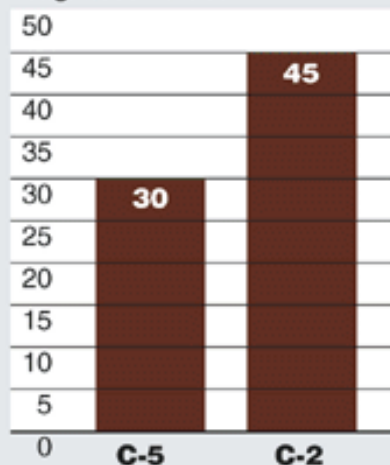
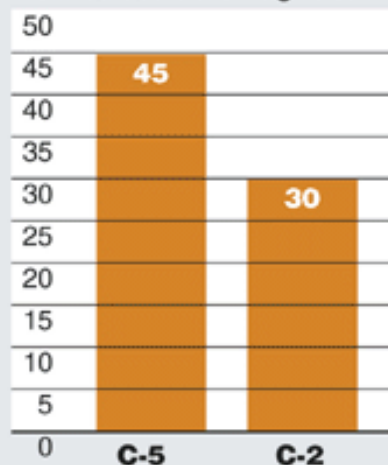


SPADE DRILL SELECTION & APPLICATIONS **CARBIDE**

Toughness Values



Wear Values Under High Heat



If C-5 chips try C-2 at 10% – 20% lower S.F.M. than C-5 rating

Grade	Geometry and Application	Stocked Coatings
C-5	Steel Cutting	Super TiN TiAlN
C-3	Cast Iron	Super TiN TiAlN
C-2	Ductile Iron Stainless Steel Aluminum Exotic Alloys	Super TiN TiAlN

Note: Carbide has a lower transverse rupture strength than HSS and is prone to chipping and breakage.

Recutting of chips or lack of rigidity can cause breakage.

Check Coolant Recommendations Chart on Page 27 for flow rates.

SPEEDS – FEEDS AND COATING RECOMMENDATIONS **CARBIDE**

Material	Material Hardness (BHN)	Coating & Grades ⊕ Super TiN ⊖ Super TiAlN		SFM Surface Footage	Feed (IPR)				
					3/8" to 1/2"	33/64" to 11/16"	45/64" to 15/16"	31/32" to 1-3/8"	1-13/32" to 1-7/8"
Free Machining Steel 1118, 1215, 12L14, etc.	100 - 150	⊕	C-5	420	.006	.009	.012	.015	.019
	150 - 200			360	.006	.008	.011	.013	.017
	200 - 250			340	.005	.008	.010	.012	.015
Low & Medium Carbon Steel 1018, 1040, 1140, etc.	125 - 175	⊕	C-5	340	.005	.008	.010	.014	.017
	175 - 225			310	.005	.007	.008	.012	.016
	225 - 275			270	.004	.007	.008	.012	.015
	275 - 325			230	.004	.006	.006	.010	.014
Alloy Steel 4140, 5140, 8640, etc.	125 - 175	⊖ ⊕	C-5	325	.005	.008	.010	.013	.016
	175 - 225			300	.005	.007	.009	.012	.015
	225 - 275			270	.004	.007	.009	.012	.015
	275 - 325			250	.004	.006	.008	.011	.014
	325 - 375			220	.003	.005	.008	.010	.013
High Strength Alloy Steel 4340, 4330V, 300M, etc.	225 - 300	⊖	C-5	200	.005	.007	.008	.010	.014
	300 - 350			180	.004	.006	.007	.009	.012
	350 - 400			160	.003	.005	.006	.008	.010
Structural Steel A36, A285, A516, etc.	100 - 150	⊕	C-5	310	.006	.010	.011	.012	.016
	150 - 250			250	.005	.008	.009	.011	.015
	250 - 350			230	.004	.007	.008	.009	.013
High Temp. Alloy Hastelloy B, Inconel 600, etc.	140 - 220	⊕ ⊖	C-2	80	.003	.006	.007	.009	.011
	220 - 310			60	.003	.005	.006	.008	.010
Stainless Steel 303, 416, 420, 17-4 PH, etc.	135 - 185	⊕	C-2	210	.006	.008	.009	.011	.013
	185 - 275			160	.005	.007	.008	.010	.011
Tool Steel H-13, H021, A04, O-2, S-3, etc.	150 - 200	⊖	C-5	220	.003	.005	.007	.009	.011
	200 - 250			170	.003	.005	.007	.009	.011
Aluminum	30	⊕	C-2	1500	.008	.013	.016	.020	.022
	180			1000	.007	.011	.014	.018	.020
Cast Iron Gray Iron	120 - 150	⊖	C-3	460	.006	.009	.011	.015	.020
	150 - 200			400	.005	.008	.010	.014	.018
	200 - 220			360	.005	.007	.008	.012	.015
	220 - 260			310	.004	.006	.007	.010	.013
	260 - 320			270	.004	.005	.006	.008	.011
Ductile Iron Nodular Iron	120 - 150	⊖ ⊕	C-3	460	.006	.009	.011	.015	.020
	150 - 200			400	.005	.008	.010	.014	.018
	200 - 220			360	.005	.007	.008	.012	.015
	220 - 260			310	.004	.006	.007	.010	.013
	260 - 320			270	.004	.005	.006	.008	.011