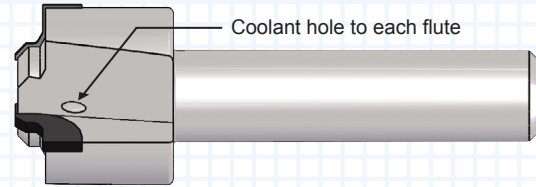
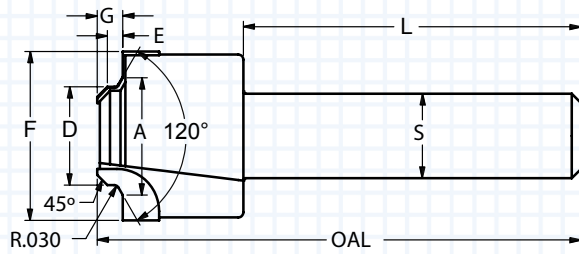


AS5202 PORT TOOL WITHOUT PILOT - CARBIDE TIPPED



- Ideal for non-standard minor diameter lengths
- Polished flute face for optimum performance
- Meets the requirements of AS5202/MS33649 and AND10050 ports
- ALTiN+ coating for improved surface finish
- Polished flute face for optimum performance
- The AS5202/MS33649 require a UNJ, the AND10050 thread requires a UN thread

| A | D | E | G | F | S | L | OAL | FLUTES | TUBE | THREAD | ORDER # | | EDP # | |
|-------|--------|-------|-------|-------|-------|------|------|--------|-------|-------------------|----------------|-------------|----------|--------|
| | | | | | | | | | | | UNCOATED | ALTiN+ | UNCOATED | ALTiN+ |
| 0.367 | 0.2665 | 0.071 | 0.121 | 0.575 | 0.500 | 2.00 | 2.75 | 3 | N/A | 0.2500-28 UNJF-3B | Solid Carbide | | | |
| | | | | | | | | | | | AS5202-01X | AS5202-01XA | 406850 | 406851 |
| 0.446 | 0.3305 | 0.071 | 0.121 | 0.742 | 0.500 | 2.00 | 2.75 | 3 | 0.125 | 0.3125-24 UNJF-3B | Carbide Tipped | | | |
| | | | | | | | | | | | AS5202-02X | AS5202-02XA | 406852 | 406853 |
| 0.508 | 0.3925 | 0.071 | 0.121 | 0.805 | 0.500 | 2.00 | 2.75 | 3 | 0.188 | 0.3750-24 UNJF-3B | AS5202-03X | AS5202-03XA | 406854 | 406855 |
| 0.570 | 0.4565 | 0.083 | 0.133 | 0.888 | 0.500 | 2.00 | 2.75 | 3 | 0.250 | 0.4375-20 UNJF-3B | AS5202-04X | AS5202-04XA | 406856 | 406857 |
| 0.633 | 0.5195 | 0.083 | 0.133 | 0.950 | 0.500 | 2.00 | 2.75 | 3 | 0.312 | 0.5000-20 UNJF-3B | AS5202-05X | AS5202-05XA | 406858 | 406859 |
| 0.696 | 0.5825 | 0.091 | 0.151 | 1.012 | 0.500 | 2.00 | 2.75 | 3 | 0.375 | 0.5625-18 UNJF-3B | AS5202-06X | AS5202-06XA | 406860 | 406861 |
| 0.758 | 0.6455 | 0.102 | 0.162 | 1.105 | 0.500 | 2.00 | 2.88 | 3 | 0.438 | 0.6250-18 UNJF-3B | AS5202-07X | AS5202-07XA | 406862 | 406863 |
| 0.883 | 0.7715 | 0.102 | 0.172 | 1.240 | 0.750 | 2.13 | 3.13 | 3 | 0.500 | 0.7500-16 UNJF-3B | AS5202-08X | AS5202-08XA | 406864 | 406865 |
| 0.946 | 0.8345 | 0.115 | 0.185 | 1.300 | 0.750 | 2.13 | 3.13 | 3 | 0.562 | 0.8125-16 UNJ-3B | AS5202-09X | AS5202-09XA | 406866 | 406867 |
| 1.008 | 0.8985 | 0.115 | 0.195 | 1.415 | 0.750 | 2.13 | 3.25 | 3 | 0.625 | 0.8750-14 UNJF-3B | AS5202-10X | AS5202-10XA | 406868 | 406869 |
| 1.164 | 1.0255 | 0.133 | 0.213 | 1.500 | 0.750 | 2.13 | 3.25 | 3 | 0.688 | 1.0000-12 UNJF-3B | AS5202-11X | AS5202-11XA | 406870 | 406871 |
| 1.242 | 1.0885 | 0.133 | 0.213 | 1.665 | 0.750 | 2.13 | 3.25 | 3 | 0.750 | 1.0625-12 UNJ-3B | AS5202-12X | AS5202-12XA | 406872 | 406873 |
| 1.370 | 1.2135 | 0.133 | 0.213 | 1.790 | 1.000 | 2.25 | 3.50 | 3 | 0.875 | 1.1875-12 UNJ-3B | AS5202-14X | AS5202-14XA | 406874 | 406875 |
| 1.495 | 1.3385 | 0.133 | 0.213 | 1.965 | 1.000 | 2.25 | 3.50 | 3 | 1.000 | 1.3125-12 UNJ-3B | AS5202-16X | AS5202-16XA | 406876 | 406877 |
| 1.683 | 1.5265 | 0.133 | 0.213 | 2.090 | 1.000 | 2.25 | 3.50 | 3 | 1.125 | 1.5000-12 UNJF-3B | AS5202-18X | AS5202-18XA | 406878 | 406879 |
| 1.808 | 1.6505 | 0.133 | 0.223 | 2.310 | 1.000 | 2.25 | 3.63 | 3 | 1.250 | 1.6250-12 UNJ-3B | AS5202-20X | AS5202-20XA | 406880 | 406881 |
| 2.058 | 1.9005 | 0.133 | 0.223 | 2.628 | 1.000 | 2.25 | 3.63 | 3 | 1.500 | 1.8750-12 UNJ-3B | AS5202-24X | AS5202-24XA | 406882 | 406883 |
| 2.433 | 2.2755 | 0.133 | 0.223 | 3.050 | 1.250 | 2.25 | 3.75 | 3 | 1.750 | 2.2500-12 UNJ-3B | AS5202-28X | AS5202-28XA | 406884 | 406885 |
| 2.683 | 2.5265 | 0.133 | 0.223 | 3.520 | 1.250 | 2.25 | 3.75 | 3 | 2.000 | 2.5000-12 UNJ-3B | AS5202-32X | AS5202-32XA | 406886 | 406887 |

