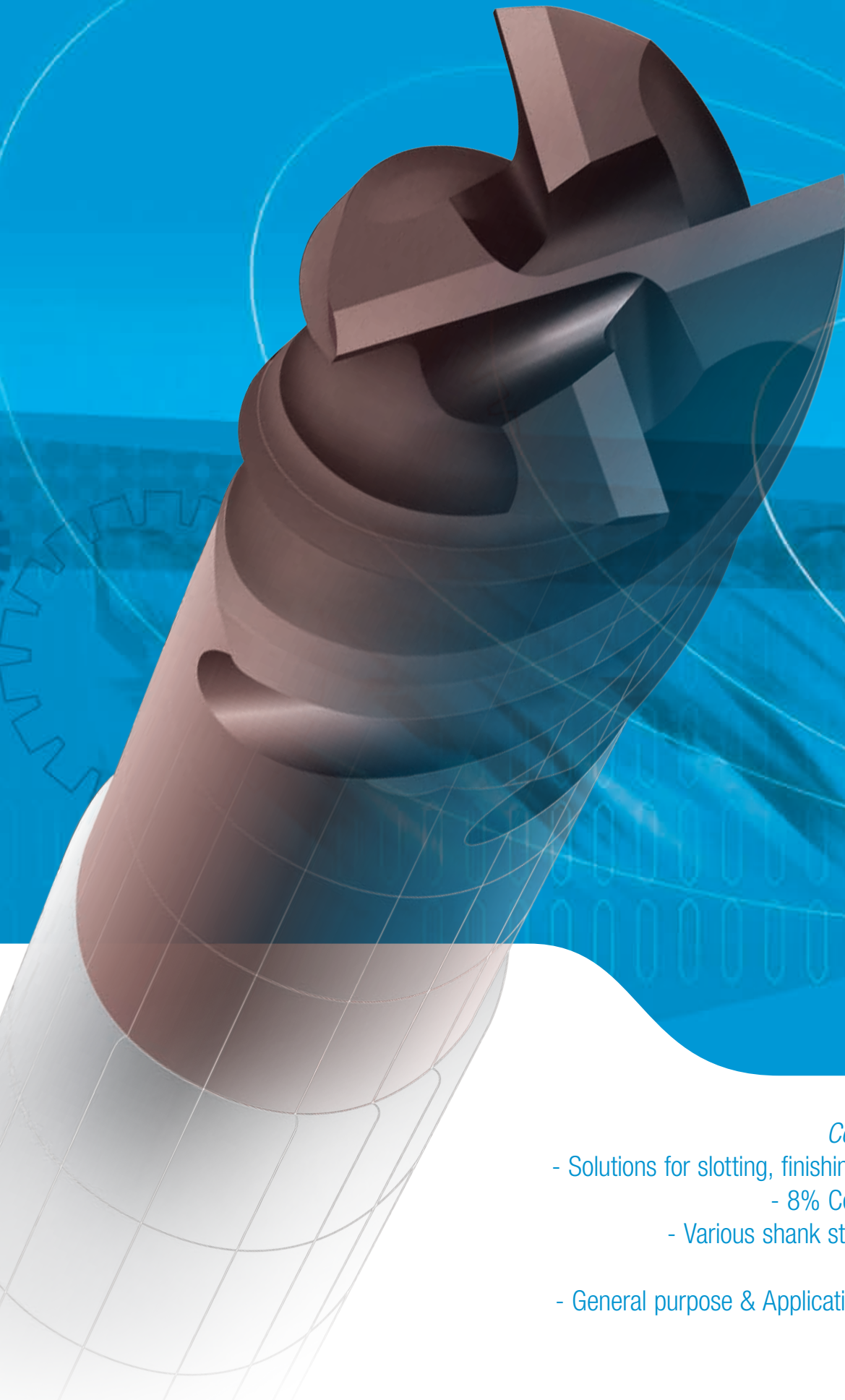


# ENDMILLS



## **Endmills**























*Cost effective machining*

- Solutions for slotting, finishing, roughing & profiling
  - 8% Co & PM grades of HSS
  - Various shank styles to suit your needs
    - Short & Long Series
- General purpose & Application specific geometries



Page	Regular, 2 Flute, R30 N		Regular, 2 Flute, R30 N		Long, 2 Flute, R30 N		Long, 2 Flute, R30 N		Stub, 2 Flute, R30 UNI		Stub, 2 Flute, R30 UNI		Regular, 2 Flute, R40 Al		Regular, 2 Flute, R40 Al		Long, Ballnose, 2 Flute, R30		Long, Ballnose, 2 Flute, R30		Stub, 3 Flute, R30 UNI		Stub, 3 Flute, R30 N	
	334	334	336	336	338	338	339	339	340	341	341	342	343	343	343	343	343	343	343	343	343	343	343	343
Catalogue Code	E100	E101	E102	E103	E108	E109	E110	E111	E112	E113	E114	E118	E187	E188										
Material	HSS Co.8				SPM				HSS Co				HSS Co.8		SPM		HSS Co.8							
Surface Finish	BrT	TiCN	BrT	TiCN	BrT	TiAlN	BrT	TiAlN	CrN	BrT	TiCN	TiAlN	BrT	TiAlN										
Colour Ring & Application	N				UNI				Al				Cu		General Purpose		UNI				N			
Standard	JIS				DIN 327D				DIN 844K				DIN 844K		-		DIN 327D		DIN 327D					
Type of Cut	Slotting										Profiling						Slotting / Finishing							
Material																								
Shank Tolerance	h6																							

Material	HB	N/mm <sup>2</sup>	% Elong.																							
<b>1.0 Steels</b>																										
1.1 Mild steels, magnetic soft steel	<200	>200 <400	10	●	●	●	●	●	●					●	●	●	●	●	●	●	●	●	●	●	●	
1.2 Free cutting, structural, unalloyed	<200	>350 <700	30	●	●	●	●	●	●					●	●	●	●	●	●	●	●	●	●	●	●	
1.3 Plain carbon, low alloyed	<300	>350 <850	20	○	●	○	○	○	○					○	●	●	○	○	○	○	○	○	○	○	○	
1.4 Alloy steels harden. / tempered	<250	>500 <850	30	○	○	○	○	○	●					○	○	●	○	○	○	○	○	○	○	○	○	
1.5 Alloy steels harden. / tempered	<350	>850 <1200	30	○	○	○	○	○	●					○	○	●	○	○	○	○	○	○	○	○	○	
1.6 Hardened, heat treated, high tensile alloy	<420	>1500	12	○	○	○	○	○	○						○	○	○	○	○	○	○	○	○	○	○	
1.7 Hardened Steel 45-50 Rc	<550		<12																							
1.8 Hardened Steel 50-62 Rc	<700		<12																							
<b>2.0 Stainless Steels</b>																										
2.1 Free machining	<250	<850	25	○	○	○	○	○	●	●				○	○	●	○	○	○	○	○	○	○	○	○	
2.2 Austenitic	<250	<850	20	○	○	○	○	○	●	●				○	○	●	○	○	○	○	○	○	○	○	○	
2.3 Ferritic + martensitic	<250	<850	20				○	○	○						○	○	○	○	○	○	○	○	○	○	○	
<b>3.0 Cast Irons</b>																										
3.1 Lamellar graphite (Grey soft)	<150	<500	10	○	●	○	●	●	●					○	●	●	○	○	○	○	○	○	○	○	○	
3.2 Lamellar graphite (Grey hard)	<300	<1000	10	○	●		○	○						○	●	●	○	○	○	○	○	○	○	○	○	
3.3 Nodular (spheroidal) graphite & malleable	<200	<700	10	○	○		○	○						○	○	○	○	○	○	○	○	○	○	○	○	
<b>4.0 Titaniums</b>																										
4.1 Pure Titanium	<250	<850	20																							
4.2 Titanium alloys	>250	>850	20																							
<b>5.0 Nickels</b>																										
5.1 Nickel alloys	<250	<850	25																							
5.2 Nickel alloys	>250	>850	25																							
<b>6.0 Coppers</b>																										
6.1 Pure Copper (electrolytic copper)	<120	<400	12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
6.2 Short chip Brass, Phosphor Bronze, gun metal	<200	<700	12																							
6.3 Long chip Brass, Bronze	<200	<700	12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
<b>7.0 Aluminiums</b>																										
7.1 Aluminium unalloyed	<100	<350	15	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
7.2 Magnesium unalloyed	<150	<350	15	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
7.3 Al Alloyed Si < 1.5 %	<120	<500	15	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
7.4 Al Alloyed 1.5 % < Si < 10%	<120	<400	10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
7.5 Al Alloyed > 10% Si	-	<400	N	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
7.6 Magnesium alloys	-	<400	N	○	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
<b>8.0 Plastics</b>																										
8.1 Plastics, Thermoplastics, Polyethylene	<340	<50	N	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

Stub, 3 Flute, R30 N, Keyway		Stub, 3 Flute, R30 N, Keyway		Regular, 3 Flute, R45 IW		Regular, 3 Flute, R45 IW		Long, 3 Flute, R40 IW		Long, 3 Flute, R40 IW		Regular, 4&6 Flute, R30 N		Regular, 4&6 Flute, R30 N		Long, 4&6 Flute, R30 N		Long, 4&6 Flute, R30 N		Regular, 4 Flute, R30/32, Harmony		Regular, 4 Flute, R30/32, Harmony		Regular, 2 Flute, R30 V4		Long, 2 Flute, R30, Threaded		Regular, 2 Flute, R30, Threaded		Long, Ballnose, 2 Flute, R30, Threaded		Regular, 3 Flute, R30, Threaded		Long, 3 Flute, R30, Threaded		Regular, 4&6 Flute, R30, Threaded		Long, 4 Flute, R30, Threaded		Woodruff Cutter, Threaded		
344	344	345	345	346	346	347	347	349	349	350	351	352	368	370	371	372	373	374	375	377	378																					
																																										
E232	E240	E121	E122	E123	E124	E125	E126	E127	E128	E134	E136	E137	E104	E106	E115	E116	E119	E120	E129	E131	E178																					
HSS Co.8		SPM				HSS Co.8				SPM			HSS Co							HSS																						
Br	TiAlN	Br	TiAlN	Br	TiAlN	Br	TiCN	Br	TiCN	TiAlN			Br																													
N	W				N				UNI	VA	N																															
DIN 327D	DIN 844K		DIN 844L		JIS				DIN 844K	DIN 844L	DIN 844K	-																														
Slotting / Finishing				Finishing								Slotting	Profiling	Slotting / Finishing	Finishing	Key																										
h6				h6								-0.025			h6																											
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Page	353	353	354	354	355	355	356	356	357	357	358	358	359	359
	Regular, 3-6 Flute, R30, NF (semi roughing)		Regular, 3-6 Flute, R30, NF (semi roughing)		Long, 3-6 Flute, R30, NF (semi roughing)		Long, 3-6 Flute, R30, NF (semi roughing)		Regular, 3-6 Flute, R30, NR		Regular, 3-6 Flute, R30, NR		Long, 3-6 Flute, R30, NR (coarse pitch)	
	Stub, 3-4 Flute, R30, NR (coarse pitch)		Stub, 3-4 Flute, R30, HR (fine pitch)		Regular, 4-6 Flute, R30, HR (fine pitch)		Regular, 4-6 Flute, R30, HR (fine pitch)		Long, 4-6 Flute, R30, HR (fine pitch)		Long, 4-6 Flute, R30, HR (fine pitch)			
<b>Catalogue Code</b>	E201	E202	E205	E206	E140	E141	E148	E149	E162	E163	E166	E167	E174	E175
<b>Material</b>	HSS Co.8								HSS Co					
<b>Surface Finish</b>	Brt	TiAlN	Brt	TiAlN	Brt	TiCN	Brt	TiCN	Brt	TiCN	Brt	TiCN	Brt	TiCN
<b>Colour Ring &amp; Application</b>	N		N		Soft-Medium <22HR <sub>c</sub>				Med-Hard 22-40HR <sub>c</sub>					
<b>Standard</b>	DIN 844K		DIN 844L		DIN 844K		DIN 844L		DIN 327D		DIN 844K		DIN 844L	
<b>Type of Cut</b>	Semi Finishing				Roughing									
<b>Material</b>														
<b>Shank Tolerance</b>	h6													

