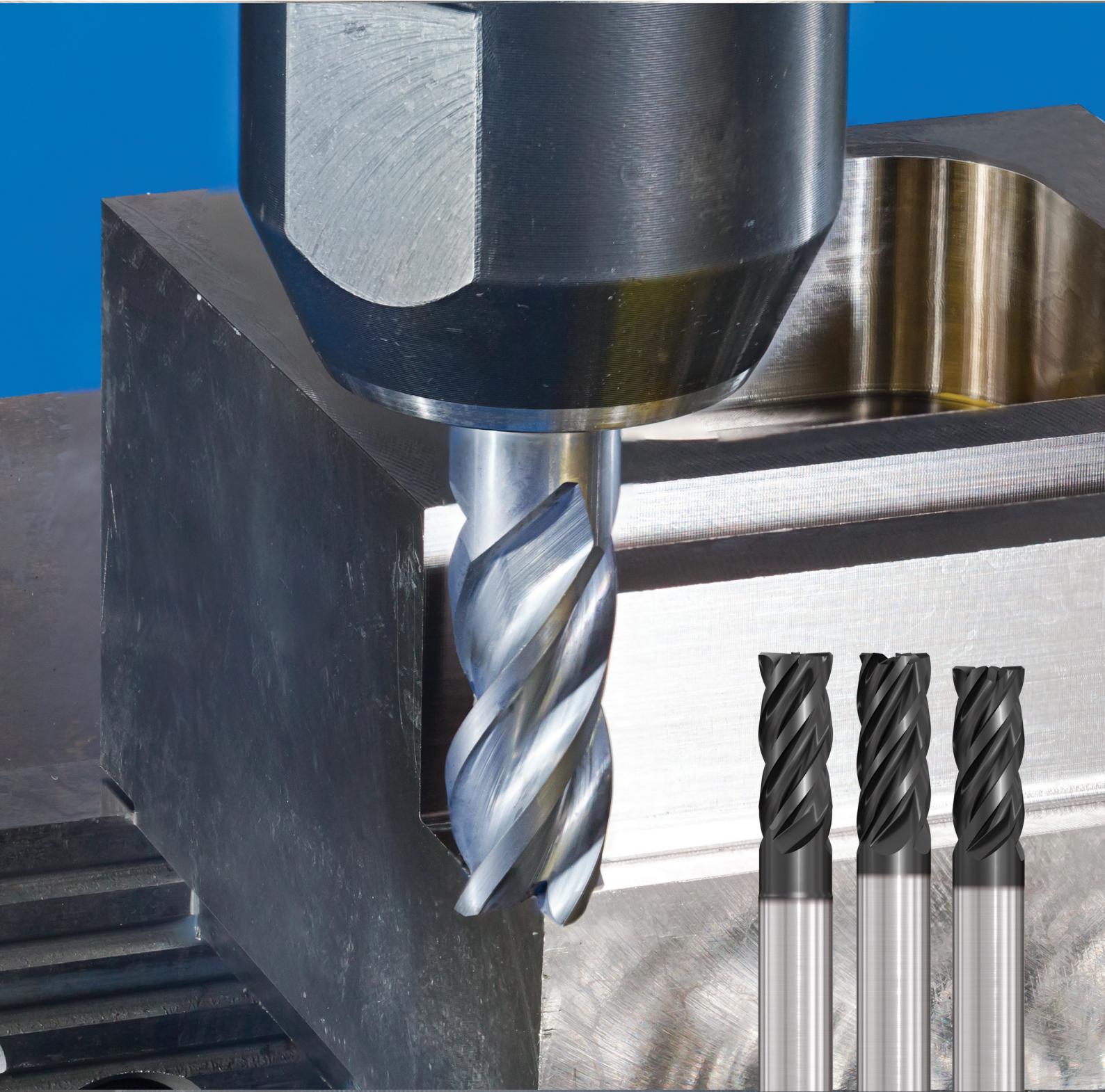


*Milling With ISCAR*  
**FLASHSOLID**  
ECO SOLID LINE



**UNIVERSAL FLASH SOLID**

A new line is added to the Flash Solid carbide endmills for roughing and finishing operations up to 2xD axial depth of cut. The new endmills features variable pitch and different helix to mitigate vibrations and improved performance. The Universal line consist of 4 flutes with and without extended neck and 5 flutes endmills.



**138-4-U**

**Variable Pitch & Different Helix**  
Variable Pitch & Different Helix of 35° & 37° to mitigate vibrations and improved performance.

**Extended Reach**  
Relieved neck options for deep shouldering and pocketing application.

**4 Flute Endmill**  
For roughing and finishing operations on any kind of material.

**IC900 Coating**  
A tough submicron PVD AITiN coated grade. Suitable for medium to high cutting speed. Designed for machining various materials like steel, stainless steel, titanium and heat resistant alloy.

**Shank Options**  
For most items available with both Cylindrical and Weldon shanks.

**138-5-U**

**Variable Pitch & Different Helix**  
Variable Pitch & Different Helix of 35° & 37° to mitigate vibrations and improved performance

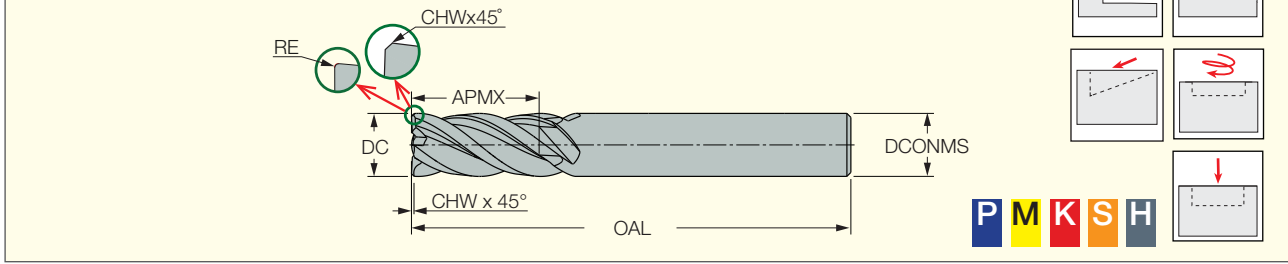
**Shank Options**  
For most items available with both Cylindrical and Weldon shanks

**5 Flute Endmill**  
For roughing and finishing operations on any kind of material.

**IC900 Coating**  
A tough submicron PVD AITiN coated grade. Suitable for medium to high cutting speed. Designed for machining various materials like steel, stainless steel, titanium and heat resistant alloy

