





| Dia./ Type | Dec. Equiv. | Fractional Tap | Machine Screw Tap | Metric Tap | Screw Ext. |
|---------------|----------------|-------------------|----------------------|---------------|---------------|
| 1/64" | .0156 | | | | |
| 1/32" | .0312 | | | | |
| 1.0 mm | .0394 | | | | |
| 60 | .0400 | | | | |
| 59 | .0410 | | | | |
| 58 | .0420 | | | | |
| 57 | .0430 | | | | |
| 56 | .0465 | | | | |
| 3/64" | .0469 | | 0 - 80 NF | | |
| 55 | .0520 | | | | |
| 54 | .0550 | | | | |
| 1.5 mm | .0591 | | | | |
| 53 | .0595 | | 1 - 64 NC, 1 - 72 NF | | |
| 1/16" | .0625 | | | | |
| 52 | .0635 | | | | |
| 51 | .0670 | | | | |
| 50 | .0700 | | 2 - 56 NC, 2 - 64 NF | | |
| 49 | .0730 | | | | |
| 48 | .0760 | | | | |
| 5/64" | .0781 | | 3 - 48 NC | | EX-1 |
| 47 | .0785 | | | | |
| 2.0 mm | .0787 | | | | |
| 46 | .0810 | | | | |
| 45 | .0820 | | 3 - 56 NF | | |
| 44 | .0860 | | 4 - 36 NS | | |
| 43 | .0890 | | 4 - 40 NC | | |
| 42 | .0935 | | | | |
| 3/32" | .0938 | | 4 - 48 NF | | |
| 41 | .0960 | | | 3 mm60 | |
| 40 | .0980 | | | | |
| 2.5 mm | .0984 | | | 3 mm50 | |
| 39 | .0995 | | | 3 mm50 | |
| 38 | .1015 | 1/8" - 40 NS | 5 - 40 NC | | |
| 37 | .1040 | | 5 - 44 NF | | |
| 36 | .1065 | | 6 - 32 NC | | |
| 7/64" | .1094 | | | | EX-2 |
| 35 | .1100 | | | | |
| 34 | .1110 | | 6 - 36 NS | | |
| 33 | .1130 | | 6 - 40 NF | | |
| 32 | .1160 | | 6 - 48 NS | | |
| 3.0 mm | .1181 | | | | |
| 31 | .1200 | | | | |
| 1/8" | .1250 | | | | |
| 30 | .1285 | | | 4mm70,4mm75 | |
| 29 | .1360 | | 8 - 32 NC, 8 - 36 NF | | |
| 3.5 mm | .1378 | | | | |
| 28 | .1405 | | | | |

| Dia./ | Dec. | Fractional | Machine Screw | Metric | Screw |
|--------|--------|---------------|---------------|-------------|-------|
| Туре | Equiv. | Тар | Тар | Тар | Ext. |
| 9/64" | .1406 | 8 - 40 NS | | | ST-1 |
| 27 | .1440 | | | | |
| 26 | .1470 | 3/16" - 24 NS | | | |
| 25 | .1495 | | 10 - 24 NC | | |
| 24 | .1520 | | | | |
| 23 | .1540 | | | | |
| 5/32" | .1562 | 3/16" - 32 NS | | | EX-3 |
| 22 | .1570 | | | | |
| 4.0 mm | .1575 | | | | |
| 21 | .1590 | | 10 - 32 NF | | |
| 20 | .1600 | | | 5 mm90 | |
| 19 | .1660 | | | 5 mm80 | |
| 18 | .1695 | | | | |
| 11/64" | .1719 | | | | |
| 17 | .1730 | | | | |
| 16 | .1770 | | 12 - 24 NC | | |
| 4.5 mm | .1772 | | | | |
| 15 | .1800 | | | | |
| 14 | .1820 | | 12 - 28 NF | | |
| 13 | .1850 | | 12 - 32 NEF | | |
| 3/16" | .1875 | | | | ST-2 |
| 12 | .1890 | | | | |
| 11 | .1910 | | | | |
| 10 | .1935 | | 14 - 20 NS | | |
| 9 | .1960 | | | | |
