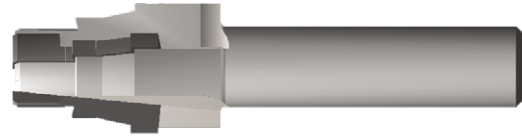
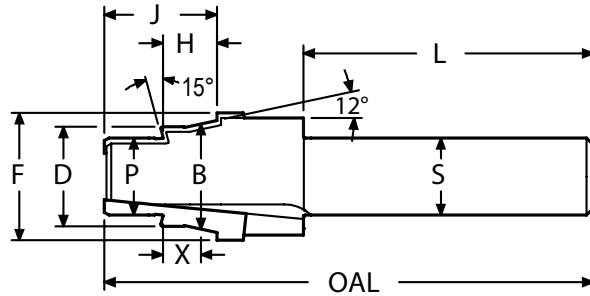


MS33514 (AS33514) - PORT TOOL CARBIDE



- Meets the requirements of the MS33514
- Precision ground for maximum concentricity
- ALTiN+ coating for higher cutting speed
- Polished flute face for optimum performance
- Also meets the requirements of MS33515, AS33515, AS4375, NAS1214, and NAS1215

B	D	F	H	J	P	X	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #		EDP #	
													UNCOATED	ALTIN+	UNCOATED	ALTIN+
0.163	0.137	0.300	0.188	0.380	0.091	0.128	2.00	0.375	3.00	3	0.125	0.3125-24 UNJF-3A	Solid Carbide			
													MS33514-2	MS33514-2A	403110	403166
0.234	0.198	0.375	0.234	0.460	0.123	0.158	2.00	0.375	3.00	3	0.188	0.3750-24 UNJF-3A	MS33514-3	MS33514-3A	403119	403172
0.293	0.263	0.415	0.234	0.460	0.185	0.174	2.00	0.500	3.00	3	0.250	0.4375-20 UNJF-3A	MS33514-4	MS33514-4A	403125	403175
0.356	0.326	0.475	0.250	0.480	0.232	0.190	2.00	0.500	3.00	3	0.312	0.5000-20 UNJF-3A	MS33514-5	MS33514-5A	403128	403178
0.416	0.388	0.530	0.250	0.480	0.295	0.193	2.00	0.500	3.00	3	0.375	0.5625-18 UNJF-3A	MS33514-6	MS33514-6A	403131	403181
0.560	0.516	0.690	0.305	0.675	0.420	0.210	1.88	0.500	3.00	3	0.500	0.7500-16 UNJF-3A	Carbide Tipped			
													MS33514-8	MS33514-8A	403134	403184
0.686	0.643	0.825	0.350	0.725	0.498	0.255	1.88	0.500	3.15	3	0.625	0.8750-14 UNJF-3A	MS33514-10	MS33514-10A	403101	403151
0.810	0.768	1.000	0.350	0.775	0.654	0.253	1.88	0.500	3.23	3	0.750	1.0625-12 UNJ-3A	MS33514-12	MS33514-12A	403104	403154
1.062	1.018	1.250	0.415	0.915	0.873	0.322	2.00	0.750	3.50	4	1.000	1.3125-12 UNJ-3A	MS33514-16	MS33514-16A	403107	403157
1.316	1.272	1.560	0.415	0.925	1.091	0.325	2.00	0.750	3.62	4	1.250	1.6250-12 UNJ-3A	MS33514-20	MS33514-20A	403113	403160
1.565	1.522	1.800	0.485	0.925	1.342	0.390	2.12	1.000	3.82	4	1.500	1.8750-12 UNJ-3A	MS33514-24	MS33514-24A	403116	403163
2.068	2.024	2.400	0.485	0.925	1.811	0.395	2.25	1.000	4.09	4	2.000	2.5000-12 UNJ-3A	MS33514-32	MS33514-32A	403122	403169

Thread mills are available. See page 9.

PORT & CAVITY TECHNICAL INFORMATION

MATERIAL	HB/Rc	SPEED (SFM)		CUTTING CONDITIONS	
		UNCOATED	ALTiN+	INFEED PER FLUTE REAM	INFEED PER FLUTE SPOT FACE
CAST IRON	130 HB	75-210	200-450	.001-.0025	.0008-.0020
CARBON STEEL	18 Rc	125-190	190-400	.001-.0030	.001-.0020
ALLOY STEEL	20 Rc	70-135	130-350	.001-.0030	.0008-.0020
TOOL STEEL	25 Rc	75-100	100-220	.001-.0025	.0005-.0020
300 STAINLESS STEEL	150 HB	90-100	100-230	.001-.0020	.0007-.0015
400 STAINLESS STEEL	195 HB	90-135	135-300	.001-.0020	.0005-.0015
HIGH TEMP ALLOY (NICKEL & COBALT BASE)	20 Rc	30-125	100-150	.0008-.0015	.0005-.0010
TITANIUM	25 Rc	50-100	100-140	.001-.0020	.0005-.0010
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-75	75-130	.0008-.0015	.0005-.0010
ALUMINUM	100 HB	850-1000	800-1500	.002-.0040	.0010-.0030
BRASS, ZINC	80 HB	750-950	800-1200	.002-.0040	.0010-.0030

SFM = Surface Feet per Minute
RPM = SFM x 3.82 divided by tool diameter

Starting parameters only. Setup and machine rigidity may affect performance.

PROBLEM	CAUSE	SOLUTION
RAPID FLANK WEAR	CUTTING CONDITIONS	Check for excessive speed and feed - see chart.
	TOOL	Select a coated tool.
	PROGRAM	Remove dwell from program at end of cut.
BUILT-UP EDGE	TOOL	Select a coated tool. The coating will resist built-up edges.
	HEAT	Use coolant through port tool. If coolant is not available, use shop air and a coated tool.
SURFACE TORN	TOOL	Use a coated tool. On most carbon steels, an uncoated tool will not produce an acceptable finish.
CHATTER	TOOL	Hone cutting edge of spot face. Use Coated Tool. Increase chip load.
LIGHT CHATTER	PROGRAM	Increase speed by 15-20%. A faster speed reduces forces. A dwell typically will not remove chatter.
POOR TOOL LIFE	AMOUNT OF STOCK	Rough port to 0.97 inch of finish size.
	PART	Make sure prior operation did not work harden the material.

SAMPLE PROGRAM FOR MAXIMUM PRODUCTIVITY

N51 (Sample Port Tool Program: MS33649-4RA (ALTiN+) cutting Carbon Steel

T51 M06

S2916 M03

G00 G90 G54 X0. Y0.

G43 H51 Z0.1 M08

G01 Z-0.6 F23.3

S1290 M03

G04 P1.

G01 Z-.73 F10.3

G00 Z5. M09

Select Tool

SFM = 300 ; RPM = 300 x 3.82 / Reamer Diameter

RPM = 300 X 3.82 / 0.393

RPM = 2916

Feed Rate = RPM x 0.002 x 4 (Number of Flutes)

RPM = 300 x 3.82 / 0.888 (Spot Face Diameter)

Dwell to slow down spindle

Feed rate = RPM x 0.002 x 4 (Number of Flutes)