**UNIVERSAL FLASH SOLID**

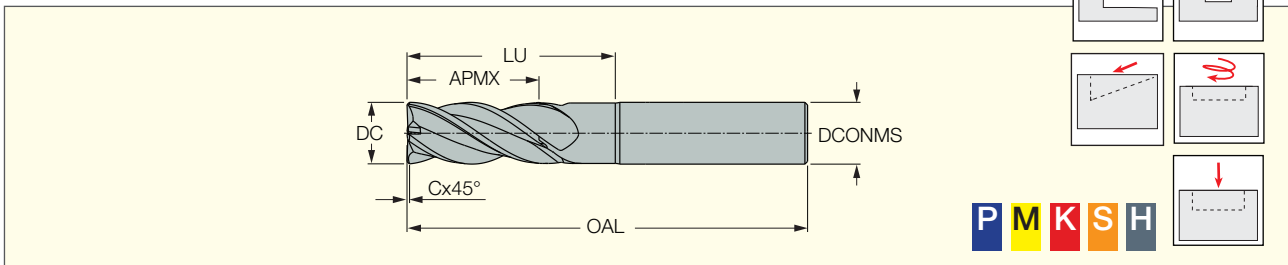
**138-4-U**



Item No..	Designation	DC	DCONMS	APMX	OAL	NOF <sup>(1)</sup>	RMPX <sup>(2)</sup>	Shank <sup>(3)</sup>	f <sub>z</sub> (min)	f <sub>z</sub> (max)	CHW	R	Grade
3404728	138-060-12-C06-57-4-U	6.00	6.00	12.00	57.00	4	5.0	C	0.03	0.07	0.25	-	IC900
3424617	138-060-12-C06R0.2-57-4-U	6.00	6.00	12.00	57.00	4	5.0	C	0.03	0.07	-	0.2	IC900
3424618	138-060-12-C06R0.5-57-4-U	6.00	6.00	12.00	57.00	4	5.0	C	0.03	0.07	-	0.5	IC900
3424619	138-060-12-C06R1-57-4-U	6.00	6.00	12.00	57.00	4	5.0	C	0.03	0.07	-	1.0	IC900
3404729	138-080-16-C08-63-4-U	8.00	8.00	16.00	63.00	4	5.0	C	0.03	0.09	0.30	-	IC900
3424620	138-080-16-C08R0.3-63-4-U	8.00	8.00	16.00	63.00	4	5.0	C	0.03	0.09	-	0.3	IC900
3424621	138-080-16-C08R0.5-63-4-U	8.00	8.00	16.00	63.00	4	5.0	C	0.03	0.09	-	0.5	IC900
3424622	138-080-16-C08R1-63-4-U	8.00	8.00	16.00	63.00	4	5.0	C	0.03	0.09	-	1.0	IC900
3424623	138-080-16-C08R1.5-63-4-U	8.00	8.00	16.00	63.00	4	5.0	C	0.03	0.09	-	1.5	IC900
3404731	138-100-20-C10-72-4-U	10.00	10.00	20.00	72.00	4	5.0	C	0.03	0.09	0.40	-	IC900
3424625	138-100-20-C10R0.3-72-4-U	10.00	10.00	20.00	72.00	4	5.0	C	0.03	0.09	-	0.3	IC900
3424626	138-100-20-C10R0.5-72-4-U	10.00	10.00	20.00	72.00	4	5.0	C	0.03	0.09	-	0.5	IC900
3424627	138-100-20-C10R1-72-4-U	10.00	10.00	20.00	72.00	4	5.0	C	0.03	0.09	-	1.0	IC900
3424628	138-100-20-C10R1.5-72-4-U	10.00	10.00	20.00	72.00	4	5.0	C	0.03	0.09	-	1.5	IC900
3404732	138-120-24-C12-83-4-U	12.00	12.00	24.00	83.00	4	5.0	C	0.04	0.10	0.50	-	IC900
3404733	138-120-24-W12-83-4-U	12.00	12.00	24.00	83.00	4	5.0	W	0.04	0.10	0.50	-	IC900
3424629	138-120-24-C12R0.5-83-4-U	12.00	12.00	24.00	83.00	4	5.0	C	0.04	0.10	-	0.5	IC900
3424630	138-120-24-C12R1.5-83-4-U	12.00	12.00	24.00	83.00	4	5.0	C	0.04	0.10	-	1.5	IC900
3424631	138-120-24-C12R2-83-4-U	12.00	12.00	24.00	83.00	4	5.0	C	0.04	0.10	-	2.0	IC900
3424632	138-120-24-C12R3-83-4-U	12.00	12.00	24.00	83.00	4	5.0	C	0.04	0.10	-	3.0	IC900
3404734	138-160-32-C16-92-4-U	16.00	16.00	32.00	92.00	4	5.0	C	0.05	0.11	0.60	-	IC900
3404735	138-160-32-W16-92-4-U	16.00	16.00	32.00	92.00	4	5.0	W	0.05	0.11	0.60	-	IC900
3424633	138-160-32-C16R0.5-92-4-U	16.00	16.00	32.00	92.00	4	5.0	C	0.05	0.11	-	0.5	IC900
3424634	138-160-32-C16R1.5-92-4-U	16.00	16.00	32.00	92.00	4	5.0	C	0.05	0.11	-	1.5	IC900
3424635	138-160-32-C16R2-92-4-U	16.00	16.00	32.00	92.00	4	5.0	C	0.05	0.11	-	2.0	IC900
3424636	138-160-32-C16R3-92-4-U	16.00	16.00	32.00	92.00	4	5.0	C	0.05	0.11	-	3.0	IC900
3424637	138-160-32-C16R4-92-4-U	16.00	16.00	32.00	92.00	4	5.0	C	0.05	0.11	-	4.0	IC900
3404736	138-200-40-C20-104-4-U	20.00	20.00	40.00	104.00	4	5.0	C	0.05	0.11	0.60	-	IC900
3404737	138-200-40-W20-104-4-U	20.00	20.00	40.00	104.00	4	5.0	W	0.05	0.11	0.60	-	IC900
3424638	138-200-40-C20R.5-104-4-U	20.00	20.00	40.00	104.00	4	5.0	C	0.05	0.11	-	0.5	IC900
3424639	138-200-40-C20R1.5-104-4-U	20.00	20.00	40.00	104.00	4	5.0	C	0.05	0.11	-	1.5	IC900
3424640	138-200-40-C20R2-104-4-U	20.00	20.00	40.00	104.00	4	5.0	C	0.05	0.11	-	2.0	IC900
3424641	138-200-40-C20R3-104-4-U	20.00	20.00	40.00	104.00	4	5.0	C	0.05	0.11	-	3.0	IC900
3424642	138-200-40-C20R5-104-4-U	20.00	20.00	40.00	104.00	4	5.0	C	0.05	0.11	-	5.0	IC900

<sup>(1)</sup> Number of flutes <sup>(2)</sup> Maximum ramping angle <sup>(3)</sup> C-Cylindrical, W-Weldon

**138-4-U Relieved Neck**

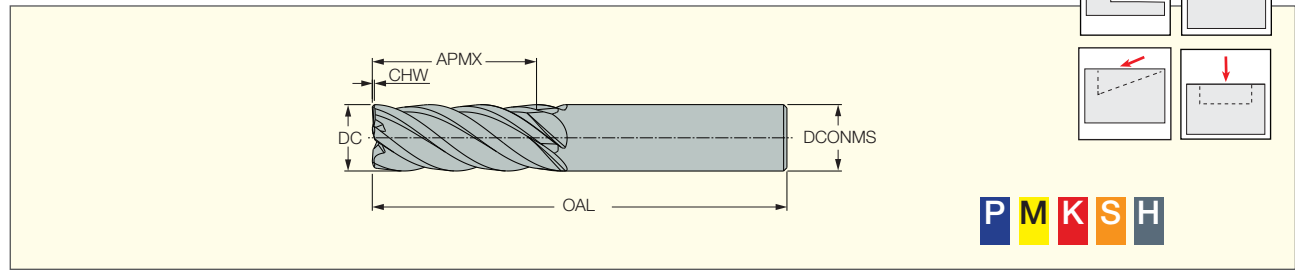


Item No..	Designation	DC	DCONMS	APMX	OAL	LU	NOF <sup>(1)</sup>	RMPX <sup>(2)</sup>	Shank <sup>(3)</sup>	f <sub>z</sub> (min)	f <sub>z</sub> (max)	CHW	Grade
3404852	138-100-20/32-C10-72-4-U	10.00	10.00	20.00	72.00	32.00	4	5.0	C	0.03	0.09	0.40	IC900
3404860	138-120-24/38-C12-83-4-U	12.00	12.00	24.00	83.00	38.00	4	5.0	C	0.04	0.10	0.50	IC900
3404861	138-120-24/38-W12-83-4-U	12.00	12.00	24.00	83.00	38.00	4	5.0	W	0.04	0.10	0.50	IC900
3404862	138-160-32/50-C16-92-4-U	16.00	16.00	32.00	92.00	50.00	4	5.0	C	0.05	0.11	0.60	IC900
3404863	138-160-32/50-W16-92-4-U	12.00	16.00	32.00	92.00	50.00	4	5.0	W	0.05	0.11	0.60	IC900
3404864	138-200-40/60-C20-104-4-U	20.00	20.00	40.00	104.00	60.00	4	5.0	C	0.05	0.11	0.60	IC900
3404865	138-200-40/60-W20-104-4-U	20.00	20.00	40.00	104.00	60.00	4	5.0	W	0.05	0.11	0.60	IC900

<sup>(1)</sup> Number of flutes <sup>(2)</sup> Maximum ramping angle <sup>(3)</sup> C-Cylindrical, W-Weldon