| 5.0 mm | .1969 | | | 6 mm - 1.00 | |
| 8 | .1990 | | | 6 mm - 1.00 | |
| 7 | .2010 | 1/4" - 20 NC | | | |
| 13/64" | .2031 | | 14 - 24 NS | | |
| 6 | .2040 | | | | |
| 5 | .2055 | | | | |
| 4 | .2090 | 1/4" - 24 NS | | | |
| 3 | .2130 | 1/4" - 28 NF | | | |
| 5.5 mm | .2165 | | | | |
| 7/32" | .2188 | 1/4" - 32 NEF | | | |
| 2 | .2210 | | | | |
| 1 | .2280 | 1/4" - 40 NS | | | |
| Α | .2340 | | | | |
| 15/64" | .2344 | | | 7 mm - 1.00 | ST-3 |
| 6.0 mm | .2362 | | | 7 mm - 1.00 | |
| В | .2380 | | | | |
| С | .2420 | | | | |
| D | .2460 | | | | |
| E | .2500 | | | | |
| 1/4" | .2500 | | | | EX-4 |
| 6.5 mm | .2559 | | | | |
| F | .2570 | 5/16" - 18 NC | | | |

Tap & Drill Selection Chart

| Type Equiv. Tap Tap Tap Exercises G .2610 .2610 .2610 .2610 .2610 .2610 .2610 .2610 .2610 .2610 .2610 .2720 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> | | | | | | |
|---|---------|-------|---------------------|---------------|-----------------|-------|
| G 2610 17/64" 2656 H .2660 I .2720 5/16" - 24 NF 7.0 mm .2756 J .2770 K .2810 9/32" 2812 5/16" - 32 NEF L .2900 M .2950 7.5 mm .2953 19/64" .2969 N .3020 5/16" .3125 3/8" - 16 NC 8.0 mm .3150 O .3160 P .3230 P .3230 P .325 21/64" .3281 1/8" - 28 BSP O .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 R .3390 10 mm - 1.50 11/32" .3438 9.0 mm .3543 T .3580 9.0 mm .3543 T .3580 23/64" .3594 U .3680 7/16" - 14 NC | | | | | | Screw |
| 17/64" .2656 8 mm - 1.25 H .2660 8 mm - 1.25 I .2720 5/16" - 24 NF 7.0 mm .2756 8 mm - 1.00 J .2770 8 mm - 1.00 K .2810 9/32" 9/32" .2812 5/16" - 32 NEF L .2900 M .2950 7.5 mm .2953 19/64" .2969 N .3020 9 mm - 1.25 5/16" .3125 3/8" - 16 NC 8.0 mm .3150 9 mm - 1.00 P .3230 9 mm - 1.00 P .3230 9 mm - 1.00 21/64" .3281 1/8" - 28 BSP Q .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 10 mm - 1.50 R .3390 10 mm - 1.50 11/32" .3438 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC </td <td></td> <td></td> <td>тар</td> <td>тар</td> <td>lab</td> <td>LAL.</td> | | | тар | тар | lab | LAL. |
| H .2660 I .2720 5/16" - 24 NF 7.0 mm .2756 J .2770 8 mm - 1.00 K .2810 9/32" .2812 5/16" - 32 NEF L .2900 M .2950 7.5 mm .2953 19/64" .2969 N .3020 5/16" .3125 3/8" - 16 NC 8.0 mm .3150 0 .3160 P .3230 P .3200 9 mm - 1.00 P .3230 1/8" - 24 NF 1/8" - 28 BSP 0 .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 R .3390 10 mm - 1.50 11/32" .3438 9.0 mm .3543 T .3580 10 mm - 1.00 10 mm - 1.00 11 .3580 23/64" .3594 U .3680 7/16" - 14 NC | | | | | 0 mm 1 2F | |
| 1 | | | | | 8 111111 - 1.25 | |