Material	HB	N/mm <sup>2</sup>	% Elong.											
<b>1.0 Steels</b>														
1.1 Mild steels, magnetic soft steel	<200	>200 <400	10	●	●	●	●	●	●	●				
1.2 Free cutting, structural, unalloyed	<200	>350 <700	30	●	●	●	●	○	○	○				
1.3 Plain carbon, low alloyed	<300	>350 <850	20	○	●	○	●	○	○	○				
1.4 Alloy steels harden. / tempered	<250	>500 <850	30	○	●	○	●				●	●	●	●
1.5 Alloy steels harden. / tempered	<350	>850 <1200	30	○	●		●				○	●	○	●
1.6 Hardened, heat treated, high tensile alloy	<420	>1500	12	○	●		●				○	○	○	○
1.7 Hardened Steel 45-50 Rc	<550		<12									○	○	
1.8 Hardened Steel 50-62 Rc	<700		<12											
<b>2.0 Stainless Steels</b>														
2.1 Free machining	<250	<850	25	○	●	○	●				○	○	○	○
2.2 Austenitic	<250	<850	20	○	●	○	●					○	○	○
2.3 Ferritic + martensitic	<250	<850	20	○	○		○					○	○	○
<b>3.0 Cast Irons</b>														
3.1 Lamellar graphite (Grey soft)	<150	<500	10	○	●	○	●	○	●	○	○	●	○	●
3.2 Lamellar graphite (Grey hard)	<300	<1000	10	○	○	○	○	○	○	○	○	○	○	○
3.3 Nodular (spheroidal) graphite & malleable	<200	<700	10	○	○	○	○	○	○	○	○	○	○	○
<b>4.0 Titaniums</b>														
4.1 Pure Titanium	<250	<850	20	○	○		○							
4.2 Titanium alloys	>250	>850	20	○	○		○							
<b>5.0 Nickels</b>														
5.1 Nickel alloys	<250	<850	25	○	○		○							
5.2 Nickel alloys	>250	>850	25	○	○		○							
<b>6.0 Coppers</b>														
6.1 Pure Copper (electrolytic copper)	<120	<400	12	●	●	●	●			○	○			
6.2 Short chip Brass, Phosphor Bronze, gun metal	<200	<700	12	○	○		○				○	●	○	●
6.3 Long chip Brass, Bronze	<200	<700	12	○	●	○	●			○	○			
<b>7.0 Aluminiums</b>														
7.1 Aluminium unalloyed	<100	<350	15	●	●	●	●	○	○	○				
7.2 Magnesium unalloyed	<150	<350	15	○	○	○	○	○	○	○				
7.3 Al Alloyed Si < 1.5 %	<120	<500	15	○	○	○	○	○	○	○				
7.4 Al Alloyed 1.5 % < Si < 10%	<120	<400	10	○	○	○	○	○	○	○				
7.5 Al Alloyed > 10% Si	-	<400	N											
7.6 Magnesium alloys	-	<400	N											
<b>8.0 Plastics</b>														
8.1 Plastics, Thermoplastics, Polyethylene	<340	<50	N			○	●	○	○	○	○			

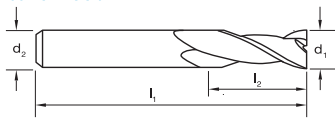
	Regular, 3-5 Flute, R30 UNI, W (coarse pitch)		Regular, 3-6 Flute, R45 UNI, HR (fine pitch)		Regular, 3 Flute, R35, W (coarse pitch)		Regular, 3 Flute, R35, W (coarse pitch)		Long, 3 Flute, R35, W (coarse pitch)		Long, 3 Flute, R35, W (coarse pitch)		Regular, 4 Flute, R55 VA		Regular, 4 Flute, R30 TT		Regular, 4 Flute, R30 TT		Regular, 4-5 Flute, R30, HR (fine pitch)		Long, 4-5 Flute, R30, HR (fine pitch)	
	360	361	362	362	363	363	364	365	365	366	367											
	E150	E151	E152	E153	E154	E155	E157	E158	E159	E176	E177											
	<b>SPM</b>																					
	<b>TiAIN</b>		<b>BrT</b>		<b>TiAIN</b>		<b>BrT</b>		<b>TiAIN</b>		<b>BrT</b>		<b>TiAIN</b>									
	<b>UNI</b>		<b>W</b>						<b>VA</b>		<b>Titanium Alloys</b>				<b>H</b>							
	<b>DIN 844K</b>				<b>DIN 844L</b>				<b>DIN 844K</b>				<b>DIN 844L</b>									
	Roughing																					
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# Slot Drills Regular, 2 Flute, R30 N



- For precision milling of slots & cavities
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- For soft steels & non-ferrous material
- TiCN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (e8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z
0100	1	50	3	6	2
0150	1.5	50	4.5	6	2
0200	2	50	7	6	2
0250	2.5	50	7	6	2
0300	3	50	9	6	2
0350	3.5	60	12	8	2
0400	4	60	12	8	2
0450	4.5	60	15	8	2
0500	5	60	15	8	2
0550	5.5	60	15	8	2
0600	6	60	15	8	2
0650	6.5	65	20	10	2
0700	7	65	20	10	2
0750	7.5	65	20	10	2
0800	8	65	20	10	2
0850	8.5	75	25	10	2
0900	9	75	25	10	2
0950	9.5	75	25	10	2
1000	10	75	25	10	2
1100	11	80	30	12	2
1200	12	80	30	12	2
1300	13	90	35	16	2
1400	14	90	35	16	2
1500	15	95	40	16	2
1600	16	95	40	16	2
1700	17	105	40	20	2
1800	18	105	40	20	2
1900	19	110	45	20	2
2000	20	110	45	20	2
2100	21	110	45	20	2
2200	22	110	45	20	2
2400	24	120	50	25	2
2500	25	120	50	25	2
2800	28	125	55	25	2
3000	30	125	55	25	2
3200	32	145	60	32	2
3500	35	145	60	32	2
4000	40	150	65	32	2
4500	45	155	70	32	2
5000	50	155	70	32	2



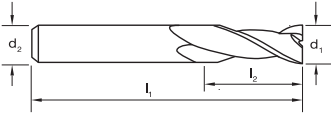
Catalogue Code	<b>E100</b>	<b>E101</b>
Discount Group	B0502	B0516
Material	<b>HSS Co.8</b>	<b>HSS Co.8</b>
Surface Finish	<b>Brt</b>	<b>TiCN</b>
Colour Ring & Application	<b>N</b>	<b>N</b>
Geometry	R30	R30
Shank Form (DIN 1835)	A	A
Shank Tolerance	h6	h6

Item #	Item #
E100 0100	E101 0100
E100 0150	E101 0150
E100 0200	E101 0200
E100 0250	E101 0250
E100 0300	E101 0300
E100 0350	E101 0350
E100 0400	E101 0400
E100 0450	E101 0450
E100 0500	E101 0500
E100 0550	E101 0550
E100 0600	E101 0600
E100 0650	E101 0650
E100 0700	E101 0700
E100 0750	E101 0750
E100 0800	E101 0800
E100 0850	E101 0850
E100 0900	E101 0900
E100 0950	E101 0950
E100 1000	E101 1000
E100 1100	E101 1100
E100 1200	E101 1200
E100 1300	E101 1300
E100 1400	E101 1400
E100 1500	E101 1500
E100 1600	E101 1600
E100 1700	E101 1700
E100 1800	E101 1800
E100 1900	E101 1900
E100 2000	E101 2000
E100 2100	E101 2100
E100 2200	E101 2200
E100 2400	E101 2400
E100 2500	E101 2500
E100 2800	E101 2800
E100 3000	E101 3000
E100 3200	E101 3200
E100 3500	E101 3500
E100 4000	E101 4000
E100 4500	E101 4500
E100 5000	E101 5000

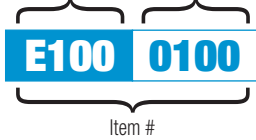
# Slot Drills Regular, 2 Flute, R30 N



- For precision milling of slots & cavities
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- For soft steels & non-ferrous material
- TiCN for longer tool life



Catalogue Code    Size Ref.



Catalogue Code	<b>E100</b>	<b>E101</b>
Discount Group	B0502	B0516
Material	<b>HSS Co.8</b>	<b>HSS Co.8</b>
Surface Finish	<b>Brt</b>	<b>TiCN</b>
Colour Ring & Application	<b>N</b>	<b>N</b>
Geometry	R30	R30
Shank Form (DIN 1835)	A	A
Shank Tolerance	h6	h6

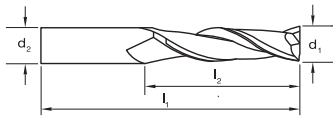
Size Ref.	d <sub>1</sub> (e8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #	Item #
<b>0159</b>	<b>1/16</b>	1-31/32	1/8	1/4	2	E100 0159	E101 0159
<b>0238</b>	<b>3/32</b>	1-31/32	3/16	1/4	2	E100 0238	E101 0238
<b>0318</b>	<b>1/8</b>	1-31/32	7/32	1/4	2	E100 0318	E101 0318
<b>0397</b>	<b>5/32</b>	2-3/8	5/16	1/4	2	E100 0397	E101 0397
<b>0476</b>	<b>3/16</b>	2-3/8	3/8	1/4	2	E100 0476	E101 0476
<b>0635</b>	<b>1/4</b>	2-9/16	9/16	1/4	2	E100 0635	E101 0635
<b>0794</b>	<b>5/16</b>	2-9/16	9/16	3/8	2	E100 0794	E101 0794
<b>0953</b>	<b>3/8</b>	2-3/4	23/32	3/8	2	E100 0953	E101 0953
<b>1270</b>	<b>1/2</b>	3-17/32	1	1/2	2	E100 1270	E101 1270
<b>1588</b>	<b>5/8</b>	3-3/4	1-3/16	5/8	2	E100 1588	E101 1588
<b>1905</b>	<b>3/4</b>	4-5/16	1-9/16	3/4	2	E100 1905	•
<b>2223</b>	<b>7/8</b>	4-17/32	1-3/4	3/4	2	E100 2223	•
<b>2540</b>	<b>1</b>	4-23/32	2	3/4	2	E100 2540	•

• Available on request as special manufacture. Subject to lead time.

# Slot Drills Long, 2 Flute, R30 N



- For long-reach slotting applications
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- For soft steels & non-ferrous material
- TiCN for longer tool life



Catalogue Code    Size Ref.



**Catalogue Code**  
**Discount Group**  
**Material**  
**Surface Finish**  
**Colour Ring & Application**  
**Geometry**  
**Shank Form (DIN 1835)**  
**Shank Tolerance**



<b>E102</b>	<b>E225</b>	<b>E103</b>	<b>E226</b>
B0502	B0502	B0516	B0516
<b>HSS Co.8</b>	<b>HSS Co.8</b>	<b>HSS Co.8</b>	<b>HSS Co.8</b>
<b>BrT</b>	<b>BrT</b>	<b>TiCN</b>	<b>TiCN</b>
<b>N</b>	<b>N</b>	<b>N</b>	<b>N</b>
R30	R30	R30	R30
A	A	A	A
h6	h6	h6	h6

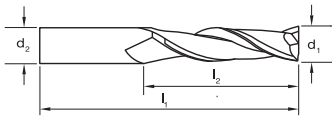
Size Ref.	d <sub>1</sub> (e8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #	Item #	Item #	Item #
0300	3.0	60	15	6	2	E102 0300		E103 0300	
0350	3.5	60	15	6	2	E102 0350		E103 0350	
0400	4.0	60	20	6	2		E225 0400		E226 0400
0400	4.0	60	20	8	2	E102 0400		E103 0400	
0450	4.5	60	20	6	2	E102 0450		E103 0450	
0500	5.0	65	25	6	2		E225 0500		E226 0500
0500	5.0	65	25	8	2	E102 0500		E103 0500	
0550	5.5	65	25	6	2	E102 0550		E103 0550	
0600	6.0	65	25	6	2		E225 0600		E226 0600
0600	6.0	65	25	8	2	E102 0600		E103 0600	
0650	6.5	65	25	10	2	E102 0650		E103 0650	
0700	7.0	65	25	10	2	E102 0700		E103 0700	
0750	7.5	65	25	10	2	E102 0750		E103 0750	
0800	8.0	80	35	10	2	E102 0800		E103 0800	
0850	8.5	80	35	10	2	E102 0850		E103 0850	
0900	9.0	80	35	10	2	E102 0900		E103 0900	
0950	9.5	80	35	10	2	E102 0950		E103 0950	
1000	10.0	95	45	10	2	E102 1000		E103 1000	
1100	11.0	95	45	12	2	E102 1100		E103 1100	
1200	12.0	105	55	12	2	E102 1200		E103 1200	
1400	14.0	110	55	16	2	E102 1400		E103 1400	
1600	16.0	120	65	16	2	E102 1600		E103 1600	
1800	18.0	130	65	20	2	E102 1800		E103 1800	
2000	20.0	140	75	20	2	E102 2000		E103 2000	
2200	22.0	140	75	20	2	E102 2200		E103 2200	
2400	24.0	160	90	25	2	E102 2400		E103 2400	
2500	25.0	160	90	25	2	E102 2500		E103 2500	
3000	30.0	160	90	25	2	E102 3000		E103 3000	
3200	32.0	190	105	32	2	E102 3200		E103 3200	



# Slot Drills Long, 2 Flute, R30 N



- For long-reach slotting applications
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.