**UNIVERSAL FLASH SOLID**

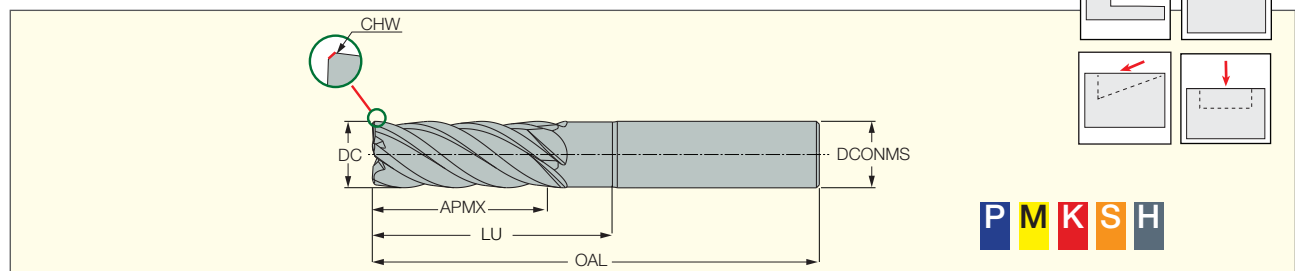
**138-5-U**



Item No..	Designation	DC	DCONMS	APMX	OAL	NOF <sup>(1)</sup>	RMPX <sup>(2)</sup>	Shank <sup>(3)</sup>	f <sub>z</sub> (min)	f <sub>z</sub> (max)	CHW	Grade
3404867	138-060-12-C06-57-5-U	6.00	6.00	12.00	57.00	5	5.0	C	0.03	0.07	0.25	IC900
3404869	138-080-16-C08-63-5-U	8.00	8.00	16.00	63.00	5	5.0	C	0.03	0.09	0.30	IC900
3404870	138-100-20-C10-72-5-U	10.00	10.00	20.00	72.00	5	5.0	C	0.03	0.09	0.40	IC900
3404871	138-120-24-C12-83-5-U	12.00	12.00	24.00	83.00	5	5.0	C	0.04	0.10	0.50	IC900
3404872	138-120-24-W12-83-5-U	12.00	12.00	24.00	83.00	5	5.0	W	0.04	0.10	0.50	IC900
3404873	138-160-32-C16-92-5-U	16.00	16.00	32.00	92.00	5	5.0	C	0.05	0.11	0.60	IC900
3404874	138-160-32-W16-92-5-U	16.00	16.00	32.00	92.00	5	5.0	W	0.05	0.11	0.60	IC900
3404875	138-200-40-C20-104-5-U	20.00	20.00	40.00	104.00	5	5.0	C	0.05	0.11	0.60	IC900
3404876	138-200-40-W20-104-5-U	20.00	20.00	40.00	104.00	5	5.0	W	0.05	0.11	0.60	IC900

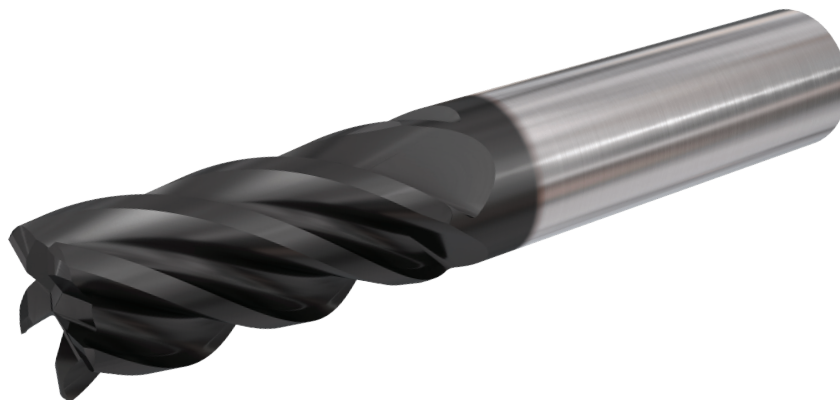
<sup>(1)</sup> Number of flutes <sup>(2)</sup> Maximum ramping angle <sup>(3)</sup> C-Cylindrical, W-Weldon

**138-5-U Relieved Neck**



Item No..	Designation	DC	DCONMS	APMX	OAL	LU	NOF <sup>(1)</sup>	RMPX <sup>(2)</sup>	Shank <sup>(3)</sup>	f <sub>z</sub> (min)	f <sub>z</sub> (max)	CHW	Grade
3440037	138-060-13/21-W06-57-5-U	6.00	6.00	13.00	57.00	21	5	5.0	W	0.03	0.05	0.25	IC900
3440038	138-080-19/27-W08-63-5-U	8.00	8.00	19.00	63.00	27	5	5.0	W	0.03	0.007	0.3	IC900

<sup>(1)</sup> Number of flutes <sup>(2)</sup> Maximum ramping angle <sup>(3)</sup> C-Cylindrical, W-Weldon



**Identification Code**



**A:**  
130 – Finish profile 30°  
138 – Finish profile 38°  
145 – Finish profile 45°  
230 – Ball nose profile  
338 – Chip splitter profile 38°  
438 – Roughing profile 38°  
445 – Roughing profile 45°  
500 – Endmill for rib tools  
510 – Ball nose rib tools

**B:**  
Head diameter ( mm )

**C:**  
Depth of cut

**D:**  
Neck relief

**E:**  
Shank type  
**C:** Cylindrical  
**W:** Weldon

**F:**  
Shank diameter

**G:**  
Total length

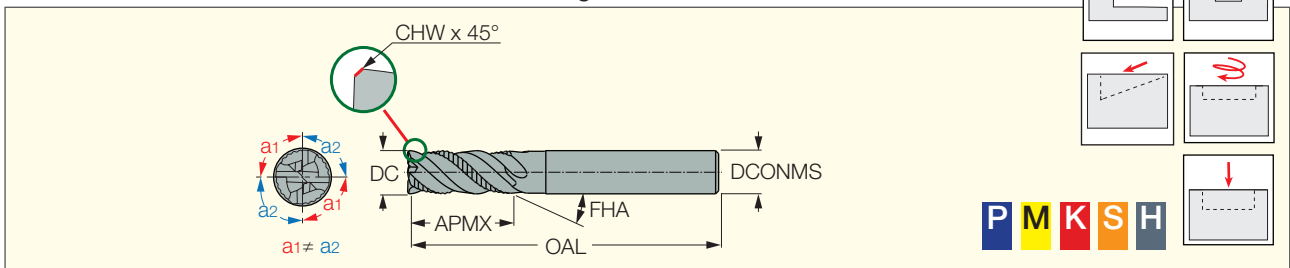
**H:**  
Number of flutes

**I :**  
Radius ( mm )

**J:**  
Geometry for material  
A – Aluminum  
P – Steel  
G – General  
M – Stainless Steel

**338-4-P**

Combination of Roughing and Finishing Solid Carbide Endmills with Variable Pitch for Chatter Free Milling

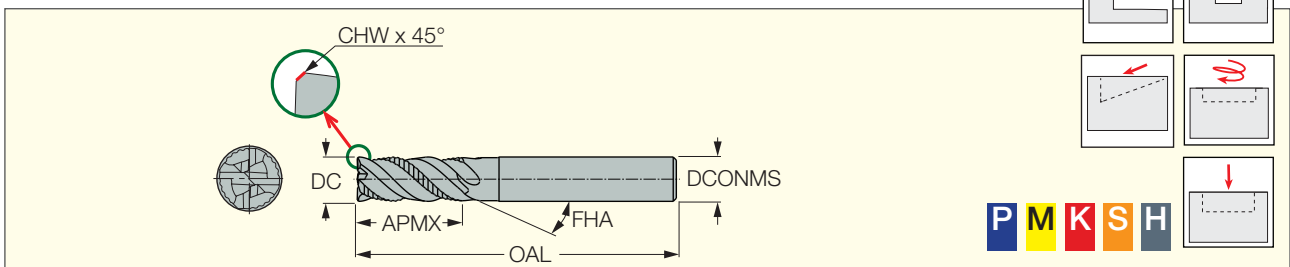


Item No.	Designation	DC	DCONMS	APMX	OAL	NOF <sup>(1)</sup>	FHA	RMPX <sup>(2)</sup>	Shank <sup>(3)</sup>	CHW	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3377980	338-060-14-06-57-4-P	6.00	6.00	14.00	57.00	4	38.0	5.0	C	0.25	0.03	0.06	IC900
3377981	338-080-18-08-63-4-P	8.00	8.00	18.00	63.00	4	38.0	5.0	C	0.30	0.03	0.06	IC900
3377982	338-100-22-10-72-4-P	10.00	10.00	22.00	72.00	4	38.0	5.0	C	0.40	0.03	0.09	IC900
3377983	338-120-26-12-83-4-P	12.00	12.00	26.00	83.00	4	38.0	5.0	C	0.50	0.04	0.10	IC900
3377984	338-160-34-16-92-4-P	16.00	16.00	34.00	92.00	4	38.0	5.0	C	0.60	0.05	0.11	IC900
3377985	338-200-42-20-104-4-P	20.00	20.00	42.00	104.00	4	38.0	5.0	C	0.60	0.05	0.11	IC900

