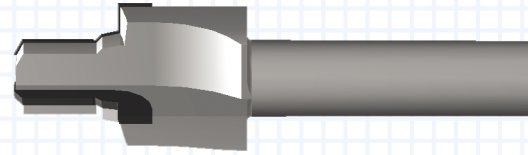
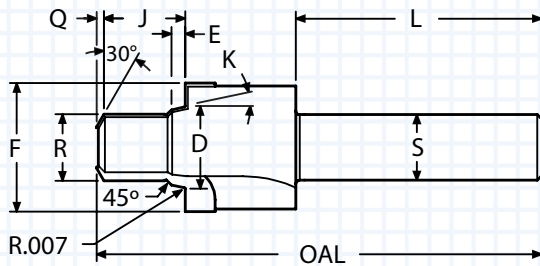


# SAE J1926 (MS16142) O-RING BOSS PORT TOOL REAMER PILOT - CARBIDE TIPPED

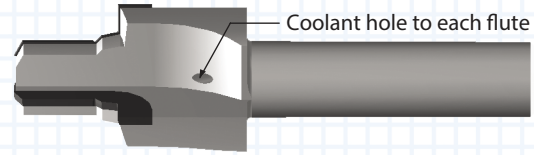
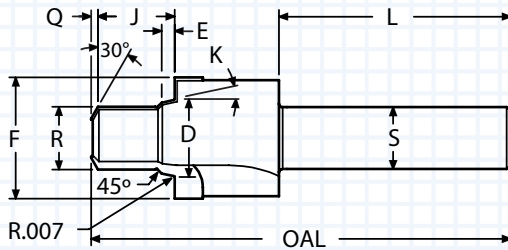


- Reams minor thread diameter to size
- Often called ORB (followed by port size number)
- Meets the requirements of SAEJ1926/1
- Precision ground for maximum concentricity
- ALTiN+ coating extends tool life
- Meets the requirements of MS16142

K	D	E	F	R	J	Q	L	S	OAL	FLUTES	TUBE	THREAD	SAE#	ORDER #		EDP #	
														UNCOATED	ALTiN+	UNCOATED	ALTiN+
12°	0.3605	0.082	0.682	0.271	0.479	0.032	1.75	0.500	3.00	3	0.125	0.3125-24 UNF-2B	SAE#2	SAEJ1926-02R	SAEJ1926-02RA	406001	406003
12°	0.4235	0.082	0.760	0.333	0.479	0.040	1.75	0.500	3.00	3	0.188	0.3750-24 UNF-2B	SAE#3	SAEJ1926-03R	SAEJ1926-03RA	406007	406009
12°	0.4895	0.101	0.838	0.388	0.558	0.045	1.88	0.500	3.12	3	0.250	0.4375-20 UNF-2B	SAE#4	SAEJ1926-04R	SAEJ1926-04RA	406013	406015
12°	0.5525	0.101	0.916	0.450	0.558	0.045	1.88	0.500	3.12	3	0.312	0.5000-20 UNF-2B	SAE#5	SAEJ1926-05R	SAEJ1926-05RA	406019	406021
12°	0.6185	0.105	0.990	0.507	0.620	0.055	1.88	0.500	3.38	3	0.375	0.5625-18 UNF-2B	SAE#6	SAEJ1926-06R	SAEJ1926-06RA	406025	406027
15°	0.8135	0.108	1.198	0.688	0.699	0.070	2.12	0.750	3.70	3	0.500	0.7500-16 UNF-2B	SAE#8	SAEJ1926-08R	SAEJ1926-08RA	406031	406033
15°	0.9445	0.108	1.354	0.804	0.792	0.080	2.12	0.750	3.80	3	0.625	0.8750-14 UNF-2B	SAE#10	SAEJ1926-10R	SAEJ1926-10RA	406037	406039
15°	1.1505	0.138	1.635	0.979	0.917	0.080	2.12	0.750	3.94	3	0.750	1.0625-12 UN-2B	SAE#12	SAEJ1926-12R	SAEJ1926-12RA	406043	406045
15°	1.2755	0.138	1.775	1.104	0.917	0.090	2.25	1.000	4.21	3	0.875	1.1875-12 UN-2B	SAE#14	SAEJ1926-14R	SAEJ1926-14RA	406049	406051
15°	1.4005	0.138	1.935	1.229	0.917	0.090	2.25	1.000	4.25	3	1.000	1.3125-12 UN-2B	SAE#16	SAEJ1926-16R	SAEJ1926-16RA	406055	406057
15°	1.7155	0.140	2.290	1.542	0.917	0.095	2.25	1.000	4.35	3	1.250	1.6250-12 UN-2B	SAE#20	SAEJ1926-20R	SAEJ1926-20RA	406061	406063
15°	1.9645	0.140	2.570	1.792	0.917	0.095	2.25	1.000	4.54	3	1.500	1.8750-12 UN-2B	SAE#24	SAEJ1926-24R	SAEJ1926-24RA	406067	406069
15°	2.5895	0.140	3.490	2.417	0.917	0.095	2.50	1.250	5.15	3	2.000	2.5000-12 UN-2B	SAE#32	SAEJ1926-32R	SAEJ1926-32RA	406073	406075

Thread mills are available. See pages 8-18.