E100    0100

Item #



**Catalogue Code** E102  
**Discount Group** B0502  
**Material** HSS Co.8  
**Surface Finish** Brt  
**Colour Ring & Application** N  
**Geometry** R30  
**Shank Form (DIN 1835)** A  
**Shank Tolerance** h6

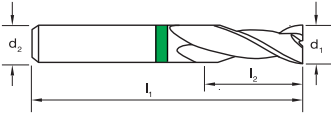
<b>E102</b>
B0502
HSS Co.8
<b>Brt</b>
<b>N</b>
R30
A
h6

Size Ref.	d <sub>1</sub> (e8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
0318	1/8	2-3/8	19/32	1/4	2	E102 0318
0397	5/32	2-3/8	25/32	1/4	2	E102 0397
0476	3/16	2-9/16	63/64	1/4	2	E102 0476
0635	1/4	2-9/16	1	1/4	2	E102 0635
0794	5/16	3-5/32	1-3/8	3/8	2	E102 0794
0953	3/8	3-3/4	1-3/4	3/8	2	E102 0953
1270	1/2	4-5/16	2-5/32	1/2	2	E102 1270
1588	5/8	4-23/32	2-9/16	5/8	2	E102 1588
1905	3/4	5-1/2	2-61/64	3/4	2	E102 1905

# Slot Drills Stub, 2 Flute, R30 UNI



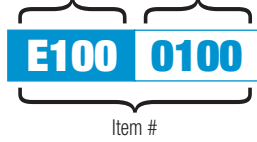
- SPM offers superior performance
- For precision milling of slots & cavities
- Suitable for materials up to 1400 N/mm<sup>2</sup>
- For steels & non-ferrous materials
- TiAIN for longer tool life



**DIN 327D**



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (e8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z
<b>0100</b>	<b>1</b>	47	3	6	2
<b>0200</b>	<b>2</b>	48	4	6	2
<b>0300</b>	<b>3</b>	49	5	6	2
<b>0400</b>	<b>4</b>	51	7	6	2
<b>0500</b>	<b>5</b>	52	8	6	2
<b>0600</b>	<b>6</b>	52	8	6	2
<b>0800</b>	<b>8</b>	61	11	10	2
<b>1000</b>	<b>10</b>	63	13	10	2
<b>1200</b>	<b>12</b>	73	16	12	2
<b>1400</b>	<b>14</b>	73	16	12	2
<b>1600</b>	<b>16</b>	79	19	16	2
<b>1800</b>	<b>18</b>	79	19	16	2
<b>2000</b>	<b>20</b>	88	22	20	2
<b>2200</b>	<b>22</b>	88	22	20	2



Catalogue Code	<b>E108</b>	<b>E109</b>
Discount Group	B0610	B0612
Material	<b>SPM</b>	<b>SPM</b>
Surface Finish	<b>Brt</b>	<b>TiAIN</b>
Colour Ring & Application	<b>UNI</b>	<b>UNI</b>
Geometry	R30	R30
Shank Form (DIN 1835)	A	A
Shank Tolerance	h6	h6

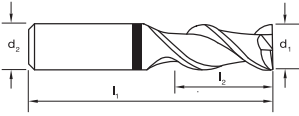
Item #	Item #
E108 0100	•
E108 0200	E109 0200
E108 0300	E109 0300
E108 0400	E109 0400
E108 0500	E109 0500
E108 0600	E109 0600
E108 0800	E109 0800
E108 1000	E109 1000
E108 1200	E109 1200
E108 1400	•
E108 1600	E109 1600
E108 1800	•
E108 2000	E109 2000
E108 2200	•

• Available on request as special manufacture. Subject to lead time.

# Slot Drills Regular, 2 Flute, R40 AI



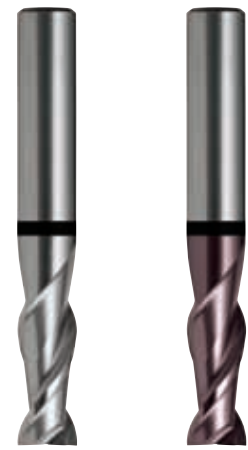
- For precision milling of slots & cavities
- Optimised for Wrought Aluminium Alloys
- Brt for Unalloyed Aluminiums & Al Si ≤0.5%
- TiAlN for Alloyed Aluminiums, offering excellent resistance to abrasion



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (e8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z
<b>0300</b>	<b>3</b>	52	8	6	2
<b>0400</b>	<b>4</b>	55	11	6	2
<b>0500</b>	<b>5</b>	57	13	6	2
<b>0600</b>	<b>6</b>	57	13	6	2
<b>0800</b>	<b>8</b>	69	19	10	2
<b>1000</b>	<b>10</b>	72	22	10	2
<b>1200</b>	<b>12</b>	83	26	12	2
<b>1600</b>	<b>16</b>	92	32	16	2
<b>2000</b>	<b>20</b>	104	38	20	2



<b>Catalogue Code</b>	<b>E110</b>	<b>E111</b>
<b>Discount Group</b>	B0606	B0608
<b>Material</b>	HSS Co.8	HSS Co.8
<b>Surface Finish</b>	<b>Brt</b>	<b>TiAlN</b>
<b>Colour Ring &amp; Application</b>	<b>Al</b>	<b>Al</b>
<b>Geometry</b>	R40	R40
<b>Shank Form (DIN 1835)</b>	A	A
<b>Shank Tolerance</b>	h6	h6

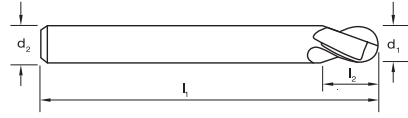
Item #	Item #
E110 0300	E111 0300
E110 0400	E111 0400
E110 0500	E111 0500
E110 0600	E111 0600
E110 0800	E111 0800
E110 1000	E111 1000
E110 1200	E111 1200
E110 1600	E111 1600
E110 2000	E111 2000



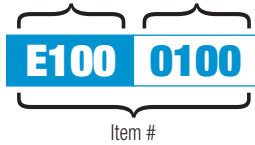
# Slot Drills Long, Ballnose, 2 Flute, R30



- For long-reach profiling & contour milling applications
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- TiCN for longer tool life



Catalogue Code    Size Ref.



Catalogue Code	<b>E113</b>	<b>E114</b>
Discount Group	B0502	B0516
Material	<b>HSS Co.8</b>	<b>HSS Co.8</b>
Surface Finish	<b>BrT</b>	<b>TiCN</b>
Colour Ring & Application	<b>N</b>	<b>N</b>
Geometry	R30	R30
Shank Form (DIN 1835)	A	A
Shank Tolerance	h6	h6

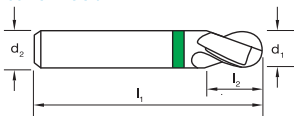
Size Ref.	d <sub>1</sub> (h8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #	Item #
<b>0150</b>	<b>1.5</b>	55	3	6	2	E113 0150	E114 0150
<b>0200</b>	<b>2</b>	55	4	6	2	E113 0200	E114 0200
<b>0250</b>	<b>2.5</b>	55	5	6	2	E113 0250	E114 0250
<b>0300</b>	<b>3</b>	60	6	6	2	E113 0300	E114 0300
<b>0400</b>	<b>4</b>	70	8	6	2	E113 0400	E114 0400
<b>0450</b>	<b>4.5</b>	70	8	6	2	•	E114 0450
<b>0500</b>	<b>5</b>	80	10	6	2	E113 0500	E114 0500
<b>0600</b>	<b>6</b>	90	12	6	2	E113 0600	E114 0600
<b>0700</b>	<b>7</b>	90	14	6	2	E113 0700	E114 0700
<b>0800</b>	<b>8</b>	100	16	8	2	E113 0800	E114 0800
<b>0900</b>	<b>9</b>	100	18	8	2	E113 0900	E114 0900
<b>1000</b>	<b>10</b>	100	20	10	2	E113 1000	E114 1000
<b>1200</b>	<b>12</b>	110	24	12	2	E113 1200	E114 1200
<b>1400</b>	<b>14</b>	110	28	12	2	E113 1400	E114 1400
<b>1600</b>	<b>16</b>	140	32	16	2	E113 1600	E114 1600
<b>1800</b>	<b>18</b>	160	35	16	2	E113 1800	E114 1800
<b>2000</b>	<b>20</b>	160	40	20	2	E113 2000	E114 2000
<b>2500</b>	<b>25</b>	180	50	25	2	E113 2500	E114 2500
<b>3000</b>	<b>30</b>	180	55	25	2	E113 3000	E114 3000
<b>0318</b>	<b>1/8</b>	2-11/32	7/32	1/4	2	E113 0318	
<b>0397</b>	<b>5/32</b>	2-3/4	5/16	1/4	2	E113 0397	
<b>0476</b>	<b>3/16</b>	3-5/32	3/8	1/4	2	E113 0476	
<b>0635*</b>	<b>1/4</b>	3-17/32	15/32	1/4	2	E113 0635	
<b>0794*</b>	<b>5/16</b>	3-15/16	5/8	5/16	2	E113 0794	
<b>0953*</b>	<b>3/8</b>	3-15/16	25/32	3/8	2	E113 0953	
<b>1270*</b>	<b>1/2</b>	4-11/32	15/16	1/2	2	E113 1270	
<b>1588*</b>	<b>5/8</b>	5-1/2	1-1/4	5/8	2	E113 1588	
<b>1905*</b>	<b>3/4</b>	6-9/32	1-9/16	3/4	2	E113 1905	

\* Not available once current stock is depleted.  
 • Available on request as special manufacture. Subject to lead time.

# Slot Drills Stub, Ballnose, 2 Flute, R30 UNI



- SPM offers superior performance
- For profile & contour milling applications
- Suitable for materials up to 1400 N/mm<sup>2</sup>
- TiAIN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (e8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0300</b>	<b>3</b>	49	5	6	2	E118 0300
<b>0400</b>	<b>4</b>	51	7	6	2	E118 0400
<b>0500</b>	<b>5</b>	52	8	6	2	E118 0500
<b>0600</b>	<b>6</b>	52	8	6	2	E118 0600
<b>0800</b>	<b>8</b>	61	11	10	2	E118 0800
<b>1000</b>	<b>10</b>	63	13	10	2	E118 1000
<b>1200</b>	<b>12</b>	73	16	12	2	E118 1200
<b>1600</b>	<b>16</b>	79	19	16	2	E118 1600
<b>2000</b>	<b>20</b>	88	22	20	2	E118 2000



Catalogue Code	<b>E118</b>
Discount Group	B0612
Material	<b>SPM</b>
Surface Finish	<b>TiAIN</b>
Colour Ring & Application	<b>UNI</b>
Geometry	R30
Shank Form (DIN 1835)	A
Shank Tolerance	h6

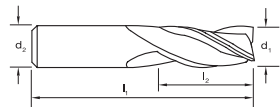




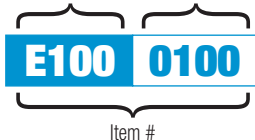
# Endmills Stub, 3 Flute, R30 N, Keyway



- Universal use for slotting and finishing with the one tool
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- TiAlN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (e8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z
0180	1.8	48	4	6	3
0280	2.8	49	5	6	3
0380	3.8	51	7	6	3
0480	4.8	52	8	6	3
0575	5.75	52	8	6	3
0775	7.75	61	11	10	3
0970	9.7	63	13	10	3
1170	11.7	70	13	12	3
1370	13.7	73	16	12	3
1570	15.7	79	19	16	3
1770	17.7	79	19	16	3
1970	19.7	88	22	20	3
2170	21.7	88	22	20	3



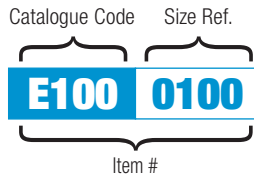
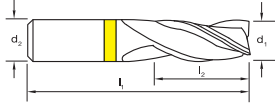
Catalogue Code	<b>E232</b>	<b>E240</b>
Discount Group	B0606	B0608
Material	<b>HSS Co.8</b>	<b>HSS Co.8</b>
Surface Finish	<b>BrT</b>	<b>TiAlN</b>
Colour Ring & Application	<b>N</b>	<b>N</b>
Geometry	R30	R30
Shank Form (DIN 1835)	A	A
Shank Tolerance	h6	h6

Item #	Item #
E232 0180	E240 0180
E232 0280	E240 0280
E232 0380	E240 0380
E232 0480	E240 0480
E232 0575	E240 0575
E232 0775	E240 0775
E232 0970	E240 0970
E232 1170	E240 1170
E232 1370	E240 1370
E232 1570	E240 1570
E232 1770	E240 1770
E232 1970	E240 1970
E232 2170	E240 2170

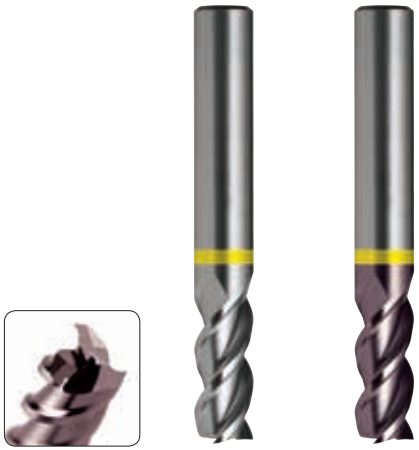
# Endmills Regular, 3 Flute, R45 W



- SPM offers superior performance
- Universal use for slotting & finishing applications, with one tool
- Optimised geometry for soft materials
- Brt for non ferrous materials
- TiAIN for longer tool life