<sup>(1)</sup> Number of flutes <sup>(2)</sup> Maximum ramping angle <sup>(3)</sup> C-Cylindrical

**445-4-T**

Combination of Roughing and Finishing Solid Carbide Endmills in a Single Tool

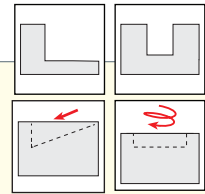
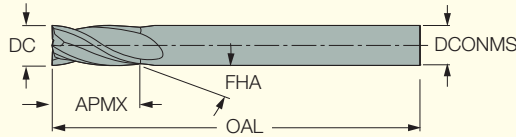


Item No.	Designation	DC	DCONMS	APMX	OAL	NOF <sup>(1)</sup>	FHA	RMPX <sup>(2)</sup>	Shank <sup>(3)</sup>	CHW	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3377974	445-060-14-06-57-4-T	6.00	6.00	14.00	57.00	4	45.0	5.0	C	0.25	0.03	0.06	IC900
3377975	445-080-18-08-63-4-T	8.00	8.00	18.00	63.00	4	45.0	5.0	C	0.30	0.03	0.08	IC900
3377976	445-100-22-10-72-4-T	10.00	10.00	22.00	72.00	4	45.0	5.0	C	0.30	0.03	0.09	IC900
3377977	445-120-26-12-83-4-T	12.00	12.00	26.00	83.00	4	45.0	5.0	C	0.40	0.04	0.10	IC900
3377978	445-160-34-16-92-4-T	16.00	16.00	34.00	92.00	4	45.0	5.0	C	0.60	0.05	0.11	IC900
3377979	445-200-42-20-104-4-T	20.00	20.00	42.00	104.00	4	45.0	5.0	C	0.60	0.05	0.11	IC900

<sup>(1)</sup> Number of flutes <sup>(2)</sup> Maximum ramping angle <sup>(3)</sup> C-Cylindrical

## 145-4G

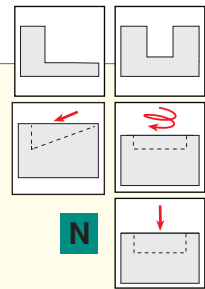
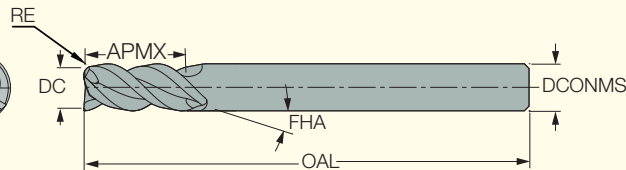
4 Flute, 45° Helix Solid Carbide Endmills  
(for general use on different materials)



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	RMPX	Shank C-Cylindrical	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316073	145-020-07-06-57-4-G	2	6	7	57	4	45	3	C	0.01	0.03	IC900
3316074	145-030-10-03-57-4-G	3	3	10	38	4	45	3	C	0.01	0.04	IC900
3316075	145-030-10-06-57-4-G	3	6	10	57	4	45	3	C	0.01	0.04	IC900
3316076	145-040-12-04-50-4-G	4	4	12	50	4	45	3	C	0.02	0.05	IC900
3316077	145-040-12-06-57-4-G	4	6	12	57	4	45	3	C	0.02	0.05	IC900
3316078	145-050-14-05-50-4-G	5	5	14	50	4	45	3	C	0.02	0.06	IC900
3316079	145-050-14-06-57-4-G	5	6	14	57	4	45	3	C	0.02	0.06	IC900
3316080	145-060-16-06-57-4-G	6	6	16	57	4	45	4	C	0.03	0.08	IC900
3316081	145-080-20-08-63-4-G	8	8	20	63	4	45	4	C	0.03	0.08	IC900
3316082	145-100-22-10-72-4-G	10	10	22	72	4	45	5	C	0.03	0.09	IC900
3316083	145-120-25-12-83-4-G	12	12	25	83	4	45	5	C	0.03	0.10	IC900
3316084	145-160-32-16-92-4-G	16	16	32	92	4	45	5	C	0.03	0.12	IC900

## 145-3A

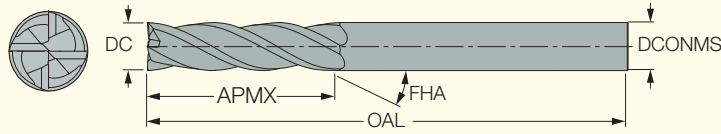
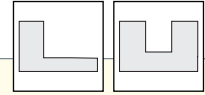
3 Flute, 45° Helix Medium Length Solid Carbide Endmills,  
for Machining Aluminum



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	RMPX	RE	Shank C-Cylindrical	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316136	145-040-12-06-57-3-R01-A	4	6	12	57	3	45	3	0.1	C	0.02	0.05	IC08
3316137	145-050-14-06-57-3-R02-A	5	6	14	57	3	45	3	0.2	C	0.02	0.06	IC08
3316139	145-060-16-06-57-3-R02-A	6	6	16	57	3	45	4	0.2	C	0.03	0.07	IC08
3316141	145-080-20-08-63-3-R02-A	8	8	20	63	3	45	4	0.2	C	0.03	0.09	IC08
3316142	145-100-22-10-72-3-R02-A	10	10	22	72	3	45	5	0.2	C	0.03	0.1	IC08
3316143	145-120-25-12-83-3-R02-A	12	12	25	83	3	45	5	0.2	C	0.04	0.11	IC08
3316144	145-140-30-14-83-3-R02-A	14	14	30	83	3	45	5	0.2	C	0.04	0.12	IC08
3316145	145-160-32-16-92-3-R02-A	16	16	32	92	3	45	5	0.2	C	0.05	0.13	IC08
3316146	145-200-38-20-104-3-R02-A	20	20	38	104	3	45	5	0.2	C	0.05	0.13	IC08

## 145-4G

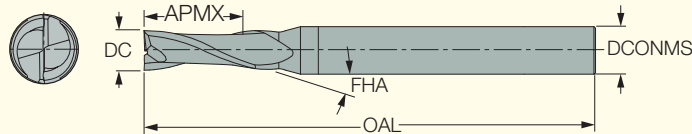
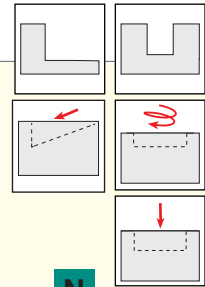
4 Flute, 45° Helix **Long** Solid Carbide Endmills  
(for general use on different materials)



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA°	Shank C-Cylindrical W-Weldon	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316111	<b>145-060-24-06-65-4-G</b>	6	6	24	65	4	45	C	0.03	0.07	IC900
3316112	<b>145-080-32-08-79-4-G</b>	8	8	32	79	4	45	C	0.03	0.09	IC900
3323964	<b>145-100-40-10-100-4-G</b>	10	10	40	100	4	45	C	0.03	0.1	IC900
3316113	<b>145-120-48-12-100-4-G</b>	12	12	48	100	4	45	C	0.04	0.11	IC900
3316114	<b>145-140-50-14-100-4-G</b>	14	14	50	100	4	45	C	0.04	0.11	IC900
3397782	<b>145-060-16-06W57-4-G</b>	6	6	16	57	4	45	W	0.03	0.07	IC900
3397783	<b>145-080-20-08W63-4-G</b>	8	8	20	63	4	45	W	0.03	0.09	IC900
3397784	<b>145-100-22-10W72-4-G</b>	10	10	22	72	4	45	W	0.03	0.1	IC900
3397785	<b>145-120-25-12W83-4-G</b>	12	12	25	83	4	45	W	0.04	0.11	IC900
3397786	<b>145-160-32-16W92-4-G</b>	16	16	32	92	4	45	W	0.05	0.13	IC900

