IPT13/IPC13 Application Guide – Speed & Feed (metric)

ISO Code	Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (M/min)	Feed (MM per Tooth) 12.0	16.0	20.0
K	Gray ASTM-A48 Class 20, 25, 30, 35 & 40	Peripheral - HEM	≤ 2 x D	.07 x D	13	113	.1080	.1436	.1793
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	113	.0960	.1277	.1593
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	110	.0816	.1085	.1354
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	110	.0720	.0958	.1195
		Finish	3 x D	.01 x D	13	111	.0480	.0638	.0797
	Cast Iron Malleable	Peripheral - HEM	≤ 2 x D	.07 x D	13	116	.1152	.1532	.1912
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	116	.1008	.1341	.1673
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	111	.0936	.1245	.1554
		Peripheral - HEM	> 3.5 - 4 x D	.07 x D	13	111	.0864	.1149	.1434
		Finish	3 x D	.01 x D	13	104	.0408	.0543	.0677
P	Low Carbon Steels ≤ 38 Rc 1018, 1020, 12L14, 5120, 8620	Peripheral - HEM	≤ 2 x D	.07 x D	13	137	.1056	.1404	.1753
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	131	.0936	.1245	.1554
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	128	.0864	.1149	.1434
		Peripheral - HEM	> 3.5 - 4 x D	.07 x D	13	125	.0816	.1085	.1354
		Finish	3 x D	.01 x D	13	120	.0408	.0543	.0677
	Medium Carbon Steels ≤ 48 HRC 1045, 4140, 4340, 5140	Peripheral - HEM	≤ 2 x D	.06 x D	13	123	.1056	.1404	.1753
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	123	.0984	.1309	.1633
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	123	.0936	.1245	.1554
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	123	.0864	.1149	.1434
		Finish	3 x D	.01 x D	13	113	.0408	.0543	.0677
	Tool and Die Steels ≤ 48 Rc A2, D2, O1, S7, P20, H13	Peripheral - HEM	≤ 2 x D	.06 x D	13	128	.1080	.1436	.1793
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	128	.0960	.1277	.1593
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	126	.0888	.1181	.1474
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	126	.0840	.1117	.1394
		Finish	3 x D	.01 x D	13	117	.0360	.0479	.0598
M	Martensitic & Ferritic Stainless Steels 410, 416, 440	Peripheral - HEM	≤ 2 x D	.06 x D	13	140	.0984	.1309	.1633
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	140	.0960	.1277	.1593
		Peripheral - HEM	> 3 - 3.5 x D	.06 x D	13	137	.0888	.1181	.1474
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	136	.0840	.1117	.1394
		Finish	3 x D	.01 x D	13	119	.0360	.0479	.0598
	Austenitic Stainless Steels, FeNi Alloys 303, 304, 316, Invar, Kovar	Peripheral - HEM	≤ 2 x D	.06 x D	13	137	.1200	.1596	.1992
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	137	.1152	.1532	.1912
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	137	.0960	.1277	.1593
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	136	.0840	.1117	.1394
		Finish	3 x D	.01 x D	13	126	.0432	.0575	.0717
	Precipitation Hardening Stainless Steels 17-4, 15-5	Peripheral - HEM	≤ 2 x D	.06 x D	13	134	.1080	.1436	.1793
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	134	.0984	.1309	.1633
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	133	.0912	.1213	.1514
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	133	.0816	.1085	.1354
		Finish	3 x D	.01 x D	13	122	.0408	.0543	.0677
S	Titanium Alloys 6Al-4V, 6-2-4	Peripheral - HEM	≤ 2 x D	.08 x D	13	120	.1200	.1596	.1992
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	119	.1080	.1436	.1793
		Peripheral - HEM	> 3 - 3.5 x D	.06 x D	13	116	.0984	.1309	.1633
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	116	.0816	.1085	.1354
		Finish	3 x D	.015 x D	13	108	.0528	.0702	.0876
	Difficult-to-Machine Titanium Alloys 10-2-3 Precipitation Hardening Stainless Steel M 13-8	Peripheral - HEM	≤ 2 x D	.06 x D	13	107	.1200	.1596	.1992
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	101	.0864	.1149	.1434
		Peripheral - HEM	> 3 - 3.5 x D	.055 x D	13	96	.0840	.1117	.1394
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	94	.0768	.1021	.1275
		Finish	3 x D	.01 x D	13	91	.0408	.0543	.0677
	Hastalloy, Waspalloy	Peripheral - HEM	≤ 2 x D	.07 X D	13	32	.1704	.2266	.2828
		Peripheral - HEM	> 2 - 3 x D	.065 x D	13	30	.1536	.2043	.2550
		Peripheral - HEM	> 3 - 3.5 x D	.055 x D	13	27	.1488	.1979	.2470
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	27	.1368	.1819	.2271
		Finish	3 x D	.01 x D	13	27	.1056	.1404	.1753
	Inconel 718, Rene 88	Peripheral - HEM	≤ 2 x D	.06 x D	13	30	.1248	.1660	.2072
		Peripheral - HEM	> 2 - 3 x D	.05 x D	13	29	.1248	.1660	.2072
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	29	.1152	.1532	.1912
		Peripheral - HEM	> 3.5 - 4 x D	.04 x D	13	29	.1152	.1532	.1912
		Finish	3 x D	.01 x D	13	27	.0552	.0734	.0916

D = Tool Diameter HEM = High-efficiency machining (chip thinning calculations have already been applied to HEM parameters)

Information on tips and adjustments can be found in our Technical Resources section beginning on page 129.