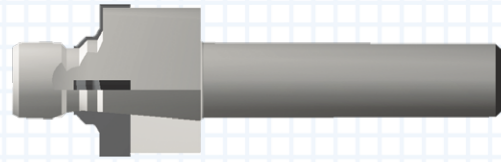
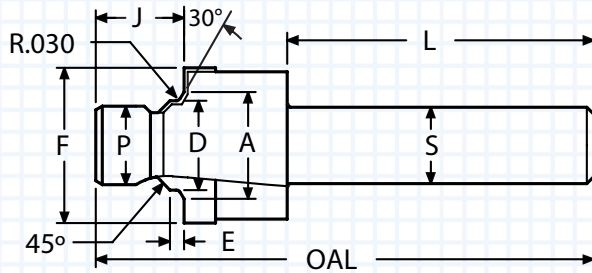


MS33649 (AS5202) - SOLID PILOT PORT TOOL CARBIDE TIPPED



- Ideal for non-standard minor diameter lengths
- Polished flute face for optimum performance
- ALTiN+ coating for improved surface finish
- This port requires a UNJ thread which will specify a larger minor thread diameter

A	D	E	F	J	P	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #		EDP #	
												UNCOATED	ALTiN+	UNCOATED	ALTiN+
0.367	0.2665	0.071	0.575	0.345	0.217	2.00	0.500	3.00	3	N/A	0.2500-28 UNJF-3B	MS33649-1S	MS33649-1SA	401616	401686
0.446	0.3305	0.071	0.742	0.365	0.274	2.00	0.500	3.00	3	0.125	0.3125-24 UNJF-3B	MS33649-2S	MS33649-2SA	401628	401698
0.508	0.3925	0.071	0.805	0.415	0.337	2.00	0.500	3.00	3	0.188	0.3750-24 UNJF-3B	MS33649-3S	MS33649-3SA	401634	401704
0.570	0.4565	0.083	0.888	0.445	0.392	2.00	0.500	3.12	4	0.250	0.4375-20 UNJF-3B	MS33649-4S	MS33649-4SA	401637	401707
0.633	0.5195	0.083	0.950	0.465	0.454	2.00	0.500	3.12	4	0.312	0.5000-20 UNJF-3B	MS33649-5S	MS33649-5SA	401640	401710
0.696	0.5825	0.091	1.012	0.495	0.511	2.00	0.500	3.25	4	0.375	0.5625-18 UNJF-3B	MS33649-6S	MS33649-6SA	401643	401713
0.758	0.6455	0.102	1.105	0.495	0.574	2.00	0.500	3.25	4	0.438	0.6250-18 UNJF-3B	MS33649-7S	MS33649-7SA	401646	401716
0.883	0.7715	0.102	1.240	0.560	0.692	2.12	0.750	3.57	4	0.500	0.7500-16 UNJF-3B	MS33649-8S	MS33649-8SA	401649	401719
0.946	0.8345	0.115	1.300	0.590	0.755	2.12	0.750	3.61	4	0.562	0.8125-16 UNJ-3B	MS33649-9S	MS33649-9SA	401652	401722
1.008	0.8985	0.115	1.415	0.610	0.809	2.12	0.750	3.66	4	0.625	0.8750-14 UNJF-3B	MS33649-10S	MS33649-10SA	401601	401671
1.164	1.0255	0.133	1.602	0.640	0.923	2.12	0.750	3.75	4	0.688	1.0000-12 UNJF-3B	MS33649-11S	MS33649-11SA	401604	401674
1.242	1.0885	0.133	1.665	0.640	0.983	2.12	0.750	3.75	4	0.750	1.0625-12 UNJ-3B	MS33649-12S	MS33649-12SA	401607	401677
1.370	1.2135	0.133	1.790	0.710	1.110	2.25	1.000	4.00	4	0.875	1.1875-12 UNJ-3B	MS33649-14S	MS33649-14SA	401610	401680
1.495	1.3385	0.133	1.965	0.710	1.233	2.25	1.000	4.05	4	1.000	1.3125-12 UNJ-3B	MS33649-16S	MS33649-16SA	401613	401683
1.808	1.6505	0.133	2.310	0.750	1.547	2.25	1.000	4.20	4	1.250	1.6250-12 UNJ-3B	MS33649-20S	MS33649-20SA	401619	401689
2.058	1.9005	0.133	2.628	0.750	1.797	2.25	1.000	4.20	4	1.500	1.8750-12 UNJ-3B	MS33649-24S	MS33649-24SA	401622	401692
2.433	2.2755	0.133	3.050	0.800	2.172	2.25	1.250	4.50	4	1.750	2.2500-12 UNJ-3B	MS33649-28S	MS33649-28SA	401625	401695
2.683	2.5265	0.133	3.520	0.800	2.422	2.50	1.250	4.60	4	2.000	2.5000-12 UNJ-3B	MS33649-32S	MS33649-32SA	401631	401701

Thread mills are available. See pages 8-18.

PORT & CAVITY TECHNICAL INFORMATION

MATERIAL	HB/Rc	SPEED (SFM)		CUTTING CONDITIONS	
		UNCOATED	ALTiN+	INFEEED PER FLUTE REAM	INFEEED 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

Select Tool

S2916 M03

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

G00 G90 G54 X0. Y0.

RPM = 300 X 3.82 / 0.393

G43 H51 Z0.1 M08

RPM = 2916

G01 Z-0.6 F23.3

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

S1290 M03

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

G04 P1.

Dwell to slow down spindle

G01 Z-.73 F10.3

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

G00 Z5. M09