## 145-2A

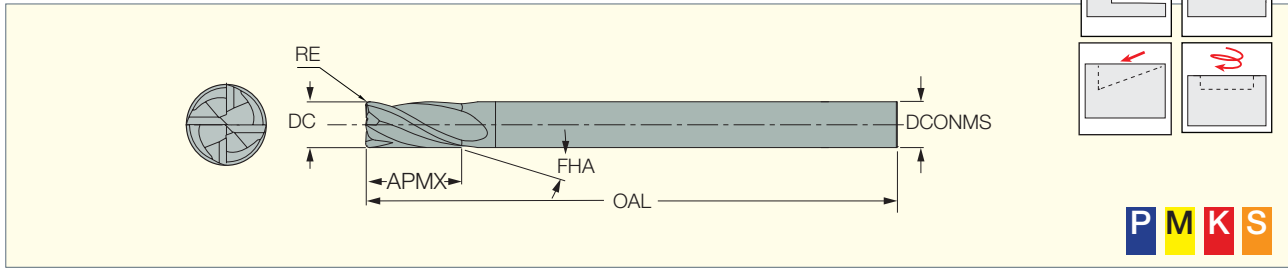
2 Flute, 45° Helix Medium Length Solid Carbide Endmills,  
for Machining Aluminum



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	RMPX	Shank C-Cylindrical	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316127	<b>145-040-12-06-57-2-A</b>	4	6	12	57	2	45	3	C	0.02	0.05	IC08
3316128	<b>145-050-14-06-57-2-A</b>	5	6	14	57	2	45	3	C	0.02	0.06	IC08
3316129	<b>145-060-16-06-57-2-A</b>	6	6	16	57	2	45	4	C	0.03	0.07	IC08
3316130	<b>145-080-20-08-63-2-A</b>	8	8	20	63	2	45	4	C	0.03	0.09	IC08
3316131	<b>145-100-22-10-72-2-A</b>	10	10	22	72	2	45	5	C	0.03	0.10	IC08
3316132	<b>145-120-25-12-83-2-A</b>	12	12	25	83	2	45	5	C	0.04	0.11	IC08
3316134	<b>145-160-32-16-92-2-A</b>	16	16	32	92	2	45	5	C	0.05	0.13	IC08

**145-4-R**

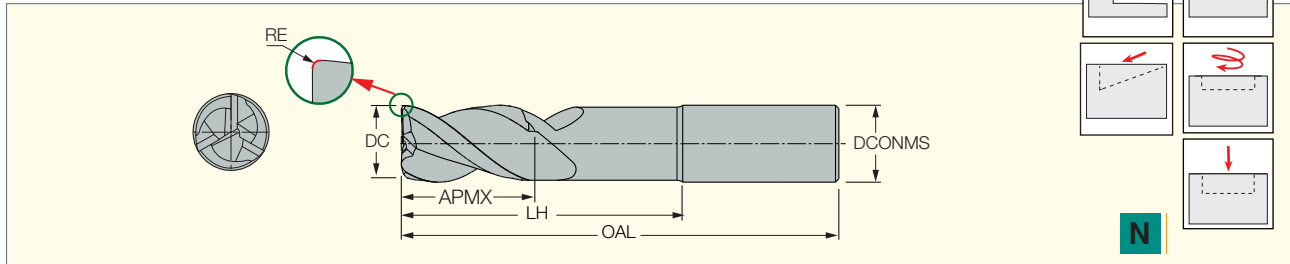
4 Flute, 45° Helix Solid Carbide Endmills and Drill Endmills with 4 Flutes and Various Radii (for general use on different materials)



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	RMPX	Shank C-Cylindrical	RE	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316096	145-060-16-06-57-4R05-G	6	6	16	57	4	45	4	C	0.5	0.03	0.07	IC900
3316097	145-060-16-06-57-4R1-G	6	6	16	57	4	45	4	C	1	0.03	0.07	IC900
3316098	145-080-20-08-63-4R05-G	8	8	20	63	4	45	4	C	0.5	0.03	0.09	IC900
3316101	145-080-20-08-63-4R1-G	8	8	20	63	4	45	4	C	1	0.03	0.09	IC900
3316100	145-080-20-08-63-4R1.5-G	8	8	20	63	4	45	4	C	1.5	0.03	0.09	IC900
3316103	145-080-20-08-63-4R2-G	8	8	20	63	4	45	4	C	2	0.03	0.09	IC900
3316104	145-100-22-10-72-4R05-G	10	10	22	72	4	45	5	C	0.5	0.03	0.10	IC900
3316106	145-100-22-10-72-4R1-G	10	10	22	72	4	45	5	C	1	0.03	0.10	IC900
3316105	145-100-22-10-72-4R1.5-G	10	10	22	72	4	45	5	C	1.5	0.03	0.10	IC900
3316107	145-100-22-10-72-4R2-G	10	10	22	72	4	45	5	C	2	0.03	0.10	IC900
3316108	145-100-22-10-72-4R3-G	10	10	22	72	4	45	5	C	3	0.03	0.10	IC900

**138-A**

Solid Carbide Endmills, 3, 4 and 5xD Relieved Necks, for Machining Aluminum Chatter Dampening

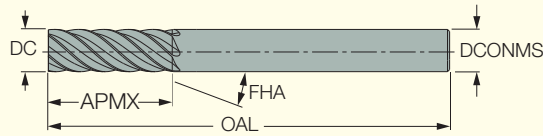
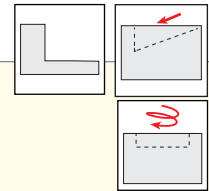


Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	LH	RE	Shank C-Cylindrical	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316196	138-020-05/08-06-57-3R-A	2	6	5	57	3	38	8	0.1	C	0.01	0.02	IC08
3316197	138-030-07/12-06-57-3R-A	3	6	7	57	3	38	12	0.1	C	0.03	0.05	IC08
3316199	138-040-10/16-06-57-3R-A	4	6	10	57	3	38	16	0.2	C	0.03	0.05	IC08
3316201	138-050-12/20-06-57-3R-A	5	6	12	57	3	38	20	0.2	C	0.03	0.06	IC08
3316203	138-060-09/18-06-57-3R-A	6	6	9	57	3	38	18	0.2	C	0.03	0.07	IC08
3316204	138-060-09/30-06-65-3R-A	6	6	9	65	3	38	30	0.2	C	0.03	0.07	IC08
3316205	138-060-14/24-06-60-3R-A	6	6	14	60	3	38	24	0.2	C	0.03	0.07	IC08
3316207	138-080-12/24-08-63-3R-A	8	8	12	63	3	38	24	0.2	C	0.03	0.09	IC08
3316208	138-080-12/40-08-79-3R-A	8	8	12	79	3	38	40	0.2	C	0.03	0.09	IC08
3316209	138-080-18/32-08-68-3R-A	8	8	18	68	3	38	32	0.2	C	0.03	0.09	IC08
3316210	138-100-15/30-10-72-3R-A	10	10	15	72	3	38	30	0.2	C	0.03	0.10	IC08
3316211	138-100-15/50-10-92-3R-A	10	10	15	92	3	38	50	0.2	C	0.03	0.10	IC08
3316212	138-100-22/40-10-80-3R-A	10	10	22	80	3	38	40	0.2	C	0.03	0.10	IC08
3316213	138-120-18/36-12-83-3R-A	12	12	18	83	3	38	36	0.2	C	0.04	0.11	IC08
3316214	138-120-18/60-12-100-3R-A	12	12	18	100	3	38	60	0.2	C	0.04	0.11	IC08
3316215	138-120-26/48-12-93-3R-A	12	12	26	93	3	38	48	0.2	C	0.04	0.11	IC08
3316216	138-160-24/48-16-92-3R-A	16	16	24	92	3	38	48	0.2	C	0.05	0.13	IC08
3316217	138-160-24/80-16-128-3R-A	16	16	24	128	3	38	80	0.2	C	0.05	0.13	IC08
3316218	138-160-34/64-16-115-3R-A	16	16	34	115	3	38	64	0.2	C	0.05	0.13	IC08