Size Ref.	d <sub>1</sub> (e8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z
0300	3	52	8	6	3
0400	4	55	11	6	3
0500	5	57	13	6	3
0600	6	57	13	6	3
0800	8	69	19	10	3
1000	10	72	22	10	3
1200	12	83	26	12	3
1600	16	92	32	16	3
2000	20	104	38	20	3



Catalogue Code	<b>E121</b>	<b>E122</b>
Discount Group	B0610	B0612
Material	<b>SPM</b>	<b>SPM</b>
Surface Finish	<b>Brt</b>	<b>TAIN</b>
Colour Ring & Application	<b>W</b>	<b>W</b>
Geometry	R45	R45
Shank Form (DIN 1835)	A	A
Shank Tolerance	h6	h6

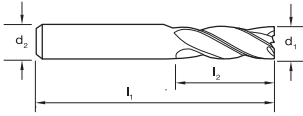
Item #	Item #
E121 0300	E122 0300
E121 0400	E122 0400
E121 0500	E122 0500
E121 0600	E122 0600
E121 0800	E122 0800
E121 1000	E122 1000
E121 1200	E122 1200
E121 1600	E122 1600
E121 2000	E122 2000



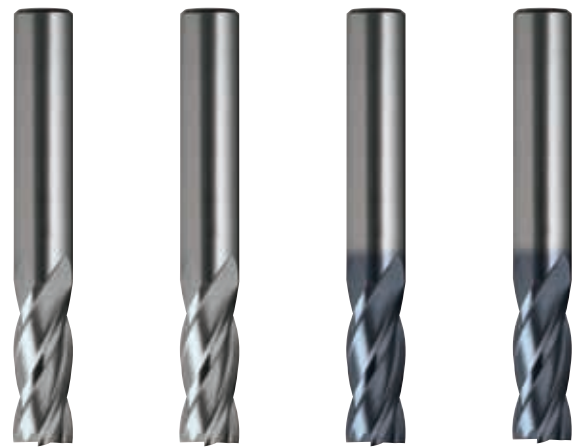
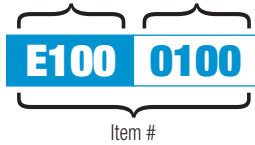
# Endmills Regular, 4&6 Flute, R30 N



- For precision finish milling applications
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- TiCN for longer tool life



Catalogue Code Size Ref.



Catalogue Code  
Discount Group  
Material  
Surface Finish  
Colour Ring & Application  
Geometry  
Shank Form (DIN 1835)  
Shank Tolerance

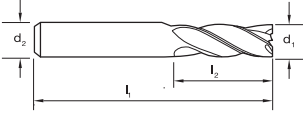
E125	E227	E126	E228
B0502	B0502	B0516	B0516
HSS Co.8	HSS Co.8	HSS Co.8	HSS Co.8
<b>BrT</b>	<b>BrT</b>	<b>TiCN</b>	<b>TiCN</b>
<b>N</b>	<b>N</b>	<b>N</b>	<b>N</b>
R30	R30	R30	R30
A	A	A	A
h6	h6	h6	h6

Size Ref.	d <sub>1</sub> (k9)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #	Item #	Item #	Item #
<b>0150</b>	1.5	50	3	6	4	E125 0150		E126 0150	
<b>0200</b>	2.0	50	6	6	4	E125 0200		E126 0200	
<b>0250</b>	2.5	50	7	6	4	E125 0250		E126 0250	
<b>0300</b>	3.0	50	9	6	4	E125 0300		E126 0300	
<b>0350</b>	3.5	60	12	6	4		E227 0350		E228 0350
<b>0350</b>	3.5	60	12	8	4	E125 0350		E126 0350	
<b>0400</b>	4.0	60	12	6	4		E227 0400		E228 0400
<b>0400</b>	4.0	60	12	8	4	E125 0400		E126 0400	
<b>0450</b>	4.5	60	15	6	4		E227 0450		E228 0450
<b>0450</b>	4.5	60	15	8	4	E125 0450		E126 0450	
<b>0500</b>	5.0	60	15	6	4		E227 0500		E228 0500
<b>0500</b>	5.0	60	15	8	4	E125 0500		E126 0500	
<b>0550</b>	5.5	60	15	6	4		E227 0550		E228 0550
<b>0550</b>	5.5	60	15	8	4	E125 0550		E126 0550	
<b>0600</b>	6.0	60	15	6	4		E227 0600		E228 0600
<b>0600</b>	6.0	60	15	8	4	E125 0600		E126 0600	
<b>0650</b>	6.5	65	20	10	4	E125 0650		E126 0650	
<b>0700</b>	7.0	65	20	10	4	E125 0700		E126 0700	
<b>0750</b>	7.5	65	20	10	4	E125 0750		E126 0750	
<b>0800</b>	8.0	65	20	10	4	E125 0800		E126 0800	
<b>0850</b>	8.5	75	25	10	4	E125 0850		E126 0850	
<b>0900</b>	9.0	75	25	10	4	E125 0900		E126 0900	
<b>0950</b>	9.5	75	25	10	4	E125 0950		E126 0950	
<b>1000</b>	10.0	75	25	10	4	E125 1000		E126 1000	
<b>1050</b>	10.5	80	30	12	4	E125 1050		E126 1050	
<b>1100</b>	11.0	80	30	12	4	E125 1100		E126 1100	
<b>1150</b>	11.5	80	30	12	4	E125 1150		E126 1150	
<b>1200</b>	12.0	80	30	12	4	E125 1200		E126 1200	
<b>1300</b>	13.0	90	35	16	4	E125 1300		E126 1300	
<b>1400</b>	14.0	90	35	16	4	E125 1400		E126 1400	
<b>1500</b>	15.0	95	40	16	4	E125 1500		E126 1500	
<b>1600</b>	16.0	95	40	16	4	E125 1600		E126 1600	
<b>1700</b>	17.0	105	40	20	4	E125 1700		E126 1700	
<b>1800</b>	18.0	105	40	20	4	E125 1800		E126 1800	
<b>1900</b>	19.0	110	45	20	4	E125 1900		E126 1900	
<b>2000</b>	20.0	110	45	20	4	E125 2000		E126 2000	
<b>2200</b>	22.0	110	45	20	4	E125 2200		E126 2200	
<b>2400</b>	24.0	120	50	25	4	E125 2400		E126 2400	
<b>2500</b>	25.0	120	50	25	4	E125 2500		E126 2500	
<b>2600</b>	26.0	120	50	25	4			E126 2600	
<b>2800</b>	28.0	125	55	25	6	E125 2800		E126 2800	
<b>3000</b>	30.0	125	55	25	6	E125 3000		E126 3000	
<b>3200</b>	32.0	145	60	32	6	E125 3200		E126 3200	
<b>3500</b>	35.0	145	60	32	6	E125 3500		E126 3500	
<b>4000</b>	40.0	150	65	32	6	E125 4000		E126 4000	
<b>4500</b>	45.0	155	70	32	6	E125 4500		E126 4500	
<b>5000</b>	50.0	155	70	32	6	E125 5000		E126 5000	

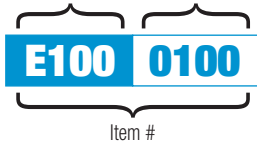
# Endmills Regular, 4&6 Flute, R30 N



- For precision finish milling applications
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- TiCN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (k9)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z
0159	1/16	1-31/32	1/4	1/4	4
0238	3/32	1-31/32	9/32	1/4	4
0318	1/8	1-31/32	11/32	1/4	4
0397	5/32	2-11/32	15/32	1/4	4
0476	3/16	2-11/32	19/32	1/4	4
0635	1/4	2-11/32	19/32	1/4	4
0794	5/16	2-9/16	25/32	3/8	4
0953	3/8	2-15/16	31/32	3/8	4
1270	1/2	3-7/32	1-3/8	1/2	4
1588	5/8	3-3/4	1-9/16	5/8	4
1905	3/4	4-5/16	1-3/4	3/4	4
2223	7/8	4-5/16	1-3/4	3/4	4
2540	1	4-23/321-31/32	3/4	3/4	4
2541	1	4-23/321-31/32	1	1	4



Catalogue Code	<b>E125</b>	<b>E126</b>
Discount Group	B0502	B0516
Material	<b>HSS Co.8</b>	<b>HSS Co.8</b>
Surface Finish	<b>BrT</b>	<b>TiCN</b>
Colour Ring & Application	<b>N</b>	<b>N</b>
Geometry	R30	R30
Shank Form (DIN 1835)	A	A
Shank Tolerance	h6	h6

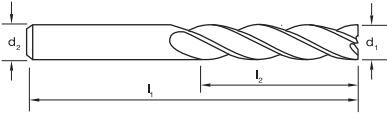
Item #	Item #
E125 0159	E126 0159
E125 0238	E126 0238
E125 0318	E126 0318
E125 0397	E126 0397
E125 0476	E126 0476
E125 0635	E126 0635
E125 0794	E126 0794
E125 0953	E126 0953
E125 1270	E126 1270
E125 1588	E126 1588
E125 1905	E126 1905
E125 2223	E126 2223
E125 2540	E126 2540
E125 2541	E126 2541



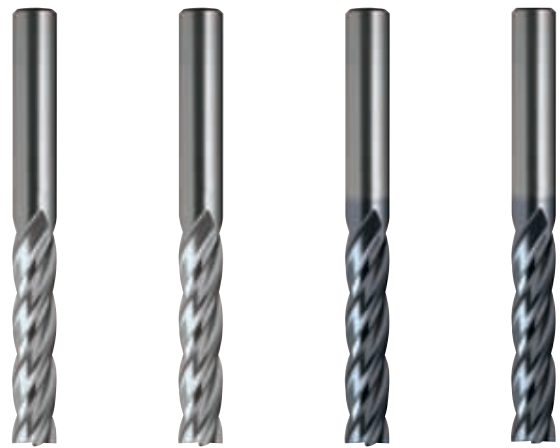
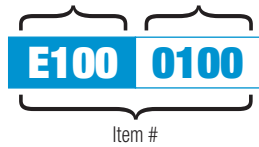
# Endmills Long, 4&6 Flute, R30 N



- For precision finish milling applications
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- TiCN for longer tool life



Catalogue Code Size Ref.



Catalogue Code  
Discount Group  
Material  
Surface Finish  
Colour Ring & Application  
Geometry  
Shank Form (DIN 1835)  
Shank Tolerance

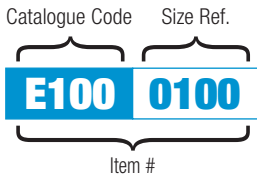
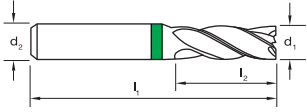
E127	E229	E128	E230
B0502	B0502	B0516	B0516
HSS Co.8	HSS Co.8	HSS Co.8	HSS Co.8
<b>Br</b>	<b>Br</b>	<b>TiCN</b>	<b>TiCN</b>
<b>N</b>	<b>N</b>	<b>N</b>	<b>N</b>
R30	R30	R30	R30
A	A	A	A
h6	h6	h6	h6

Size Ref.	d <sub>1</sub> (k10)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #	Item #	Item #	Item #
0200	2.0	60	10	6	4	E127 0200		E128 0200	
0250	2.5	60	15	6	4	E127 0250		E128 0250	
0300	3.0	60	15	6	4	E127 0300		E128 0300	
0350	3.5	60	20	6	4				E230 0350
0350	3.5	60	20	8	4	E127 0350		E128 0350	
0400	4.0	60	20	6	4		E229 0400		E230 0400
0400	4.0	60	20	8	4	E127 0400		E128 0400	
0450	4.5	65	25	6	4				E230 0450
0450	4.5	65	25	8	4	E127 0450		E128 0450	
0500	5.0	65	25	6	4		E229 0500		E230 0500
0500	5.0	65	25	8	4	E127 0500		E128 0500	
0550	5.5	65	25	6	4				E230 0550
0550	5.5	65	25	8	4	E127 0550		E128 0550	
0600	6.0	65	25	6	4		E229 0600		E230 0600
0600	6.0	65	25	8	4	E127 0600		E128 0600	
0650	6.5	80	35	10	4	E127 0650		E128 0650	
0700	7.0	80	35	10	4	E127 0700		E128 0700	
0750	7.5	80	35	10	4	E127 0750		E128 0750	
0800	8.0	80	35	10	4	E127 0800		E128 0800	
0850	8.5	95	45	10	4	E127 0850		E128 0850	
0900	9.0	95	45	10	4	E127 0900		E128 0900	
0950	9.5	95	45	10	4	E127 0950		E128 0950	
1000	10.0	95	45	10	4	E127 1000		E128 1000	
1100	11.0	105	55	12	4	E127 1100		E128 1100	
1200	12.0	105	55	12	4	E127 1200		E128 1200	
1400	14.0	110	55	16	4	E127 1400		E128 1400	
1600	16.0	120	65	16	4	E127 1600		E128 1600	
1800	18.0	130	65	20	4	E127 1800		E128 1800	
1900	19.0	140	75	20	4	E127 1900		E128 1900	
2000	20.0	140	75	20	4	E127 2000		E128 2000	
2200	22.0	140	75	20	4	E127 2200		E128 2200	
2400	24.0	160	90	25	4	E127 2400		E128 2400	
2500	25.0	160	90	25	4	E127 2500		E128 2500	
3000	30.0	160	90	25	6	E127 3000		E128 3000	
3200	32.0	190	105	32	6	E127 3200		E128 3200	
4000	40.0	210	125	32	6	E127 4000			
0159	1/16	2-3/8	3/8	1/4	4	E127 0159		E128 0159	
0238	3/32	2-3/8	3/8	1/4	4	E127 0238		E128 0238	
0318	1/8	2-3/8	19/32	1/4	4	E127 0318		E128 0318	
0397	5/32	2-3/8	25/32	1/4	4	E127 0397		E128 0397	
0476	3/16	2-9/16	31/32	1/4	4	E127 0476		E128 0476	
0635	1/4	2-9/16	31/32	1/4	4	E127 0635		E128 0635	
0794	5/16	3-5/32	1-3/8	3/8	4	E127 0794		E128 0794	
0953	3/8	3-3/4	1-25/32	3/8	4	E127 0953		E128 0953	
1270	1/2	4-5/16	2-5/32	1/2	4	E127 1270		E128 1270	
1588	5/8	4-23/32	2-9/16	5/8	4	E127 1588		E128 1588	
1905	3/4	5-1/2	2-15/16	3/4	4	E127 1905		E128 1905	
2223	7/8	5-1/2	2-15/16	3/4	4	E127 2223		E128 2223	
2540	1	6-5/16	3-17/32	3/4	4	E127 2540		E128 2540	