# SAE J1926 (MS16142) O-RING BOSS PORT TOOL REAMER PILOT - CARBIDE TIPPED - COOLANT THROUGH



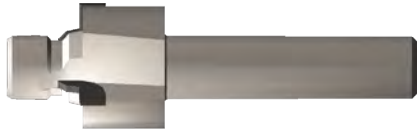
- Reams minor thread diameter to size
- Precision ground for maximum concentricity
- Often called ORB (followed by port size number)
- ALTiN+ coating extends tool life
- Meets the requirements of SAEJ1926/1
- Meets the requirements of MS16142

K	D	E	F	R	J	Q	L	S	OAL	FLUTES	TUBE	THREAD	SAE#	ORDER #			
														UNCOATED	ALTiN+	UNCOATED	ALTiN+
12°	0.3605	0.082	0.682	0.271	0.479	0.032	1.75	0.500	3.00	3	0.125	0.3125-24 UNF-2B	SAE#2	SAEJ1926-02R-X3	SAEJ1926-02R-X3A	406201	406203
12°	0.4235	0.082	0.760	0.333	0.479	0.040	1.75	0.500	3.00	3	0.188	0.3750-24 UNF-2B	SAE#3	SAEJ1926-03R-X3	SAEJ1926-03R-X3A	406205	406207
12°	0.4895	0.101	0.838	0.388	0.558	0.045	1.88	0.500	3.12	3	0.250	0.4375-20 UNF-2B	SAE#4	SAEJ1926-04R-X3	SAEJ1926-04R-X3A	406209	406211
12°	0.5525	0.101	0.916	0.450	0.558	0.045	1.88	0.500	3.12	3	0.312	0.5000-20 UNF-2B	SAE#5	SAEJ1926-05R-X3	SAEJ1926-05R-X3A	406213	406215
12°	0.6185	0.105	0.990	0.507	0.620	0.055	1.88	0.500	3.38	3	0.375	0.5625-18 UNF-2B	SAE#6	SAEJ1926-06R-X3	SAEJ1926-06R-X3A	406217	406219
15°	0.8135	0.108	1.198	0.688	0.699	0.070	2.12	0.750	3.70	3	0.500	0.7500-16 UNF-2B	SAE#8	SAEJ1926-08R-X3	SAEJ1926-08R-X3A	406221	406223
15°	0.9445	0.108	1.354	0.804	0.792	0.080	2.12	0.750	3.80	3	0.625	0.8750-14 UNF-2B	SAE#10	SAEJ1926-10R-X3	SAEJ1926-10R-X3A	406225	406227
15°	1.1505	0.138	1.635	0.979	0.917	0.080	2.12	0.750	3.94	3	0.750	1.0625-12 UN-2B	SAE#12	SAEJ1926-12R-X3	SAEJ1926-12R-X3A	406229	406231
15°	1.2755	0.138	1.775	1.104	0.917	0.090	2.25	1.000	4.21	3	0.875	1.1875-12 UN-2B	SAE#14	SAEJ1926-14R-X3	SAEJ1926-14R-X3A	406233	406235
15°	1.4005	0.138	1.935	1.229	0.917	0.090	2.25	1.000	4.25	3	1.000	1.3125-12 UN-2B	SAE#16	SAEJ1926-16R-X3	SAEJ1926-16R-X3A	406237	406239

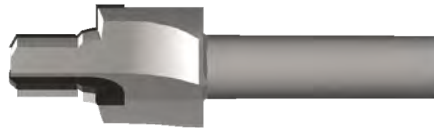
Thread mills are available. See pages 8-18.

# MS16142 to SAE J1926 Port Tool Crossover Charts

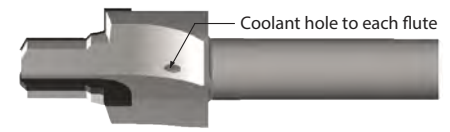
Scientific Cutting Tools is in the process of changing the MS16142 and MS33649 port tools. **MS16142 tools will be phased out and replaced with SAE J1926 port tools. MS33649 tools will be replaced with AS5202 port tools.** Order numbers and EDP numbers have changed (please refer to chart below.) The cutting dimensions remain the same except for the number of flutes on larger sizes. Previously, the larger-sized tools had 4 or 5 flutes. **All SAE J1926 and AS5202 port tools now have 3 flutes.**



