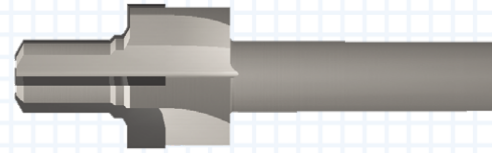
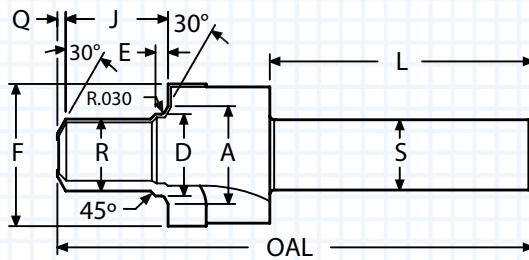


MS33649 (AS5202) - REAMER PILOT PORT TOOL CARBIDE TIPPED

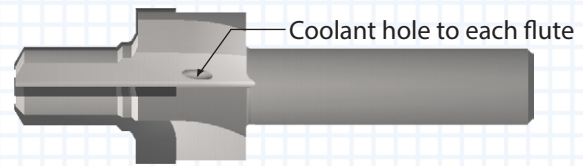
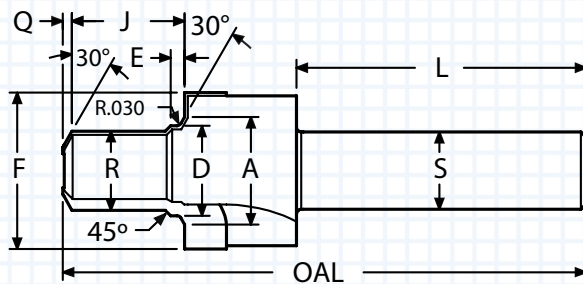


- Reams minor thread diameter to size
- Precision ground for maximum concentricity
- ALTiN+ coated tool for higher cutting speed
- This port requires a UNJ thread which specifies a larger minor-thread diameter

A	D	E	F	J	Q	R	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #		EDP #	
													UNCOATED	ALTiN+	UNCOATED	ALTiN+
0.367	0.2665	0.071	0.575	0.425	0.025	0.219	2.00	0.500	3.00	3	N/A	0.2500-28 UNJF-3B	Solid Carbide			
													MS33649-1R	MS33649-1RA	401778	401878
0.446	0.3305	0.071	0.742	0.597	0.032	0.276	1.75	0.500	3.00	3	0.125	0.3125-24 UNJF-3B	Carbide Tipped			
													MS33649-2R	MS33649-2RA	401793	401893
0.508	0.3925	0.071	0.805	0.603	0.040	0.339	1.75	0.500	3.00	3	0.188	0.3750-24 UNJF-3B	MS33649-3R	MS33649-3RA	401802	401902
0.570	0.4565	0.083	0.888	0.676	0.040	0.393	1.88	0.500	3.12	4	0.250	0.4375-20 UNJF-3B	MS33649-4R	MS33649-4RA	401808	401908
0.633	0.5195	0.083	0.950	0.676	0.045	0.455	1.88	0.500	3.12	4	0.312	0.5000-20 UNJF-3B	MS33649-5R	MS33649-5RA	401814	401914
0.696	0.5825	0.091	1.012	0.729	0.060	0.513	1.88	0.500	3.38	4	0.375	0.5625-18 UNJF-3B	MS33649-6R	MS33649-6RA	401820	401920
0.758	0.6455	0.102	1.105	0.745	0.060	0.575	1.88	0.500	3.38	4	0.438	0.6250-18 UNJF-3B	MS33649-7R	MS33649-7RA	401826	401926
0.883	0.7715	0.102	1.240	0.854	0.070	0.693	2.12	0.750	3.84	4	0.500	0.7500-16 UNJF-3B	MS33649-8R	MS33649-8RA	401829	401929
0.946	0.8345	0.115	1.300	0.870	0.070	0.758	2.12	0.750	3.84	4	0.562	0.8125-16 UNJF-3B	MS33649-9R	MS33649-9RA	401835	401935
1.008	0.8985	0.115	1.415	0.950	0.080	0.810	2.12	0.750	3.94	4	0.625	0.8750-14 UNJF-3B	MS33649-10R	MS33649-10RA	401751	401851
1.164	1.0255	0.133	1.500	1.084	0.080	0.925	2.12	0.750	4.12	4	0.688	1.0000-12 UNJF-3B	MS33649-11R	MS33649-11RA	401757	401857
1.242	1.0885	0.133	1.665	1.084	0.080	0.985	2.12	0.750	4.12	4	0.750	1.0625-12 UNJ-3B	MS33649-12R	MS33649-12RA	401760	401860
1.370	1.2135	0.133	1.790	1.084	0.090	1.112	2.25	1.000	4.37	4	0.875	1.1875-12 UNJ-3B	MS33649-14R	MS33649-14RA	401766	401866
1.495	1.3385	0.133	1.965	1.084	0.090	1.235	2.25	1.000	4.37	4	1.000	1.3125-12 UNJ-3B	MS33649-16R	MS33649-16RA	401769	401869
1.683	1.5265	0.133	2.090	1.136	0.090	1.425	2.25	1.000	4.53	4	1.125	1.5000-12 UNJF-3B	MS33649-18R	MS33649-18RA	401775	401875
1.808	1.6505	0.133	2.310	1.136	0.090	1.549	2.25	1.000	4.54	4	1.250	1.6250-12 UNJ-3B	MS33649-20R	MS33649-20RA	401781	401881
2.058	1.9005	0.133	2.628	1.147	0.095	1.799	2.25	1.000	4.54	4	1.500	1.8750-12 UNJ-3B	MS33649-24R	MS33649-24RA	401787	401887
2.433	2.2755	0.133	3.050	1.263	0.095	2.174	2.50	1.250	4.92	4	1.750	2.2500-12 UNJ-3B	MS33649-28R	MS33649-28RA	401790	401890
2.683	2.5265	0.133	3.520	1.388	0.095	2.424	2.50	1.250	5.15	4	2.000	2.5000-12 UNJ-3B	MS33649-32R	MS33649-32RA	401799	401899