# Endmills Regular, 4 Flute, R30/32, Harmony



- SPM offers superior performance
- 30/32° variable flute helix for chatter free milling
- Suitable for materials up to 1400 N/mm<sup>2</sup>
- TiAIN for longer tool life



Size Ref.	d <sub>1</sub> (k10)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0200</b>	<b>2</b>	51	7	6	4	E134 0200
<b>0300</b>	<b>3</b>	52	8	6	4	E134 0300
<b>0400</b>	<b>4</b>	55	11	6	4	E134 0400
<b>0500</b>	<b>5</b>	57	13	6	4	E134 0500
<b>0600</b>	<b>6</b>	57	13	6	4	E134 0600
<b>0800</b>	<b>8</b>	69	19	10	4	E134 0800
<b>1000</b>	<b>10</b>	72	22	10	4	E134 1000
<b>1200</b>	<b>12</b>	83	26	12	4	E134 1200
<b>1400</b>	<b>14</b>	83	26	12	4	E134 1400
<b>1600</b>	<b>16</b>	92	32	16	4	E134 1600
<b>1800</b>	<b>18</b>	92	32	16	4	E134 1800
<b>2000</b>	<b>20</b>	104	38	20	4	E134 2000

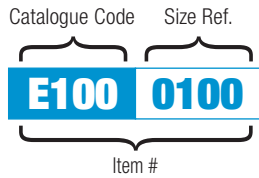
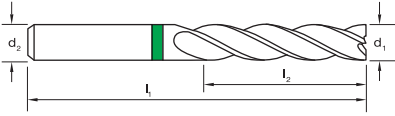


Catalogue Code	<b>E134</b>
Discount Group	B0612
Material	<b>SPM</b>
Surface Finish	<b>TIAIN</b>
Colour Ring & Application	<b>HARMONY</b>
Geometry	R30 / 32
Shank Form (DIN 1835)	A
Shank Tolerance	h6

# Endmills Long, 4 Flute, R30/32, Harmony



- SPM offers superior performance
- 30/32° variable flute helix for chatter free milling
- Suitable for materials up to 1400 N/mm<sup>2</sup>
- TiAlN for longer tool life



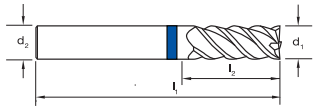
Catalogue Code	<b>E136</b>
Discount Group	B0612
Material	<b>SPM</b>
Surface Finish	<b>TiAlN</b>
Colour Ring & Application	<b>HARMONY</b>
Geometry	R30 / 32
Shank Form (DIN 1835)	A
Shank Tolerance	h6

Size Ref.	d <sub>1</sub> (k10)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0300</b>	<b>3</b>	56	12	6	4	E136 0300
<b>0400</b>	<b>4</b>	63	19	6	4	E136 0400
<b>0500</b>	<b>5</b>	68	24	6	4	E136 0500
<b>0600</b>	<b>6</b>	68	24	6	4	E136 0600
<b>0800</b>	<b>8</b>	88	38	10	4	E136 0800
<b>1000</b>	<b>10</b>	95	45	10	4	E136 1000
<b>1200</b>	<b>12</b>	110	53	12	4	E136 1200
<b>1400</b>	<b>14</b>	110	53	12	4	E136 1400
<b>1600</b>	<b>16</b>	123	63	16	4	E136 1600
<b>1800</b>	<b>18</b>	123	63	16	4	E136 1800
<b>2000</b>	<b>20</b>	141	75	20	4	E136 2000

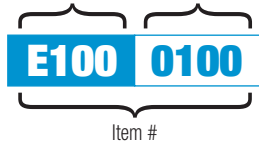
# Endmills Regular, 4 Flute, R50 VA



- SPM offers superior performance
- For superior finishing applications
- Optimised geometry for stainless steels & long chipping materials up to 1000 N/mm<sup>2</sup>
- TiAlN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (k8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0600</b>	<b>6</b>	57	13	6	4	E137 0600
<b>0800</b>	<b>8</b>	69	19	10	4	E137 0800
<b>1000</b>	<b>10</b>	72	22	10	4	E137 1000
<b>1200</b>	<b>12</b>	83	26	12	4	E137 1200
<b>1400</b>	<b>14</b>	83	26	12	4	E137 1400
<b>1600</b>	<b>16</b>	92	32	16	4	E137 1600
<b>1800</b>	<b>18</b>	92	32	16	4	E137 1800
<b>2000</b>	<b>20</b>	104	38	20	4	E137 2000



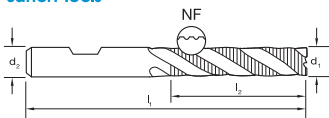
Catalogue Code	<b>E137</b>
Discount Group	B0612
Material	<b>SPM</b>
Surface Finish	<b>TiAlN</b>
Colour Ring & Application	<b>VA</b>
Geometry	R50
Shank Form (DIN 1835)	A
Shank Tolerance	h6



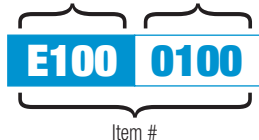
# Roughers Long, 3-6 Flute, R30, NF (semi roughing)



- For roughing applications
- NF geometry allows for heavy cuts, with a good surface finish
- Suitable for materials up to 1100 N/mm<sup>2</sup>
- TiAlN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (js14)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z
<b>0600</b>	<b>6</b>	68	24	6	3
<b>0800</b>	<b>8</b>	88	38	10	3
<b>1000</b>	<b>10</b>	95	45	10	4
<b>1200</b>	<b>12</b>	110	53	12	4
<b>1400</b>	<b>14</b>	110	53	12	4
<b>1600</b>	<b>16</b>	123	63	16	4
<b>1800</b>	<b>18</b>	123	63	16	4
<b>2000</b>	<b>20</b>	141	75	20	4
<b>2200</b>	<b>22</b>	141	75	20	5
<b>2500</b>	<b>25</b>	166	90	25	5
<b>3000</b>	<b>30</b>	166	90	25	6
<b>3200</b>	<b>32</b>	186	106	32	6
<b>3600</b>	<b>36</b>	186	106	32	6
<b>4000</b>	<b>40</b>	217	125	40	6



Catalogue Code	<b>E205</b>	<b>E206</b>
Discount Group	B0402	B0404
Material	<b>HSS Co.8</b>	<b>HSS Co.8</b>
Surface Finish	<b>BrT</b>	<b>TIAlN</b>
Colour Ring & Application	<b>N</b>	<b>N</b>
Geometry	R30 NF (semi roughing)	R30 NF (semi roughing)
Shank Form (DIN 1835)	B	B
Shank Tolerance	h6	h6

Item #	Item #
•	•
•	•
E205 1000	E206 1000
E205 1200	E206 1200
E205 1400	E206 1400
E205 1600	E206 1600
E205 1800	E206 1800
E205 2000	E206 2000
E205 2200	E206 2200
E205 2500	E206 2500
E205 3000	E206 3000
•	•
•	•
•	•

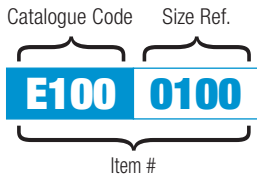
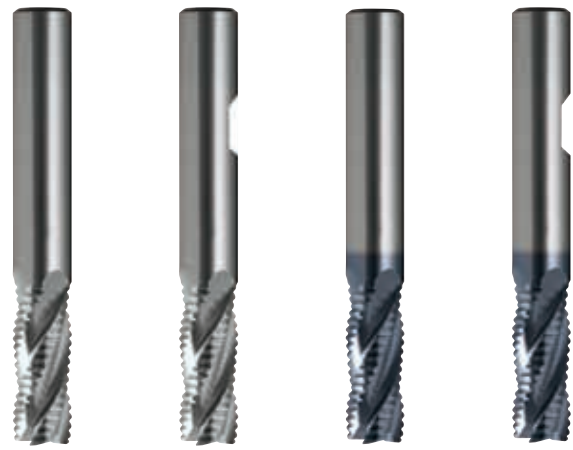
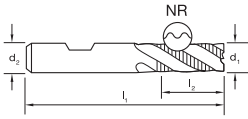
• Available on request as special manufacture. Subject to lead time.



# Roughers Regular, 3-6 Flute, R30, NR (coarse pitch)



- For roughing applications
- NR geometry allows for heavy cuts
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- TiCN for longer tool life



Catalogue Code  
Discount Group  
Material  
Surface Finish  
Colour Ring & Application  
Geometry  
Shank Form (DIN 1835)  
Shank Tolerance

E138	E140	E139	E141
B0402	B0402	B0404	B0404
HSS Co.8	HSS Co.8	HSS Co.8	HSS Co.8
<i>Br</i>	<i>Br</i>	<i>TiCN</i>	<i>TiCN</i>
Soft-Med <22HR <sub>c</sub>	Soft-Med <22HR <sub>c</sub>	Soft-Med <22HR <sub>c</sub>	Soft-Med <22HR <sub>c</sub>
R30 NR (coarse pitch)	R30 NR (coarse pitch)	R30 NR (coarse pitch)	R30 NR (coarse pitch)
A	B	A	B
h6	h6	h6	h6

Size Ref.	d <sub>1</sub> (js14)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #	Item #	Item #	Item #
0600	6	57	13	6	3	E138 0600	E140 0600	E139 0600	E141 0600
0800	8	69	19	10	3	E138 0800	E140 0800	E139 0800	E141 0800
1000	10	72	22	10	4	E138 1000	E140 1000	E139 1000	E141 1000
1200	12	83	26	12	4	E138 1200	E140 1200	E139 1200	E141 1200
1400	14	83	26	12	4	E138 1400	E140 1400	E139 1400	•
1600	16	92	32	16	4	E138 1600	E140 1600	E139 1600	E141 1600
1800	18	92	32	16	4	E138 1800	E140 1800	E139 1800	•
2000	20	104	38	20	4	E138 2000	E140 2000	E139 2000	E141 2000
2200	22	104	38	20	4	E138 2200	•	E139 2200	•
2500	25	121	45	25	5	E138 2500	E140 2500	E139 2500	E141 2500
3000	30	121	45	25	6	E138 3000	•	E139 3000	•
3200	32	133	53	32	6	•	•	•	•
4000	40*	155	63	40	6	E138 4000			
0635	1/4	2-19/32	5/8	3/8	3	E138 0635	•	E139 0635	•
0794	5/16	2-23/32	3/4	3/8	3	E138 0794	•	E139 0794	•
0953	3/8	2-13/16	7/8	3/8	4	E138 0953	•	E139 0953	•
1270	1/2	3-1/4	1	1/2	4	E138 1270	•	E139 1270	•
1588	5/8	3-5/8	1-1/4	5/8	4	E138 1588	•	E139 1588	•
1905	3/4	4-3/32	1-1/2	3/4	4	E138 1905	•	E139 1905	•
2540	1	4-3/4	1-3/4	1	5	E138 2540	•	E139 2540	•
3175	1-1/4	5-1/4	2-1/16	1-1/4	6	•	•		•
3810*	1-1/2	6-3/32	2-15/32	1-1/4	8	E138 3810			

• Available on request as special manufacture. Subject to lead time.  
\* Not available once current stock is depleted.