**145-6G**

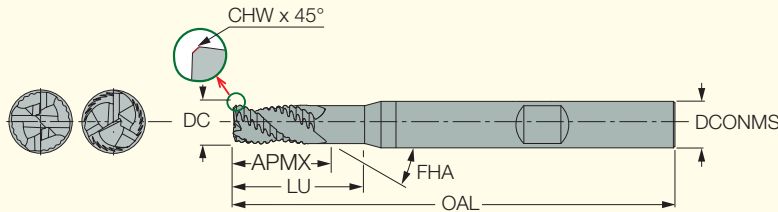
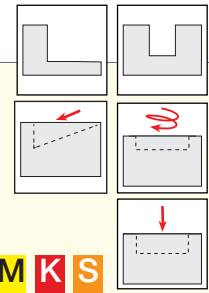
6 Flute, 45° Helix Medium Length Solid Carbide Endmills,  
for Finishing Applications and General Material



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	Shank C-Cylindrical	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316173	<b>145-060-16-06-57-6-G</b>	6	6	16	57	6	45	C	0.03	0.07	IC900
3316174	<b>145-080-20-08-63-6-G</b>	8	8	20	63	6	45	C	0.03	0.09	IC900
3316175	<b>145-100-22-10-72-6-G</b>	10	10	22	72	6	45	C	0.03	0.1	IC900
3316176	<b>145-120-25-12-83-6-G</b>	12	12	25	83	6	45	C	0.04	0.11	IC900
3316179	<b>145-160-32-16-92-6-G</b>	16	16	32	92	6	45	C	0.05	0.13	IC900
3316181	<b>145-200-38-20-104-6-G</b>	20	20	38	104	6	45	C	0.05	0.13	IC900

**438-G**

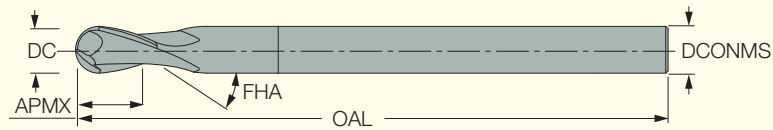
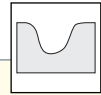
3, 4 Flute, 30° and 38° Helix Solid Carbide Roughing Endmills,  
with Relieved Neck for General Material



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	LU	RMPX	CHW	Shank C-Cylindrical, W-Weldon	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316186	<b>438-040-08/13-06-57-3-G</b>	4	6	8	57	3	38	13	3	0.25	C	0.02	0.05	IC900
3316187	<b>438-050-10/17-06-57-3-G</b>	5	6	10	57	3	38	17	3	0.3	C	0.02	0.05	IC900
3316188	<b>438-060-13/21W06-57-3-G</b>	6	6	13	57	3	38	21	4	0.3	W	0.03	0.06	IC900
3316189	<b>438-080-20/28W08-63-3-G</b>	8	8	20	63	3	38	28	4	0.3	W	0.03	0.08	IC900
3316191	<b>438-100-22/30W10-72-4-G</b>	10	10	22	72	4	30	30	5	0.3	W	0.03	0.09	IC900
3316192	<b>438-120-25/37W12-83-4-G</b>	12	12	25	83	4	30	37	5	0.4	W	0.04	0.10	IC900
3316193	<b>438-160-32/44W16-92-4-G</b>	16	16	32	92	4	30	44	5	0.5	W	0.05	0.11	IC900
3403844	<b>438-200-38/55W20-104-4-G</b>	20	20	38	104	4	30	55	5	0.6	W	0.05	0.11	IC900

**230**

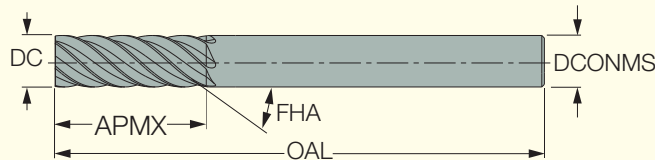
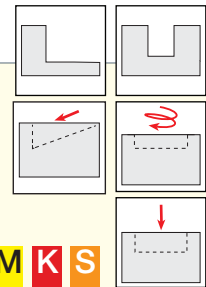
2/4 Flute, Short Ball Nose Endmills



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	Shank C-Cylindrical	Grade
3316219	<b>230-030-05-06-57-2-G</b>	3	6	5	57	2	30	C	IC900
3316220	<b>230-040-07-06-50-4-G</b>	4	6	7	50	4	30	C	IC900
3316221	<b>230-040-12-04-50-4-G</b>	4	4	12	50	4	30	C	IC900
3316222	<b>230-050-08-06-57-4-G</b>	5	6	8	57	4	30	C	IC900
3316223	<b>230-060-08-06-57-2-G</b>	6	6	8	57	2	30	C	IC900
3316224	<b>230-060-08-06-57-4-G</b>	6	6	8	57	4	30	C	IC900
3316225	<b>230-060-16-06-57-4-G</b>	6	6	16	57	4	30	C	IC900
3316226	<b>230-080-20-08-63-4-G</b>	8	8	20	63	4	30	C	IC900
3316228	<b>230-100-22-10-72-4-G</b>	10	10	22	72	4	30	C	IC900

**130-4G**

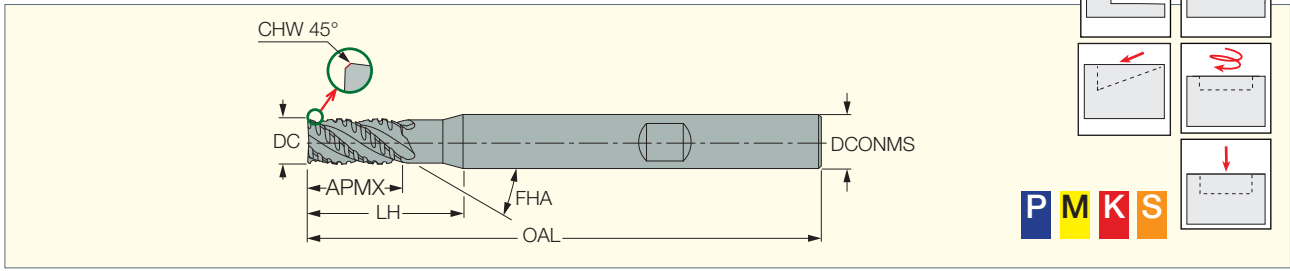
4 Flute, 30° Helix Solid Carbide Endmills  
(for general use on different materials)



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	RMPX	Shank C-Cylindrical	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316153	<b>130-020-07-03-38-4-G</b>	2	3	7	38	4	30	3	C	0.01	0.03	IC900
3316154	<b>130-025-07-03-38-4-G</b>	2.5	3	7	38	4	30	3	C	0.01	0.03	IC900
3316155	<b>130-030-10-03-38-4-G</b>	3	3	10	38	4	30	4	C	0.01	0.04	IC900
3316156	<b>130-030-10-06-57-4-G</b>	3	6	10	57	4	30	4	C	0.01	0.04	IC900
3316157	<b>130-040-12-06-57-4-G</b>	4	6	12	57	4	30	5	C	0.02	0.05	IC900
3316158	<b>130-050-14-05-50-4-G</b>	5	5	14	50	4	30	5	C	0.02	0.06	IC900
3316159	<b>130-050-14-06-57-4-G</b>	5	6	14	57	4	30	5	C	0.02	0.06	IC900
3316160	<b>130-060-16-06-57-4-G</b>	6	6	16	57	4	30	5	C	0.03	0.07	IC900
3316161	<b>130-080-20-08-63-4-G</b>	8	8	20	63	4	30	5	C	0.03	0.09	IC900
3316162	<b>130-100-22-10-72-4-G</b>	10	10	22	72	4	30	5	C	0.03	0.10	IC900
3316163	<b>130-120-25-12-83-4-G</b>	12	12	25	83	4	30	5	C	0.04	0.11	IC900