Thread mills are available. See pages 8-18.

MS33649 (AS5202) - REAMER PILOT PORT TOOL COOLANT THROUGH - CARBIDE TIPPED



- Reams minor thread diameter to size
- Precision ground for maximum concentricity
- ALTiN+ coated tool for higher cutting speed
- This port requires a UNJ thread which specifies a larger minor thread diameter

A	D	E	F	J	Q	R	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #		EDP #	
													UNCOATED	ALTiN+	UNCOATED	ALTiN+
0.446	0.3305	0.071	0.742	0.597	0.032	0.276	1.75	0.500	3.00	3	0.125	0.3125-24 UNJF-3B	MS33649-2R-X3	MS33649-2R-X3A	401963	402013
0.508	0.3925	0.071	0.805	0.603	0.040	0.339	1.75	0.500	3.00	3	0.188	0.3750-24 UNJF-3B	MS33649-3R-X3	MS33649-3R-X3A	401966	402016
0.570	0.4565	0.083	0.888	0.676	0.040	0.393	1.88	0.500	3.12	3	0.250	0.4375-20 UNJF-3B	MS33649-4R-X3	MS33649-4R-X3A	401969	402019
0.633	0.5195	0.083	0.950	0.676	0.045	0.455	1.88	0.500	3.12	3	0.312	0.5000-20 UNJF-3B	MS33649-5R-X3	MS33649-5R-X3A	401972	402022
0.696	0.5825	0.091	1.012	0.729	0.060	0.513	1.88	0.500	3.38	3	0.375	0.5625-18 UNJF-3B	MS33649-6R-X3	MS33649-6R-X3A	401975	402025
0.883	0.7715	0.102	1.240	0.854	0.070	0.693	2.12	0.750	3.84	5	0.500	0.7500-16 UNJF-3B	MS33649-8R-X5	MS33649-8R-X5A	401978	402028
1.008	0.8985	0.115	1.415	0.950	0.080	0.810	2.12	0.750	3.94	5	0.625	0.8750-14 UNJF-3B	MS33649-10R-X5	MS33649-10R-X5A	401951	402001
1.242	1.0885	0.133	1.665	1.084	0.080	0.985	2.12	0.750	4.12	5	0.750	1.0625-12 UNJ-3B	MS33649-12R-X5	MS33649-12R-X5A	401954	402004
1.370	1.2135	0.133	1.790	1.084	0.090	1.112	2.25	1.000	4.37	5	0.875	1.1875-12 UNJ-3B	MS33649-14R-X5	MS33649-14R-X5A	401957	402007
1.495	1.3385	0.133	1.965	1.084	0.090	1.235	2.25	1.000	4.37	5	1.000	1.3125-12 UNJ-3B	MS33649-16R-X5	MS33649-16R-X5A	401960	402010

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