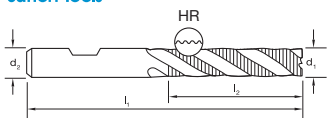




# Roughers Long, 4-6 Flute, R30, HR (fine pitch)



- For roughing applications
- HR geometry allows for heavy cuts, in harder materials
- Suitable for materials up to 1300 N/mm<sup>2</sup>
- TiCN for longer tool life



Catalogue Code	Size Ref.
<b>E100</b>	<b>0100</b>
Item #	

Catalogue Code  
Discount Group  
Material  
Surface Finish  
Colour Ring & Application  
Geometry  
Shank Form (DIN 1835)  
Shank Tolerance

<b>E172</b>	<b>E174</b>	<b>E173</b>	<b>E175</b>
B0402	B0402	B0404	B0404
<b>HSS Co</b>	<b>HSS Co</b>	<b>HSS Co</b>	<b>HSS Co</b>
<b>BrT</b>	<b>BrT</b>	<b>TiCN</b>	<b>TiCN</b>
Med-Hard 22-40HR <sub>c</sub>	Med-Hard 22-40HR <sub>c</sub>	Med-Hard 22-40HR <sub>c</sub>	Med-Hard 22-40HR <sub>c</sub>
R30 HR (fine pitch)	R30 HR (fine pitch)	R30 HR (fine pitch)	R30 HR (fine pitch)
A	B	A	B
h6	h6	h6	h6

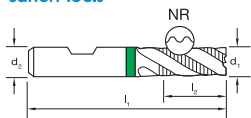
Size Ref.	d <sub>1</sub> (js14)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #	Item #	Item #	Item #
<b>1200</b>	12	110	53	12	4	E172 1200	E174 1200	E173 1200	E175 1200
<b>1600</b>	16	123	63	16	4	E172 1600	E174 1600	E173 1600	E175 1600
<b>1800</b>	18	123	63	16	4	E172 1800	E174 1800	E173 1800	•
<b>2000</b>	20	141	75	20	4	E172 2000	E174 2000	E173 2000	E175 2000
<b>2200</b>	22	141	75	20	4	E172 2200	E174 2200	E173 2200	•
<b>2500</b>	25	166	90	25	5	E172 2500	E174 2500	E173 2500	E175 2500
<b>3000</b>	30	166	90	25	6	E172 3000	E174 3000	E173 3000	•
<b>4000*</b>	40	217	125	40	6	E172 4000			

• Available on request as special manufacture. Subject to lead time.  
\* Not available once current stock is depleted.

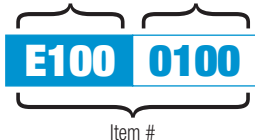
# Roughers Regular, 3-5 Flute, R30 UNI, NR (coarse pitch)



- SPM offers superior performance
- For roughing applications
- NR geometry allows for heavy cuts
- Suitable for materials up to 1000 N/mm<sup>2</sup>
- TiAlN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (js14)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
0600	6	57	13	6	3	E150 0600
0800	8	69	19	10	3	E150 0800
1000	10	72	22	10	4	E150 1000
1200	12	83	26	12	4	E150 1200
1400	14	83	26	12	4	E150 1400
1600	16	92	32	16	4	E150 1600
1800	18	92	32	16	4	E150 1800
2000	20	104	38	20	4	E150 2000
2200	22	121	45	20	4	E150 2200
2500	25	121	45	25	5	E150 2500

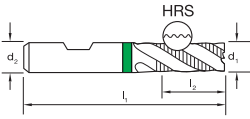


Catalogue Code	<b>E150</b>
Discount Group	B0408
Material	<b>SPM</b>
Surface Finish	<b>TiAlN</b>
Colour Ring & Application	<b>UNI</b>
Geometry	R30 NR (coarse pitch)
Shank Form (DIN 1835)	B
Shank Tolerance	h6

# Roughers Regular, 3-6 Flute, R45 UNI, HRS (fine pitch)



- SPM offers superior performance
- For roughing applications
- HRS geometry allows for heavy cuts in short & long chipping materials
- TiAIN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (k8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0400</b>	<b>4</b>	55	11	6	3	E151 0400
<b>0500</b>	<b>5</b>	57	13	6	4	E151 0500
<b>0600</b>	<b>6</b>	57	13	6	4	E151 0600
<b>0700</b>	<b>7</b>	66	16	10	4	E151 0700
<b>0800</b>	<b>8</b>	69	19	10	4	E151 0800
<b>0900</b>	<b>9</b>	69	19	10	4	E151 0900
<b>1000</b>	<b>10</b>	72	22	10	4	E151 1000
<b>1200</b>	<b>12</b>	83	26	12	4	E151 1200
<b>1400</b>	<b>14</b>	83	26	12	5	E151 1400
<b>1600</b>	<b>16</b>	92	32	16	5	E151 1600
<b>1800</b>	<b>18</b>	92	32	16	6	E151 1800
<b>2000</b>	<b>20</b>	104	38	20	6	E151 2000
<b>2500</b>	<b>25</b>	121	45	25	6	E151 2500



Catalogue Code	<b>E151</b>
Discount Group	B0408
Material	<b>SPM</b>
Surface Finish	<b>TiAIN</b>
Colour Ring & Application	<b>UNI</b>
Geometry	R45 HRS (fine pitch)
Shank Form (DIN 1835)	B
Shank Tolerance	h6

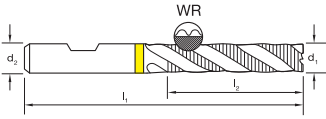




# Roughers Long, 3 Flute, R35, WR (coarse pitch)



- SPM offers superior performance
- For roughing applications
- WR geometry allows for heavy cuts in long chipping materials
- Brt for non ferrous materials
- TiAIN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (js14)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z
0600	6	68	24	6	3
0800	8	88	38	10	3
1000	10	95	45	10	3
1200	12	110	53	12	3
1400	14	110	53	12	3
1600	16	123	63	16	3
1800	18	123	63	16	3
2000	20	141	75	20	3



Catalogue Code	<b>E154</b>	<b>E155</b>
Discount Group	B0406	B0408
Material	<b>SPM</b>	<b>SPM</b>
Surface Finish	<b>Brt</b>	<b>TiAIN</b>
Colour Ring & Application	<b>W</b>	<b>W</b>
Geometry	R35 WR (coarse pitch)	R35 WR (coarse pitch)
Shank Form (DIN 1835)	B	B
Shank Tolerance	h6	h6

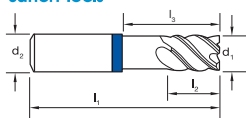
Item #	Item #
•	•
•	•
E154 1000	E155 1000
E154 1200	E155 1200
E154 1400	E155 1400
E154 1600	E155 1600
E154 1800	E155 1800
E154 2000	E155 2000

• Available on request as special manufacture. Subject to lead time.

# Roughers Regular, 4 Flute, R55 VA



- SPM offers superior performance
- For roughing & finishing applications
- Optimised geometry for stainless steels & long chipping materials up to 1000 N/mm<sup>2</sup>
- TiAlN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (k9)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	z
0400	4	55	5	16	6	4
0500	5	57	6	18	6	4
0600	6	57	7	20	6	4
0800	8	69	9	28	8	4
1000	10	72	11	31	10	4
1200	12	83	13	37	12	4
1600	16	92	17	43	16	4
2000	20	104	21	53	20	4
2500	25	121	26	64	25	4



Catalogue Code	<b>E156</b>	<b>E157</b>
Discount Group	B0612	B0612
Material	<b>SPM</b>	<b>SPM</b>
Surface Finish	<b>TiAlN</b>	<b>TiAlN</b>
Colour Ring & Application	<b>VA</b>	<b>VA</b>
Geometry	R55	R55
Shank Form (DIN 1835)	A	B
Shank Tolerance	h6	h6

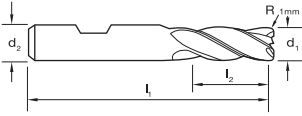
Item #	Item #
E156 0400	E157 0400
E156 0500	E157 0500
E156 0600	E157 0600
E156 0800	E157 0800
E156 1000	E157 1000
E156 1200	E157 1200
E156 1600	E157 1600
E156 2000	E157 2000
•	E157 2500

\*DIN 844K - all dimensions except l<sub>2</sub> and l<sub>3</sub>

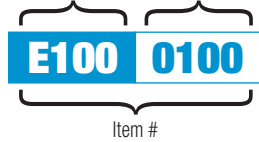
# Roughers Regular, 4 Flute, R30 Ti



- SPM offers superior performance
- For roughing applications in Titaniums
- Unique chip breaking qualities
- TiAIN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (k8)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	r
<b>1000</b>	<b>10</b>	72	22	10	4	1
<b>1200</b>	<b>12</b>	83	26	12	4	1
<b>1600</b>	<b>16</b>	92	32	16	4	1
<b>2000</b>	<b>20</b>	104	38	20	4	1
<b>2500</b>	<b>25</b>	121	45	25	4	1



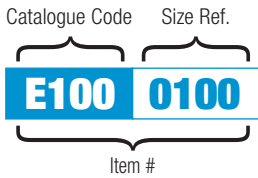
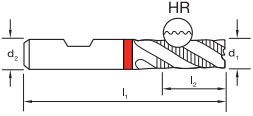
<b>Catalogue Code</b>	<b>E158</b>	<b>E159</b>
<b>Discount Group</b>	B0406	B0408
<b>Material</b>	<b>SPM</b>	<b>SPM</b>
<b>Surface Finish</b>	<b>BrT</b>	<b>TiAIN</b>
<b>Colour Ring &amp; Application</b>	<b>Titanium Alloys</b>	<b>Titanium Alloys</b>
<b>Geometry</b>	R30°	R30°
<b>Shank Form (DIN 1835)</b>	B	B
<b>Shank Tolerance</b>	h6	h6

Item #	Item #
E158 1000	E159 1000
E158 1200	E159 1200
E158 1600	E159 1600
E158 2000	E159 2000
E158 2500	E159 2500

# Roughers Regular, 4-5 Flute, R30, HR (fine pitch)



- SPM offers superior performance
- For roughing applications
- HR geometry allows for heavy cuts, in harder materials
- Suitable for materials up to 1400 N/mm<sup>2</sup>
- TiAlN for longer tool life



Size Ref.	d <sub>1</sub> (js14)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0600</b>	<b>6</b>	57	13	6	4	E176 0600
<b>0800</b>	<b>8</b>	69	19	10	4	E176 0800
<b>1000</b>	<b>10</b>	72	22	10	4	E176 1000
<b>1200</b>	<b>12</b>	83	26	12	4	E176 1200
<b>1600</b>	<b>16</b>	92	32	16	4	E176 1600
<b>2000</b>	<b>20</b>	104	38	20	4	E176 2000
<b>2500</b>	<b>25</b>	121	45	25	5	E176 2500

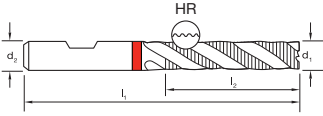


Catalogue Code	<b>E176</b>
Discount Group	B0408
Material	<b>SPM</b>
Surface Finish	<b>TiAlN</b>
Colour Ring & Application	<b>H</b>
Geometry	R30° HR (fine pitch)
Shank Form (DIN 1835)	B
Shank Tolerance	h6

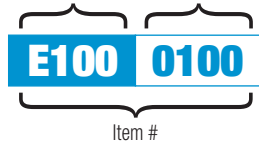
# Roughers Long, 4-5 Flute, R30, HR (fine pitch)



- SPM offers superior performance
- For roughing applications
- HR geometry allows for heavy cuts, in harder materials
- Suitable for materials up to 1400 N/mm<sup>2</sup>
- TiAlN for longer tool life



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (js14)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0600</b>	<b>6</b>	68	24	6	4	E177 0600
<b>0800</b>	<b>8</b>	88	38	10	4	E177 0800
<b>1000</b>	<b>10</b>	95	45	10	4	E177 1000
<b>1200</b>	<b>12</b>	110	53	12	4	E177 1200
<b>1600</b>	<b>16</b>	123	63	16	4	E177 1600
<b>2000</b>	<b>20</b>	141	75	20	4	E177 2000
<b>2500</b>	<b>25</b>	166	90	25	5	E177 2500

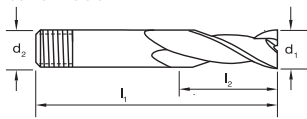


Catalogue Code	<b>E177</b>
Discount Group	B0408
Material	<b>SPM</b>
Surface Finish	<b>TiAlN</b>
Colour Ring & Application	<b>H</b>
Geometry	R30 HR (fine pitch)
Shank Form (DIN 1835)	B
Shank Tolerance	h6