**445-4G**

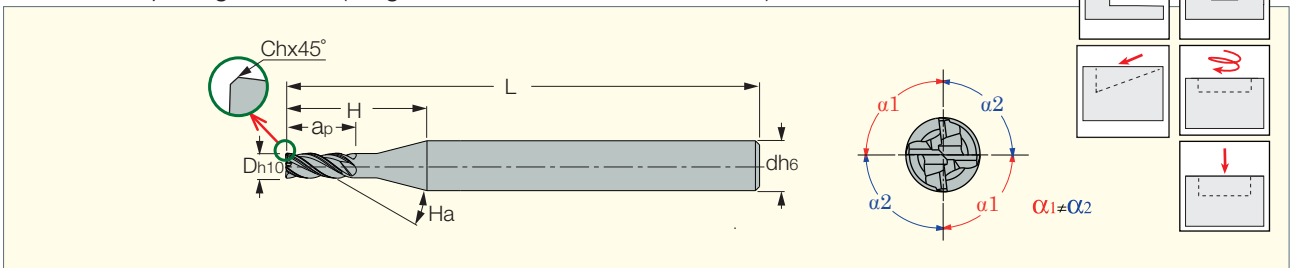
4 Flute, Roughing Endmills  
(for general use on different materials)



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	LH	RMPX	CHW	Shank		Grade
											W-Weldon	Grade	
3316229	445-050-10/15W06-57-4-G	5	6	10	57	4	45	15	3	0.20	W	IC900	
3316231	445-060-12W06-57-4-G	6	6	12	57	4	45	-	3	0.25	W	IC900	
3316232	445-060-12/18W06-57-4-G	6	6	12	57	4	45	18	3	0.25	W	IC900	
3316233	445-080-16W08-63-4-G	8	8	16	63	4	45	-	4	0.25	W	IC900	
3316234	445-080-16/24W08-63-4-G	8	8	16	63	4	45	24	4	0.25	W	IC900	
3316281	445-100-20W10-72-4-G	10	10	20	72	4	45	-	5	0.30	W	IC900	
3316236	445-100-20/30W10-72-4-G	10	10	20	72	4	45	30	5	0.30	W	IC900	
3316237	445-120-24W12-83-4-G	12	12	24	83	4	45	-	5	0.35	W	IC900	
3316238	445-120-24/36W12-83-4-G	12	12	24	83	4	45	36	5	0.35	W	IC900	

**138-4P**

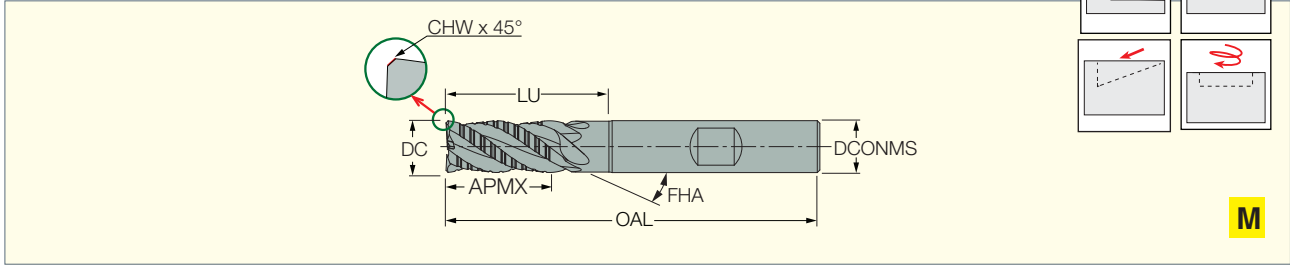
4 Flute, 38° Helix Endmills with Relieved Necks,  
Chatter Dampening Endmills (for general use on different materials)



Item No.	Designation	DC	DCONMS	APMX	OAL	NOF	FHA	LU	RMPX	CHW	Shank		Grade
											C-Cylindrical	W-Weldom	
3316240	138-030-08/11-06-57-4-P	3	6	8	57	4	38	11	3	0.10	C	IC900	
3316241	138-040-10/14-06-57-4-P	4	6	10	57	4	38	14	3	0.15	C	IC900	
3316242	138-050-12/17-06-57-4-P	5	6	12	57	4	38	17	3	0.18	C	IC900	
3316243	138-060-14/20-06-57-4-P	6	6	14	57	4	38	20	4	0.25	C	IC900	
3316244	138-080-18/26-08-63-4-P	8	8	18	63	4	38	26	4	0.30	C	IC900	
3332370	138-080-18/26W08-63-4-P	8	8	18	63	4	38	26	4	0.30	W	IC900	
3316245	138-100-22/32-10-72-4-P	10	10	22	72	4	38	32	5	0.40	C	IC900	
3332372	138-100-22/32W10-72-4-P	10	10	22	72	4	38	32	5	0.40	W	IC900	
3316246	138-120-26/38-12-83-4-P	12	12	26	83	4	38	38	5	0.50	C	IC900	
3332375	138-120-26/38W12-83-4-P	12	12	26	83	4	38	38	5	0.50	W	IC900	
3316247	138-160-34/50-16-100-4-P	16	16	34	100	4	38	50	5	0.60	C	IC900	
3332379	138-160-34/50W16-100-4-P	16	16	34	100	4	38	50	5	0.60	W	IC900	
3316248	138-200-42/60-20-110-4-P	20	20	42	110	4	38	60	5	0.60	C	IC900	
3332381	138-200-42/60W20-110-4-P	20	20	42	110	4	38	60	5	0.60	W	IC900	

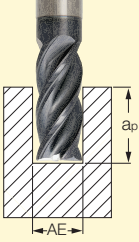
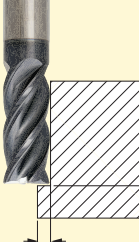
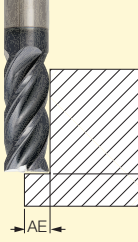
**338-4M**

4 Flute, 38° Helix with Relieved Necks and Chip Splitting Cutting Edges, Solid Carbide Roughing Endmills, for Stainless Steel Materials



Item No	Designation	DC	DCONMS	APMX	OAL	NOF	LU	FHA	CHW	Shank W-Weldon	f <sub>z</sub> (min)	f <sub>z</sub> (max)	Grade
3316089	338-060-14/20W06-57-4-M	6	6	14	57	4	20	38	0.3	W	0.03	0.06	IC900
3316091	338-080-18/26W08-63-4-M	8	8	18	63	4	26	38	0.4	W	0.03	0.08	IC900
3316092	338-100-22/32W10-72-4-M	10	10	22	72	4	32	38	0.4	W	0.03	0.09	IC900
3316093	338-120-26/38W12-83-4-M	12	12	26	83	4	38	38	0.4	W	0.04	0.10	IC900
3316094	338-160-34/50W16-100-4-M	16	16	34	100	4	50	38	0.5	W	0.05	0.12	IC900



			
	<b>Roughing</b>	<b>Trochoidal/dyn. Milling</b>	<b>General Machining</b>
<b>a<sub>e</sub></b>	40% up to full slot	10% up to 20%	20% up to 35%
<b>a<sub>p</sub></b>	1 x D	max. cutting length	2 x D

ISO	Material	Group	Cutting Speed V <sub>c</sub> in m/min		
			IC900	IC900	IC900
<b>P</b>	unalloyed	1-4	200	360	260
		5	180	325	235
	Low Alloyed	6-7	140	260	190
		8-9	130	235	170
	High Alloyed, Tool Steel	10	110	200	150
		11	100	180	130
	Ferritic Martensitic	12	110	200	145
13		70	125	105	

