

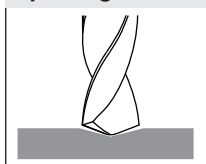
N/C Spotting Drills Speeds & Feeds

Material	Grades	SFM	Tool Diameter (IPR)						
			1/8	3/16	1/4	3/8	1/2	5/8	3/4
			(.1250)	(.1875)	(.2500)	(.3750)	(.5000)	(.6250)	(.7500)
P - Steels									
High Strength Tool Steel	A2, D2, P20, H11, H13, S2, O1	80-175	.0008-.0030	.0020-.0040	.0020-.0050	.0030-.0060	.0030-.0060	.0040-.0080	.0050-.0100
Low Carbon	A36, 12L14, 12L15, 1005, 1018, 1020, 1108-1119, 1213-1215, 1513-1518, 4012, 5015, 9310	100-175	.0010-.0030	.0020-.0040	.0025-.0050	.0030-.0080	.0040-.0100	.0050-.0120	.0060-.0130
Medium Carbon	1040-1095, 1140-1151, 1330-1345, 520-1572, 4023-4063, 4120-4161, 4330-4340, 4620-4640, 8620-8660, 8740-8750, 6150, 51000, 52100	100-175	.0010-.0030	.0020-.0040	.0025-.0050	.0030-.0080	.0040-.0100	.0050-.0120	.0060-.0130
M - Stainless Steels									
Austenitic	301-304L, 310, 316L, 321, 347	80-175	.0008-.0030	.0020-.0040	.0020-.0070	.0030-.0070	.0040-.0080	.0040-.0100	.0050-.0110
Martensitic	403, 410, 416, 420, 430, 431, 440	80-150	.0008-.0030	.0016-.0040	.0020-.0040	.0020-.0070	.0030-.0080	.0040-.0100	.0050-.0110
Precipitation Hardening	12/8, 15/5, 17/4, AM-350/355/363, PH13-8MO, PH14-8/MO	80-175	.0008-.0030	.0016-.0040	.0020-.0040	.0020-.0070	.0030-.0080	.0040-.0100	.0050-.0110
K - Cast Irons									
Ductile	A536, J434, 60-40-18	125-200	.0020-.0040	.0020-.0050	.0030-.0060	.0040-.0060	.0050-.0080	.0060-.0100	.0070-.0120
Gray	A48, A436, A319, Class 20, G4000	100-200	.0020-.0040	.0020-.0050	.0030-.0060	.0040-.0060	.0050-.0080	.0060-.0100	.0070-.0120
Malleable	A220, A602, J158	125-175	.0016-.0030	.0020-.0040	.0020-.0040	.0030-.0060	.0040-.0080	.0050-.0100	.0060-.0120
N - Non-Ferrous									
Aluminum Alloys	2014, 2024, 6061, 7075	250-500	.0020-.0040	.0030-.0060	.0035-.0080	.0040-.0100	.0060-.0120	.0070-.0140	.0080-.0150
Aluminum High Silicon	A380, A390	175-300	.0015-.0030	.0020-.0050	.0030-.0070	.0030-.0080	.0050-.0100	.0060-.0120	.0070-.0130
Brass/Bronze	Aluminum Bronze, Low Silicon Bronze	125-300	.0016-.0040	.0020-.0050	.0025-.0060	.0030-.0070	.0040-.0080	.0050-.0100	.0060-.0110
Composites	G-10, Fiberglass, Graphite, Graphite Epoxy, Plastics	150-300	.0020-.0040	.0020-.0050	.0020-.0060	.0030-.0070	.0050-.0080	.0060-.0100	.0070-.0120
Copper		150-300	.0020-.0040	.0020-.0050	.0020-.0060	.0030-.0070	.0050-.0080	.0060-.0100	.0070-.0120
Magnesium		200-500	.0020-.0040	.0020-.0050	.0020-.0060	.0030-.0070	.0050-.0080	.0060-.0100	.0070-.0120
Titanium	Commercially Pure, 6Al-4V, ASTM 1/2/3, 6Al-25N-4Zr-2Mo-Si, Ti-8Al-1Mo, Ti-8Al-4Mo	150-200	.0016-.0030	.0018-.0032	.0020-.0040	.0030-.0060	.0040-.0080	.0050-.0100	.0060-.0110
S - High Temp Alloys									
Cobalt Base	Stellite, HS-21, Haynes 25/188, X40, L605	80-150	.0008-.0020	.0009-.0025	.0010-.0040	.0020-.0050	.0030-.0080	.0040-.0100	.0050-.0120
Iron Base	Incoloy 800-802, Multmet N-155, Timkin 16-25-6, Carpenter 22-b3	150-200	.0010-.0030	.0020-.0040	.0025-.0050	.0030-.0080	.0040-.0100	.0050-.0120	.0060-.0130
Nickel Base	Inconel 625/718, Inco 700, 713C, 718, Monel 400-401, 404, K401, Rene, Rene 41 & 95 Hastelloy, Wasp-oloy, Udimet 500 & 700	100-150	.0016-.0030	.0018-.0035	.0020-.0040	.0030-.0070	.0040-.0100	.0050-.0120	.0060-.0130

NOTE: Speeds and Feeds listed are estimated and will vary by application. These tools can be found on pages 224-225.

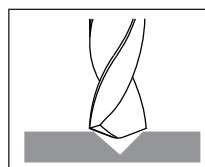
Selecting the Correct Spotting Drill

Spotting for Carbide Drills



Select a spotting drill with a point angle = to or > Greater than the final drill point angle.
The spot drill diameter should be 30% less than your drill diameter.

Spotting for HSS/Cobalt Drills



Select a spotting drill with a point angle < Less than the final drill point angle.
The spot drill diameter should be 30% less than your drill diameter.