# Slot Drills Regular, 2 Flute, R30, Threaded



- For general milling of slots & cavities
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (h9)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0200</b>	2	49	3	6	2	E104 0200
<b>0300</b>	3	51	7.5	6	2	E104 0300
<b>0400</b>	4	52.5	9.5	6	2	E104 0400
<b>0500</b>	5	52.5	9.5	6	2	E104 0500
<b>0600</b>	6	56.5	11	6	2	E104 0600
<b>0700</b>	7	59.5	11	10	2	E104 0700
<b>0800</b>	8	59.5	12.5	10	2	E104 0800
<b>0900</b>	9	60.5	14	10	2	E104 0900
<b>1000</b>	10	60.5	14.5	10	2	E104 1000
<b>1100</b>	11	66.5	17.5	12	2	E104 1100
<b>1200</b>	12	66.5	19	12	2	E104 1200
<b>1300</b>	13	68.5	19	12	2	E104 1300
<b>1400</b>	14	68.5	22	12	2	E104 1400
<b>1500</b>	15	72	22	16	2	E104 1500
<b>1600</b>	16	72	22	16	2	E104 1600
<b>1700</b>	17	74	24	16	2	E104 1700
<b>1800</b>	18	74	24	16	2	E104 1800
<b>1900</b>	19	77	25.5	16	2	E104 1900
<b>2000</b>	20	77	25.5	16	2	E104 2000
<b>2100</b>	21	98.5	25.5	25	2	E104 2100
<b>2200</b>	22	100	25.5	25	2	E104 2200
<b>2300</b>	23	101.5	25.5	25	2	E104 2300
<b>2400</b>	24	103	25.5	25	2	E104 2400
<b>2500</b>	25	101	27	25	2	E104 2500
<b>2800</b>	28	95	30	25	2	E104 2800
<b>3000</b>	30	93.5	30	25	2	E104 3000
<b>3200</b>	32	117.5	35	32	2	E104 3200
<b>3600</b>	36	111	39.5	32	2	E104 3600
<b>4000</b>	40	117	46	32	2	E104 4000
<b>4500</b>	45	119.5	47.5	32	2	E104 4500
<b>5000</b>	50	117.5	51	32	2	E104 5000

**Sets**

<b>SD2M</b>	6 piece	4, 5, 6, 8, 10, 12mm	E104 SD2M
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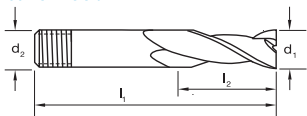


Catalogue Code	<b>E104</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025

# Slot Drills Regular, 2 Flute, R30, Threaded



- For general milling of slots & cavities
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Catalogue Code	<b>E104</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025

Size Ref.	d <sub>1</sub> (h9)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0159</b>	1/16	2	3/32	1/4	2	E104 0159
<b>0238</b>	3/32	2	5/32	1/4	2	E104 0238
<b>0318</b>	1/8	2	3/16	1/4	2	E104 0318
<b>0397</b>	5/32	2-1/16	1/4	1/4	2	E104 0397
<b>0476</b>	3/16	2-1/8	9/32	1/4	2	E104 0476
<b>0556</b>	7/32	2-3/16	11/32	1/4	2	E104 0556
<b>0635</b>	1/4	2-1/8	3/8	1/4	2	E104 0635
<b>0714</b>	9/32	2-5/16	7/16	3/8	2	E104 0714
<b>0794</b>	5/16	2-5/16	1/2	3/8	2	E104 0794
<b>0873</b>	11/32	2-3/8	9/16	3/8	2	E104 0873
<b>0953</b>	3/8	2-3/8	9/16	3/8	2	E104 0953
<b>1111</b>	7/16	2-9/16	11/16	1/2	2	E104 1111
<b>1270</b>	1/2	2-5/8	3/4	1/2	2	E104 1270
<b>1429</b>	9/16	2-11/16	7/8	1/2	2	E104 1429
<b>1588</b>	5/8	2-13/16	7/8	5/8	2	E104 1588
<b>1746</b>	11/16	2-7/8	15/16	5/8	2	E104 1746
<b>1905</b>	3/4	3	1	5/8	2	E104 1905
<b>2064</b>	13/16	3-7/8	1	1	2	E104 2064
<b>2223</b>	7/8	3-15/16	1	1	2	E104 2223
<b>2381</b>	15/16	4-1/32	1-1/32	1	2	E104 2381
<b>2540</b>	1	4	1-1/16	1	2	E104 2540
<b>2699</b>	1-1/16	4-1/32	1-1/32	1	2	E104 2699
<b>2858</b>	1-1/8	3-3/4	1-3/16	1	2	E104 2858
<b>3175</b>	1-1/4	4	1-1/2	1	2	E104 3175
<b>3493</b>	1-3/8	4-1/16	1-9/16	1	2	E104 3493
<b>3810</b>	1-1/2	4-3/16	1-11/16	1	2	E104 3810
<b>4128</b>	1-5/8	4-7/16	1-7/8	1	2	E104 4128
<b>4445</b>	1-3/4	4-9/16	2	1	2	E104 4445
<b>5080</b>	2	4-13/16	2-1/4	1	2	E104 5080

**Sets**

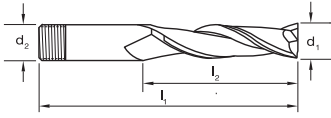
<b>SD2</b>	6 piece	1/8, 3/16, 1/4, 5/16, 3/8, 1/2"	E104 SD2
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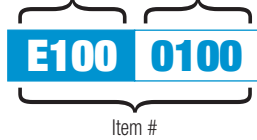
# Slot Drills Long, 2 Flute, R30, Threaded



- For general milling of slots & cavities
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (h9)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
0200	2	51	4	6	2	E106 0200
0300	3	60.5	11	6	2	E106 0300
0400	4	66.5	12.5	6	2	E106 0400
0500	5	70	12.5	6	2	E106 0500
0600	6	76	16	6	2	E106 0600
0700	7	76	16	10	2	E106 0700
0800	8	79.5	19	10	2	E106 0800
0900	9	82.5	22	10	2	E106 0900
1000	10	82.5	22	10	2	E106 1000
1100	11	89	22	12	2	E106 1100
1200	12	95	25.5	12	2	E106 1200
1300	13	95	25.5	12	2	E106 1300
1400	14	101.5	28.5	12	2	E106 1400
1500	15	108	31.5	16	2	E106 1500
1600	16	108	31.5	16	2	E106 1600
1700	17	114.5	35	16	2	E106 1700
1800	18	114.5	35	16	2	E106 1800
1900	19	120.5	38	16	2	E106 1900
2000	20	120.5	38	16	2	E106 2000
0159	1/16	2	3/16	1/4	2	E106 0159
0238	3/32	2	1/4	1/4	2	E106 0238
0318	1/8	2-1/2	7/16	1/4	2	E106 0318
0397	5/32	2-3/4	1/2	1/4	2	E106 0397
0476	3/16	2-3/4	1/2	1/4	2	E106 0476
0556	7/32	3	5/8	1/4	2	E106 0556
0635	1/4	3	5/8	1/4	2	E106 0635
0714	9/32	3-1/8	3/4	3/8	2	E106 0714
0794	5/16	3-1/8	3/4	3/8	2	E106 0794
0953	3/8	3-1/4	7/8	3/8	2	E106 0953
1111	7/16	3-1/2	7/8	1/2	2	E106 1111
1270	1/2	3-3/4	1	1/2	2	E106 1270
1429	9/16	4	1-1/8	1/2	2	E106 1429
1588	5/8	4-1/4	1-1/4	5/8	2	E106 1588
1746	11/16	4-1/2	1-3/8	5/8	2	E106 1746
1905	3/4	4-3/4	1-1/2	5/8	2	E106 1905
2223	7/8	5-3/4	1-5/8	1	2	E106 2223
2540	1	6-1/4	1-3/4	1	2	E106 2540
2858	1-1/8	6-1/4	1-7/8	1	2	E106 2858
3175	1-1/4	6-1/4	2	1	2	E106 3175
3493	1-3/8	6-1/4	2-1/8	1	2	E106 3493
3810	1-1/2	6-1/4	2-1/4	1	2	E106 3810



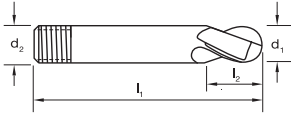
Catalogue Code	<b>E106</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025



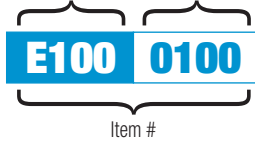
# Slot Drills Regular, Ballnose, 2 Flute, R30, Threaded



- For profiling & contour milling of slots & cavities
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (h9)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0300</b>	<b>3</b>	51	7.5	6	2	E115 0300
<b>0400</b>	<b>4</b>	52.5	9.5	6	2	E115 0400
<b>0500</b>	<b>5</b>	52.5	9.5	6	2	E115 0500
<b>0600</b>	<b>6</b>	56.5	11	6	2	E115 0600
<b>0800</b>	<b>8</b>	59.5	12.5	10	2	E115 0800
<b>1000</b>	<b>10</b>	60.5	14.5	10	2	E115 1000
<b>1200</b>	<b>12</b>	66.5	19	12	2	E115 1200
<b>1400</b>	<b>14</b>	68.5	22	12	2	E115 1400
<b>1600</b>	<b>16</b>	72	22	16	2	E115 1600
<b>1800</b>	<b>18</b>	74	24	16	2	E115 1800
<b>2000</b>	<b>20</b>	77	25.5	16	2	E115 2000
<b>2500</b>	<b>25</b>	95	27	25	2	E115 2500
<b>0318</b>	<b>1/8</b>	2	3/16	1/4	2	E115 0318
<b>0397</b>	<b>5/32</b>	2-1/16	1/4	1/4	2	E115 0397
<b>0476</b>	<b>3/16</b>	2-1/8	9/32	1/4	2	E115 0476
<b>0635</b>	<b>1/4</b>	2-1/8	3/8	1/4	2	E115 0635
<b>0794</b>	<b>5/16</b>	2-5/16	1/2	3/8	2	E115 0794
<b>0953</b>	<b>3/8</b>	2-3/8	9/16	3/8	2	E115 0953
<b>1111</b>	<b>7/16</b>	2-9/16	11/16	1/2	2	E115 1111
<b>1270</b>	<b>1/2</b>	2-5/8	3/4	1/2	2	E115 1270
<b>1588</b>	<b>5/8</b>	2-13/16	7/8	5/8	2	E115 1588
<b>1905</b>	<b>3/4</b>	3	1	5/8	2	E115 1905
<b>2540</b>	<b>1</b>	3-3/4	1-1/16	1	2	E115 2540
<b>3175</b>	<b>1-1/4</b>	4	1-1/2	1	2	E115 3175

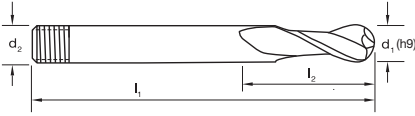


Catalogue Code	<b>E115</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025

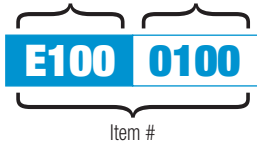
# Slot Drills Long, Ballnose, 2 Flute, R30, Threaded



- For profiling & contour milling of slots & cavities
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (h9)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0318</b>	<b>1/8</b>	2-1/2	7/16	1/4	2	E116 0318
<b>0476</b>	<b>3/16</b>	2-3/4	1/2	1/4	2	E116 0476
<b>0635</b>	<b>1/4</b>	3	5/8	1/4	2	E116 0635
<b>0794</b>	<b>5/16</b>	3-1/8	3/4	3/8	2	E116 0794
<b>0953</b>	<b>3/8</b>	3-1/4	7/8	3/8	2	E116 0953
<b>1270</b>	<b>1/2</b>	3-3/4	1	1/2	2	E116 1270
<b>1588</b>	<b>5/8</b>	4-1/4	1-1/4	5/8	2	E116 1588
<b>1905</b>	<b>3/4</b>	4-3/4	1-1/2	5/8	2	E116 1905
<b>2540</b>	<b>1</b>	6-1/4	1-3/4	1	2	E116 2540

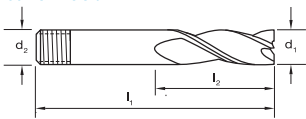


Catalogue Code	<b>E116</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025

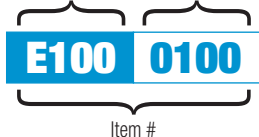
# Endmills Regular, 3 Flute, R30, Threaded



- For slotting and finishing with the one tool
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (h9)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0300</b>	3	51	8	6	3	E119 0300
<b>0400</b>	4	53	10	6	3	E119 0400
<b>0500</b>	5	58	13	6	3	E119 0500
<b>0600</b>	6	58	13	6	3	E119 0600
<b>0800</b>	8	60	13	10	3	E119 0800
<b>1000</b>	10	61	15	10	3	E119 1000
<b>1200</b>	12	67	19	12	3	E119 1200
<b>1400</b>	14	69	22	12	3	E119 1400
<b>1600</b>	16	72	22	16	3	E119 1600
<b>2000</b>	20	77	26	16	3	E119 2000
<b>0318</b>	1/8	2	3/16	1/4	3	E119 0318
<b>0476</b>	3/16	2-1/8	9/32	1/4	3	E119 0476
<b>0635</b>	1/4	2-1/8	3/8	1/4	3	E119 0635
<b>0794</b>	5/16	2-5/16	1/2	3/8	3	E119 0794
<b>0953</b>	3/8	2-3/8	9/16	3/8	3	E119 0953
<b>1270</b>	1/2	2-5/8	3/4	1/2	3	E119 1270
<b>1588</b>	5/8	2-13/16	7/8	5/8	3	E119 1588
<b>1905</b>	3/4	3	1	5/8	3	E119 1905
<b>2540</b>	1	3-3/4	1-1/16	1	3	E119 2540

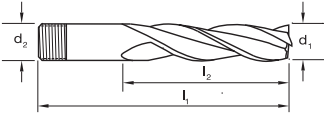


Catalogue Code	<b>E119</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Br</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025

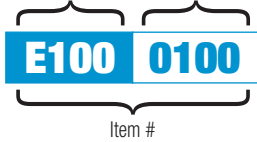
# Endmills Long, 3 Flute, R30, Threaded



- For slotting and finishing with the one tool
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (h9)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0318</b>	<b>1/8</b>	2-1/2	3/4	1/4	3	E120 0318
<b>0476</b>	<b>3/16</b>	2-3/4	1	1/4	3	E120 0476
<b>0635</b>	<b>1/4</b>	3	1-1/4	1/4	3	E120 0635
<b>0794</b>	<b>5/16</b>	3-1/8	1-3/8	3/8	3	E120 0794
<b>0953</b>	<b>3/8</b>	3-1/4	1-1/2	3/8	3	E120 0953
<b>1111*</b>	<b>7/16</b>	3-1/2	1-3/4	1/2	3	E120 1111
<b>1270</b>	<b>1/2</b>	3-3/4	2	1/2	3	E120 1270
<b>1588</b>	<b>5/8</b>	4-1/4	2-1/2	5/8	3	E120 1588
<b>1905</b>	<b>3/4</b>	4-3/4	3	5/8	3	E120 1905
<b>2540</b>	<b>1</b>	6-1/4	3-1/2	1	3	E120 2540
<b>3175</b>	<b>1-1/4</b>	6-1/4	4	1	3	E120 3175



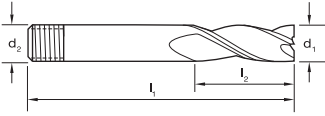
Catalogue Code	<b>E120</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025

\* Not available once current stock is depleted.