MS33649 to AS5202 Port Tool Crossover Charts

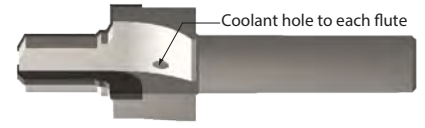
Scientific Cutting Tools is in the process of changing the MS33649 and MS16142 port tools. **MS33649 tools will be phased out and replaced with AS5202 port tools. MS16142 tools will be replaced with SAE J1926 port tools.** Order numbers and EDP numbers have changed (please refer to chart below.) The 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

| AS5202-S Replaces MS33649-S | | | |
|-----------------------------|---------|-------------|---------|
| MS33649-S | | AS5202-S | |
| Old Part # | Old EDP | New Part # | New EDP |
| MS33649-1S | 401616 | AS5202-01S | 406701 |
| MS33649-1SA | 401686 | AS5202-01SA | 406703 |
| MS33649-2S | 401628 | AS5202-02S | 406705 |
| MS33649-2SA | 401698 | AS5202-02SA | 406707 |
| MS33649-3S | 401634 | AS5202-03S | 406709 |
| MS33649-3SA | 401704 | AS5202-03SA | 406711 |
| MS33649-4S | 401637 | AS5202-04S | 406713 |
| MS33649-4SA | 401707 | AS5202-04SA | 406715 |
| MS33649-5S | 401640 | AS5202-05S | 406717 |
| MS33649-5SA | 401710 | AS5202-05SA | 406719 |
| MS33649-6S | 401643 | AS5202-06S | 406721 |
| MS33649-6SA | 401713 | AS5202-06SA | 406723 |
| MS33649-7S | 401646 | AS5202-07S | 406725 |
| MS33649-7SA | 401716 | AS5202-07SA | 406727 |
| MS33649-8S | 401649 | AS5202-08S | 406729 |
| MS33649-8SA | 401719 | AS5202-08SA | 406731 |
| MS33649-9S | 401652 | AS5202-09S | 406733 |
| MS33649-9SA | 401722 | AS5202-09SA | 406735 |
| MS33649-10S | 401601 | AS5202-10S | 406737 |
| MS33649-10SA | 401671 | AS5202-10SA | 406739 |
| MS33649-11S | 401604 | AS5202-11S | 406741 |
| MS33649-11SA | 401674 | AS5202-11SA | 406743 |
| MS33649-12S | 401607 | AS5202-12S | 406745 |
| MS33649-12SA | 401677 | AS5202-12SA | 406747 |
| MS33649-14S | 401610 | AS5202-14S | 406749 |
| MS33649-14SA | 401680 | AS5202-14SA | 406751 |
| MS33649-16S | 401613 | AS5202-16S | 406753 |
| MS33649-16SA | 401683 | AS5202-16SA | 406755 |
| MS33649-20S | 401619 | AS5202-20S | 406757 |
| MS33649-20SA | 401689 | AS5202-20SA | 406759 |
| MS33649-24S | 401622 | AS5202-24S | 406761 |
| MS33649-24SA | 401692 | AS5202-24SA | 406763 |
| MS33649-28S | 401625 | AS5202-28S | 406765 |
| MS33649-28SA | 401695 | AS5202-28SA | 406767 |
| MS33649-32S | 401631 | AS5202-32S | 406769 |
| MS33649-32SA | 401701 | AS5202-32SA | 406771 |