ISO	Material	Group	Feed per tooth f <sub>z</sub> in mm																	
			Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20
<b>P</b>	unalloyed	1-4	0.030	0.040	0.050	0.060	0.080	0.100	0.048	0.064	0.080	0.096	0.128	0.160	0.038	0.050	0.063	0.076	0.101	0.126
		5	0.030	0.040	0.050	0.060	0.080	0.100	0.048	0.064	0.080	0.096	0.128	0.160	0.038	0.050	0.063	0.076	0.101	0.126
	Low Alloyed	6-7	0.028	0.037	0.047	0.056	0.074	0.093	0.044	0.058	0.073	0.087	0.116	0.145	0.035	0.046	0.058	0.069	0.092	0.115
		8-9	0.028	0.037	0.047	0.056	0.074	0.093	0.044	0.058	0.073	0.087	0.116	0.145	0.035	0.046	0.058	0.069	0.092	0.115
	High Alloyed, Tool Steel	10	0.025	0.033	0.041	0.049	0.066	0.082	0.040	0.054	0.067	0.080	0.107	0.134	0.031	0.042	0.052	0.062	0.083	0.104
		11	0.025	0.033	0.041	0.049	0.066	0.082	0.040	0.054	0.067	0.080	0.107	0.134	0.031	0.042	0.052	0.062	0.083	0.104
	Ferritic Martensitic	12	0.027	0.036	0.045	0.054	0.072	0.090	0.043	0.058	0.072	0.086	0.115	0.144	0.034	0.045	0.056	0.067	0.090	0.112
13		0.025	0.034	0.042	0.050	0.067	0.084	0.040	0.053	0.067	0.080	0.106	0.133	0.031	0.042	0.052	0.062	0.083	0.104	

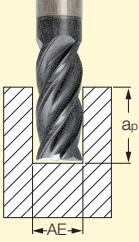
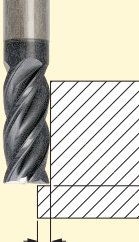
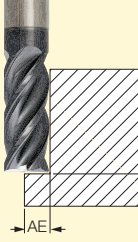
	<b>Roughing</b>	<b>Trochoidal/dyn. Milling</b>	<b>General Machining</b>
<b>a<sub>e</sub></b>	40% up to full slot	10% up to 20%	20% up to 35%
<b>a<sub>p</sub></b>	1 x D	max. cutting length	2 x D

ISO	Material	Group	Cutting Speed V <sub>c</sub> in m/min		
			IC900	IC900	IC900
<b>M</b>	Austenitic	14.1	80	150	110
	PH	14.2	70	120	90
	Duplex	14.3	60	100	65
	Heat Res. Cast Steel Ni>20%	14.4	75	130	90

ISO	Material	Group	Feed per tooth f <sub>z</sub> in mm																	
			Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20
<b>M</b>	Austenitic	14.1	0.024	0.032	0.041	0.049	0.065	0.081	0.038	0.050	0.063	0.075	0.100	0.125	0.030	0.040	0.051	0.065	0.850	0.120
	PH	14.2	0.024	0.032	0.041	0.049	0.065	0.081	0.038	0.050	0.063	0.075	0.100	0.125	0.030	0.040	0.051	0.065	0.085	0.120
	Duplex	14.3	0.020	0.027	0.037	0.044	0.060	0.075	0.035	0.048	0.060	0.073	0.095	0.102	0.026	0.036	0.048	0.056	0.076	0.095
	Heat Res. Cast Steel Ni>20%	14.4	0.023	0.030	0.035	0.044	0.065	0.080	0.038	0.050	0.063	0.075	0.100	0.125	0.028	0.038	0.050	0.060	0.080	0.100

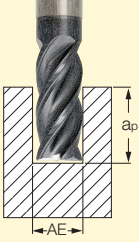
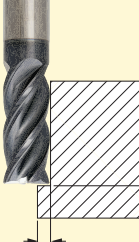
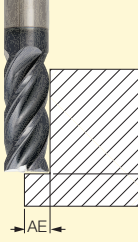
ISO	Material	Group	Cutting Speed V <sub>c</sub> in m/min		
			IC900	IC900	IC900
<b>K</b>	Grey Cast Iron	15-16	250	450	325
	Spheroidal Cast	17-18	200	360	260

ISO	Material	Group	Feed per tooth f <sub>z</sub> in mm																	
			Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20
<b>K</b>	Grey Cast Iron	15-16	0.033	0.044	0.055	0.066	0.088	0.110	0.052	0.069	0.087	0.104	0.138	0.173	0.041	0.055	0.069	0.083	0.110	0.138
	Spheroidal Cast	17-18	0.030	0.040	0.050	0.060	0.080	0.100	0.048	0.064	0.080	0.096	0.128	0.160	0.038	0.050	0.063	0.076	0.101	0.126

			
	<b>Roughing</b>	<b>Trochoidal/dyn. Milling</b>	<b>General Machining</b>
<b>a<sub>e</sub></b>	40% up to full slot	10% up to 20%	20% up to 35%
<b>a<sub>p</sub></b>	1 x D	max. cutting length	2 x D

ISO	Material	Group	Cutting Speed V <sub>c</sub> in m/min					
			IC08	IC08 Coated	IC08	IC08 Coated	IC08	IC08 Coated
<b>N</b>	Al-forging Alloy	21-22	400	-	720	-	520	-
	Cast-Al (Si>10%)	23-25	180	250	324	450	234	325
		26-27	300	-	540	-	390	-
	Copper Alloys	28 E-Cu\N	150	-	270	-	195	-
	Non Ferrous	29-30	-	-	-	-	-	-

ISO	Material	Group	Feed per tooth f <sub>z</sub> in mm																	
			Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20
<b>N</b>	Al-forging Alloy	21-22	0.042	0.056	0.070	0.084	0.112	0.140	0.067	0.089	0.0112	0.134	0.178	0.223	0.053	0.070	0.088	0.105	0.140	0.175
	Cast-Al (Si>10%)	23-25	0.035	0.046	0.058	0.069	0.092	0.115	0.056	0.074	0.093	0.111	0.148	0.185	0.044	0.058	0.073	0.087	0.116	0.145
		26-27	0.045	0.060	0.075	0.090	0.120	0.150	0.072	0.096	0.120	0.144	0.192	0.240	0.057	0.076	0.095	0.114	0.152	0.190
	Copper Alloys	28 E-Cu\N	0.035	0.046	0.058	0.069	0.092	0.115	0.056	0.074	0.093	0.111	0.148	0.185	0.044	0.058	0.073	0.087	0.116	0.145
	Non Ferrous	29-30	0.020	0.026	0.033	0.039	-	-	0.032	0.042	0.053	0.063	-	-	0.025	0.034	0.042	0.050	-	-

			
	<b>Roughing</b>	<b>Trochoidal/dyn. Milling</b>	<b>General Machining</b>
<b>ae</b>	40% up to full slot	10% up to 20%	20% up to 35%
<b>ap</b>	1 x D	max. cutting length	2 x D

ISO	Material	Group	Cutting Speed $V_c$ in m/min		
			IC900	IC900	IC900
<b>S</b>	Ni-Base Alloys	33-35	27	49	35
	Ti and Ti-alloys	36-37	45	81	59

ISO	Material	Group	Feed per tooth $f_z$ in mm																	
			Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20
<b>S</b>	Ni-Base Alloys	33-35	0.020	0.027	0.034	0.041	0.054	0.068	0.032	0.042	0.053	0.063	0.084	0.105	0.025	0.033	0.042	0.050	0.066	0.083
	Ti and Ti-alloys	36-37	0.024	0.032	0.041	0.049	0.065	0.081	0.038	0.050	0.063	0.075	0.100	0.125	0.030	0.040	0.051	0.061	0.081	0.101

ISO	Material	Group	Cutting Speed $V_c$ in m/min		
			IC900	IC900	IC900
<b>H</b>	44-48 HRC	38-41	80	144	104
	up to 57 HRC		-	-	-
	up to 62 HRC		-	-	-

ISO	Material	Group	Feed per tooth $f_z$ in mm																	
			Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20	Ø6	Ø8	Ø10	Ø12	Ø16	Ø20
<b>H</b>	44-48 HRC	38-41	0.025	0.034	0.042	0.050	0.067	0.084	0.040	0.054	0.067	0.080	0.107	0.135	0.031	0.042	0.052	0.062	0.083	0.104
	up to 57 HRC		0.020	0.026	0.033	0.039	0.052	0.065	0.032	0.042	0.053	0.063	0.084	0.105	0.025	0.033	0.042	0.050	0.066	0.083
	up to 62 HRC		-	-	-	-	-	-	0.026	0.034	0.043	0.051	0.068	0.085	0.021	0.028	0.035	0.041	0.055	0.069

only limited possible (choose HSC Strategy)