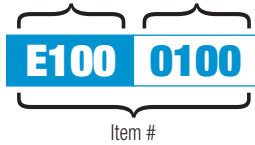
# Endmills Regular, 4&6 Flute, R30, Threaded



- For finish milling applications
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Size Ref.	d <sub>1</sub> (k10)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0300</b>	3	54	9.5	6	4	E129 0300
<b>0400</b>	4	57	12.5	6	4	E129 0400
<b>0500</b>	5	60.5	16	6	4	E129 0500
<b>0600</b>	6	60.5	16	6	4	E129 0600
<b>0700</b>	7	60.5	15	10	4	E129 0700
<b>0800</b>	8	63.5	18	10	4	E129 0800
<b>1000</b>	10	66.5	21	10	4	E129 1000
<b>1200</b>	12	70	24	12	4	E129 1200
<b>1400</b>	14	73	28.5	12	4	E129 1400
<b>1600</b>	16	77	26.5	16	4	E129 1600
<b>1800</b>	18	80	35	16	4	E129 1800
<b>2000</b>	20	83.5	38	16	4	E129 2000
<b>2200</b>	22	98.5	41.5	25	4	E129 2200
<b>2500</b>	25	101.5	44.5	25	4	E129 2500
<b>2800</b>	28	104.5	46	25	6	E129 2800
<b>3000</b>	30	104.5	46	25	6	E129 3000
<b>3200</b>	32	112.5	51	32	6	E129 3200
<b>3600</b>	36	116	54	32	6	E129 3600
<b>4000</b>	40	117.5	55.5	32	6	E129 4000
<b>4500</b>	45	119	57	32	6	E129 4500
<b>5000</b>	50	127	65	32	6	E129 5000

**Sets**

<b>EM2M</b>	6 piece	4, 5, 6, 8, 10, 12mm	E129 EM2M
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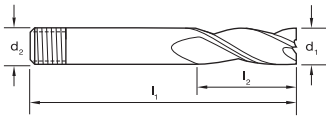


Catalogue Code	<b>E129</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025

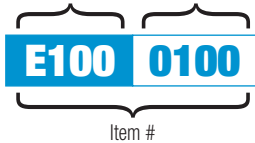
# Endmills Regular, 4&6 Flute, R30, Threaded



- For finish milling applications
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Catalogue Code	<b>E129</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025

Size Ref.	d <sub>1</sub> (k10)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0318</b>	<b>1/8</b>	2-1/8	3/8	1/4	4	E129 0318
<b>0397</b>	<b>5/32</b>	2-1/4	1/2	1/4	4	E129 0397
<b>0476</b>	<b>3/16</b>	2-1/4	1/2	1/4	4	E129 0476
<b>0556</b>	<b>7/32</b>	2-3/8	5/8	1/4	4	E129 0556
<b>0635</b>	<b>1/4</b>	2-3/8	5/8	1/4	4	E129 0635
<b>0714</b>	<b>9/32</b>	2-3/8	5/8	3/8	4	E129 0714
<b>0794</b>	<b>5/16</b>	2-1/2	3/4	3/8	4	E129 0794
<b>0873</b>	<b>11/32</b>	2-5/8	7/8	3/8	4	E129 0873
<b>0953</b>	<b>3/8</b>	2-5/8	7/8	3/8	4	E129 0953
<b>1032</b>	<b>13/32</b>	2-5/8	7/8	3/8	4	E129 1032
<b>1111</b>	<b>7/16</b>	2-5/8	7/8	1/2	4	E129 1111
<b>1270</b>	<b>1/2</b>	2-3/4	1	1/2	4	E129 1270
<b>1429</b>	<b>9/16</b>	2-7/8	1-1/8	1/2	4	E129 1429
<b>1588</b>	<b>5/8</b>	3	1-1/4	5/8	4	E129 1588
<b>1746</b>	<b>11/16</b>	3-1/8	1-3/8	5/8	4	E129 1746
<b>1905</b>	<b>3/4</b>	3-1/4	1-1/2	5/8	4	E129 1905
<b>2223</b>	<b>7/8</b>	3-7/8	1-5/8	1	4	E129 2223
<b>2540</b>	<b>1</b>	4	1-11/16	1	4	E129 2540
<b>2858</b>	<b>1-1/8</b>	4-1/8	1-13/16	1	6	E129 2858
<b>3175</b>	<b>1-1/4</b>	4-1/4	1-15/16	1	6	E129 3175
<b>3493</b>	<b>1-3/8</b>	4-3/8	2-1/16	1	6	E129 3493
<b>3810</b>	<b>1-1/2</b>	4-1/2	2-3/16	1	6	E129 3810
<b>4445</b>	<b>1-3/4</b>	4-3/4	2-1/2	1	6	E129 4445
<b>5080</b>	<b>2</b>	5	2-3/4	1	6	E129 5080

### Sets

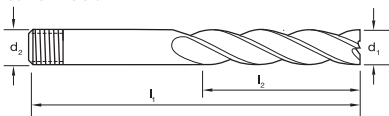
<b>EM2</b>	6 piece	1/8, 3/16, 1/4, 5/16, 3/8, 1/2"	E129 EM2
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# Endmills Long, 4 & 6 Flute, R30, Threaded



- For finish milling applications
- Suitable for materials up to 850 N/mm<sup>2</sup>
- For soft steels & non-ferrous material



Catalogue Code    Size Ref.



Catalogue Code	<b>E131</b>
Discount Group	B0602
Material	<b>HSS Co</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>N</b>
Geometry	R30
Shank Form (DIN 1835)	D
Shank Tolerance	-0025

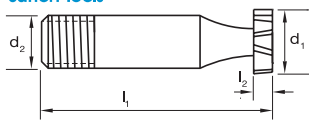
Size Ref.	d <sub>1</sub> (h10)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	z	Item #
<b>0300</b>	<b>3</b>	64	19	6	4	E131 0300
<b>0400</b>	<b>4</b>	70	26	6	4	E131 0400
<b>0500</b>	<b>5</b>	76	32	6	4	E131 0500
<b>0600</b>	<b>6</b>	76	32	6	4	E131 0600
<b>0800</b>	<b>8</b>	79.5	34	10	4	E131 0800
<b>1000</b>	<b>10</b>	82.5	37	10	4	E131 1000
<b>1200</b>	<b>12</b>	95	49.5	12	4	E131 1200
<b>1400</b>	<b>14</b>	101.5	57	12	4	E131 1400
<b>1600</b>	<b>16</b>	108.5	58	16	4	E131 1600
<b>1800</b>	<b>18</b>	115	70	16	4	E131 1800
<b>2000</b>	<b>20</b>	121.5	76	16	4	E131 2000
<b>0318</b>	<b>1/8</b>	2-1/2	5/8	1/4	4	E131 0318
<b>0397</b>	<b>5/32</b>	2-3/4	7/8	1/4	4	E131 0397
<b>0476</b>	<b>3/16</b>	2-3/4	1	1/4	4	E131 0476
<b>0556</b>	<b>7/32</b>	3	1-1/4	1/4	4	E131 0556
<b>0635</b>	<b>1/4</b>	3	1-1/4	1/4	4	E131 0635
<b>0714</b>	<b>9/32</b>	3-1/8	1-3/8	3/8	4	E131 0714
<b>0794</b>	<b>5/16</b>	3-1/8	1-3/8	3/8	4	E131 0794
<b>0953</b>	<b>3/8</b>	3-1/4	1-1/2	3/8	4	E131 0953
<b>1111</b>	<b>7/16</b>	3-1/2	1-3/4	1/2	4	E131 1111
<b>1270</b>	<b>1/2</b>	3-3/4	2	1/2	4	E131 1270
<b>1429</b>	<b>9/16</b>	4	2-1/4	1/2	4	E131 1429
<b>1588</b>	<b>5/8</b>	4-1/4	2-1/2	5/8	4	E131 1588
<b>1746</b>	<b>11/16</b>	4-1/2	2-3/4	5/8	4	E131 1746
<b>1905</b>	<b>3/4</b>	4-3/4	3	5/8	4	E131 1905
<b>2223</b>	<b>7/8</b>	5-3/4	3-1/2	1	4	E131 2223
<b>2540</b>	<b>1</b>	6-1/2	4	1	4	E131 2540
<b>2858</b>	<b>1-1/8</b>	6-1/2	4	1	6	E131 2858
<b>3175</b>	<b>1-1/4</b>	6-1/2	4	1	6	E131 3175
<b>3493</b>	<b>1-3/8</b>	6-1/2	4	1	6	E131 3493
<b>3810</b>	<b>1-1/2</b>	6-1/2	4	1	6	E131 3810
<b>3811*</b>	<b>1-1/2</b>	6-7/16	4	1-1/4	6	E131 3811
<b>4445</b>	<b>1-3/4</b>	6-1/2	4	1	6	E131 4445
<b>5080</b>	<b>2</b>	6-1/2	4	1	6	E131 5080

\* Not available once current stock is depleted.

# Roughers Woodruff Cutter, Threaded



- For cutting key seats to suit standard imperial woodruff keys



Catalogue Code    Size Ref.



Catalogue Code	<b>E178</b>
Discount Group	B0709
Material	<b>HSS</b>
Surface Finish	<b>Brt</b>
Colour Ring & Application	<b>General Purpose</b>
Geometry	-
Shank Form (DIN 1835)	D
Shank Tolerance	h6

Size Ref.	BS Cutter & Key #	d <sub>1</sub>	l <sub>2</sub>	l <sub>1</sub>	d <sub>2</sub>	Item #
0204	204	1/2	1/16	2	1/2	E178 0204
0304	304	1/2	3/32	2	1/2	E178 0304
0305	305	5/8	3/32	2	1/2	E178 0305
0404	404	1/2	1/8	2	1/2	E178 0404
0405	405	5/8	1/8	2	1/2	E178 0405
0406	406	3/4	1/8	2-1/4	1/2	E178 0406
0505	505	5/8	5/32	2	1/2	E178 0505
0506	506	3/4	5/32	2-1/4	1/2	E178 0506
0507	507	7/8	5/32	2-1/2	1/2	E178 0507
0606	606	3/4	3/16	2-1/4	1/2	E178 0606
0607	607	7/8	3/16	2-1/2	1/2	E178 0607
0608	608	1	3/16	2-3/4	1/2	E178 0608
0609	609	1-1/8	3/16	2-3/4	1/2	E178 0609
0807	807	7/8	1/4	2-1/2	1/2	E178 0807
0808	808	1	1/4	2-3/4	1/2	E178 0808
0809	809	1-1/8	1/4	2-3/4	1/2	E178 0809
0810	810	1-1/4	1/4	2-3/4	1/2	E178 0810
0812	812	1-1/2	1/4	3	1/2	E178 0812
1008	1008	1	5/16	2-3/4	1/2	E178 1008
1009	1009	1-1/8	5/16	2-3/4	1/2	E178 1009
1010	1010	1-1/4	5/16	2-3/4	1/2	E178 1010
1011	1011	1-3/8	5/16	3	1/2	E178 1011
1012	1012	1-1/2	5/16	3	1/2	E178 1012
1210	1210	1-1/4	3/8	2-3/4	1/2	E178 1210
1211	1211	1-3/8	3/8	3	1/2	E178 1211
1212	1212	1-1/2	3/8	3	1/2	E178 1212