| AS5202-R Replaces MS33649-R | | | |
|-----------------------------|---------|-------------|---------|
| MS33649-R | | AS5202-R | |
| Old Part # | Old EDP | New Part # | New EDP |
| MS33649-1R | 401778 | AS5202-01R | 406501 |
| MS33649-1RA | 401878 | AS5202-01RA | 406503 |
| MS33649-2R | 401793 | AS5202-02R | 406505 |
| MS33649-2RA | 401893 | AS5202-02RA | 406511 |
| MS33649-3R | 401802 | AS5202-03R | 406513 |
| MS33649-3RA | 401902 | AS5202-03RA | 406519 |
| MS33649-4R | 401808 | AS5202-04R | 406521 |
| MS33649-4RA | 401908 | AS5202-04RA | 406527 |
| MS33649-5R | 401814 | AS5202-05R | 406529 |
| MS33649-5RA | 401914 | AS5202-05RA | 406535 |
| MS33649-6R | 401820 | AS5202-06R | 406537 |
| MS33649-6RA | 401920 | AS5202-06RA | 406543 |
| MS33649-7R | 401826 | AS5202-07R | 406545 |
| MS33649-7RA | 401926 | AS5202-07RA | 406547 |
| MS33649-8R | 401829 | AS5202-08R | 406549 |
| MS33649-8RA | 401929 | AS5202-08RA | 406555 |
| MS33649-9R | 401835 | AS5202-09R | 406557 |
| MS33649-9RA | 401935 | AS5202-09RA | 406559 |
| MS33649-10R | 401751 | AS5202-10R | 406561 |
| MS33649-10RA | 401851 | AS5202-10RA | 406567 |
| MS33649-11R | 401757 | AS5202-11R | 406569 |
| MS33649-11RA | 401857 | AS5202-11RA | 406571 |
| MS33649-12R | 401760 | AS5202-12R | 406573 |
| MS33649-12RA | 401860 | AS5202-12RA | 406579 |
| MS33649-14R | 401766 | AS5202-14R | 406581 |
| MS33649-14RA | 401866 | AS5202-14RA | 406587 |
| MS33649-16R | 401769 | AS5202-16R | 406589 |
| MS33649-16RA | 401869 | AS5202-16RA | 406595 |
| MS33649-18R | 401775 | AS5202-18R | 406597 |
| MS33649-18RA | 401875 | AS5202-18RA | 406599 |
| MS33649-20R | 401781 | AS5202-20R | 406601 |
| MS33649-20RA | 401881 | AS5202-20RA | 406603 |
| MS33649-24R | 401787 | AS5202-24R | 406605 |
| MS33649-24RA | 401887 | AS5202-24RA | 406607 |
| MS33649-28R | 401790 | AS5202-28R | 406609 |
| MS33649-28RA | 401890 | AS5202-28RA | 406611 |
| MS33649-32R | 401799 | AS5202-32R | 406613 |
| MS33649-32RA | 401899 | AS5202-32RA | 406615 |

| AS5202-X Replaces MS33649-X | | | |
|-----------------------------|---------|----------------|---------|
| MS33649-X | | AS5202-X | |
| Old Part # | Old EDP | New Part # | New EDP |
| MS33649-2R-X3 | 401963 | AS5202-02R-X3 | 406507 |
| MS33649-2R-X3A | 402013 | AS5202-02R-X3A | 406509 |
| MS33649-3R-X3 | 401966 | AS5202-03R-X3 | 406515 |
| MS33649-3R-X3A | 402016 | AS5202-03R-X3A | 406517 |
| MS33649-4R-X3 | 401969 | AS5202-04R-X3 | 406523 |
| MS33649-4R-X3A | 402019 | AS5202-04R-X3A | 406525 |
| MS33649-5R-X3 | 401972 | AS5202-05R-X3 | 406531 |
| MS33649-5R-X3A | 402022 | AS5202-05R-X3A | 406533 |
| MS33649-6R-X3 | 401975 | AS5202-06R-X3 | 406539 |
| MS33649-6R-X3A | 402025 | AS5202-06R-X3A | 406541 |
| MS33649-8R-X5 | 401978 | AS5202-08R-X3 | 406551 |
| MS33649-8R-X5A | 402028 | AS5202-08R-X3A | 406553 |
| MS33649-10R-X5 | 401951 | AS5202-10R-X3 | 406563 |
| MS33649-10R-X5A | 402001 | AS5202-10R-X3A | 406565 |
| MS33649-12R-X5 | 401954 | AS5202-12R-X3 | 406575 |
| MS33649-12R-X5A | 402004 | AS5202-12R-X3A | 406577 |
| MS33649-14R-X5 | 401957 | AS5202-14R-X3 | 406583 |
| MS33649-14R-X5A | 402007 | AS5202-14R-X3A | 406585 |
| MS33649-16R-X5 | 401960 | AS5202-16R-X3 | 406591 |
| MS33649-16R-X5A | 402010 | AS5202-16R-X3A | 406593 |

The AS5202 port tools will replace MS33649 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+ | 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

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