**SOLID PILOT**



**REAMER PILOT**



**COOLANT THROUGH**

SAE J1926-S Replaces MS16142-S			
MS16142-S		SAE J1926-S	
Old Part #	Old EDP	New Part #	New EDP
MS16142-2S	401119	SAEJ1926-02S	406301
MS16142-2SA	401219	SAEJ1926-02SA	406303
MS16142-3S	401125	SAEJ1926-03S	406305
MS16142-3SA	401225	SAEJ1926-03SA	406307
MS16142-4S	401128	SAEJ1926-04S	406309
MS16142-4SA	401228	SAEJ1926-04SA	406311
MS16142-5S	401131	SAEJ1926-05S	406313
MS16142-5SA	401231	SAEJ1926-05SA	406315
MS16142-6S	401134	SAEJ1926-06S	406317
MS16142-6SA	401234	SAEJ1926-06SA	406319
MS16142-8S	401137	SAEJ1926-08S	406321
MS16142-8SA	401237	SAEJ1926-08SA	406323
MS16142-10S	401101	SAEJ1926-10S	406325
MS16142-10SA	401201	SAEJ1926-10SA	406327
MS16142-12S	401104	SAEJ1926-12S	406329
MS16142-12SA	401204	SAEJ1926-12SA	406331
MS16142-14S	401107	SAEJ1926-14S	406333
MS16142-14SA	401207	SAEJ1926-14SA	406335
MS16142-16S	401110	SAEJ1926-16S	406337
MS16142-16SA	401210	SAEJ1926-16SA	406339
MS16142-20S	401113	SAEJ1926-20S	406341
MS16142-20SA	401213	SAEJ1926-20SA	406343
MS16142-24S	401116	SAEJ1926-24S	406345
MS16142-24SA	401216	SAEJ1926-24SA	406347
MS16142-32S	401122	SAEJ1926-32S	406349
MS16142-32SA	401222	SAEJ1926-32SA	406351

SAE J1926-R Replaces MS16142-R			
MS16142-R		SAE J1926-R	
Old Part #	Old EDP	New Part #	New EDP
MS16142-2R	401319	SAEJ1926-02R	406001
MS16142-2RA	401369	SAEJ1926-02RA	406003
MS16142-3R	401325	SAEJ1926-03R	406007
MS16142-3RA	401375	SAEJ1926-03RA	406009
MS16142-4R	401328	SAEJ1926-04R	406013
MS16142-4RA	401378	SAEJ1926-04RA	406015
MS16142-5R	401331	SAEJ1926-05R	406019
MS16142-5RA	401381	SAEJ1926-05RA	406021
MS16142-6R	401334	SAEJ1926-06R	406025
MS16142-6RA	401384	SAEJ1926-06RA	406027
MS16142-8R	401337	SAEJ1926-08R	406031
MS16142-8RA	401387	SAEJ1926-08RA	406033
MS16142-10R	401301	SAEJ1926-10R	406037
MS16142-10RA	401351	SAEJ1926-10RA	406039
MS16142-12R	401304	SAEJ1926-12R	406043
MS16142-12RA	401354	SAEJ1926-12RA	406045
MS16142-14R	401307	SAEJ1926-14R	406049
MS16142-14RA	401357	SAEJ1926-14RA	406051
MS16142-16R	401310	SAEJ1926-16R	406055
MS16142-16RA	401360	SAEJ1926-16RA	406057
MS16142-20R	401313	SAEJ1926-20R	406061
MS16142-20RA	401363	SAEJ1926-20RA	406063
MS16142-24R	401316	SAEJ1926-24R	406067
MS16142-24RA	401366	SAEJ1926-24RA	406069
MS16142-32R	401322	SAEJ1926-32R	406073
MS16142-32RA	401372	SAEJ1926-32RA	406075

SAE J1926-X Replaces MS16142-X			
MS16142-X		SAE J1926-X	
Old Part #	Old EDP	New Part #	New EDP
MS16142-2R-X3	401513	SAEJ1926-02R-X3	406201
MS16142-2R-X3A	401563	SAEJ1926-02R-X3A	406203
MS16142-3R-X3	401516	SAEJ1926-03R-X3	406205
MS16142-3R-X3A	401566	SAEJ1926-03R-X3A	406207
MS16142-4R-X3	401519	SAEJ1926-04R-X3	406209
MS16142-4R-X3A	401569	SAEJ1926-04R-X3A	406211
MS16142-5R-X3	401522	SAEJ1926-05R-X3	406213
MS16142-5R-X3A	401572	SAEJ1926-05R-X3A	406215
MS16142-6R-X3	401525	SAEJ1926-06R-X3	406217
MS16142-6R-X3A	401575	SAEJ1926-06R-X3A	406219
MS16142-8R-X5	401528	SAEJ1926-08R-X3	406221
MS16142-8R-X5A	401578	SAEJ1926-08R-X3A	406223
MS16142-10R-X5	401501	SAEJ1926-10R-X3	406225
MS16142-10R-X5A	401551	SAEJ1926-10R-X3A	406227
MS16142-12R-X5	401504	SAEJ1926-12R-X3	406229
MS16142-12R-X5A	401554	SAEJ1926-12R-X3A	406231
MS16142-14R-X5	401507	SAEJ1926-14R-X3	406233
MS16142-14R-X5A	401557	SAEJ1926-14R-X3A	406235
MS16142-16R-X5	401510	SAEJ1926-16R-X3	406237
MS16142-16R-X5A	401560	SAEJ1926-16R-X3A	406239

**The SAE J1926 port tools will replace MS16142 port tools.**

The new 3 fluted design is less likely to chatter, requires less horsepower, and has a larger flute pocket for improved chip evacuation.

# 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**