| 7.0 mm | | | F /1/ " 24 NF | | | |
| J .2770 8 mm - 1.00 K .2810 | | | 5/10 - 24 INF | | 0 1 00 | |
| K 2810 9/32" 2812 5/16" - 32 NEF L 2900 M .2950 7.5 mm .2953 19/64" .2969 EX N .3020 9 mm - 1.25 5/16" .3125 3/8" - 16 NC ST 8.0 mm .3150 9 mm - 1.00 P .3230 9 mm - 1.00 P .3230 9 mm75 21/64" .3281 1/8" - 28 BSP Q .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 10 mm - 1.50 R .3390 10 mm - 1.50 11/32" .3438 10 mm - 1.25 S .3480 9.0 mm .3543 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | | | | |
| 9/32" 2812 5/16" - 32 NEF L 2900 M 2950 7.5 mm 2953 19/64" 2969 N 3020 9 mm - 1.25 5/16" 3125 3/8" - 16 NC 8.0 mm 3150 9 mm - 1.00 O 3160 9 mm - 1.00 P 3230 9 mm - 7.5 21/64" 3281 1/8" - 28 BSP Q 3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm 3346 R 3390 10 mm - 1.50 11/32" 3438 S 3480 9.0 mm 3543 T 3580 10 mm - 1.00 23/64" 3594 U 3680 7/16" - 14 NC | _ | | | | 8 11111 - 1.00 | |
| L 2900 M 2950 7.5 mm 2953 19/64" 2969 N 3020 5/16" 3125 3/8" - 16 NC 8.0 mm 3150 9 mm - 1.00 0 3160 9 mm - 1.00 P 3230 21/64" 3281 0 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm 3346 R 3390 10 mm - 1.50 11/32" 3438 S 3480 9.0 mm 3543 T 3580 10 mm - 1.00 23/64" 3594 U 3680 7/16" - 14 NC | | | E /14" 22 NEE | | | |
| M .2950 7.5 mm .2953 19/64" .2969 N .3020 5/16" .3125 3/8" - 16 NC 8.0 mm .3150 9 mm - 1.00 9 mm - 1.00 9 mm - 1.00 9 mm - 1.00 9 mm - 7.5 21/64" .3281 1/8" - 28 BSP Q .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 R .3390 10 mm - 1.50 11/32" .3438 S .3480 9.0 mm .3543 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | 5/10 - 32 INEF | | | |
| 7.5 mm .2953 19/64" .2969 N .3020 5/16" .3125 3/8" - 16 NC ST- 8.0 mm .3150 9 mm - 1.00 9 mm - 1.00 P .3230 21/64" .3281 1/8" - 28 BSP Q .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 R .3390 11/32" .3438 S .3480 9.0 mm .3543 T .3580 U .3680 7/16" - 14 NC | | | | | | |
| 19/64" .2969 EX N .3020 9 mm - 1.25 5/16" .3125 3/8" - 16 NC ST 8.0 mm .3150 9 mm - 1.00 0 .3160 9 mm - 1.00 P .3230 9 mm75 21/64" .3281 1/8" - 28 BSP Q .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 10 mm - 1.50 R .3390 10 mm - 1.50 11/32" .3438 10 mm - 1.25 S .3480 9.0 mm .3543 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | | | | |
| N .3020 9 mm - 1.25 5/16" .3125 3/8" - 16 NC 9 mm - 1.00 0 .3160 9 mm - 1.00 P .3230 9 mm75 21/64" .3281 1/8" - 28 BSP Q .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 10 mm - 1.50 R .3390 10 mm - 1.50 11/32" .3438 10 mm - 1.25 S .3480 9.0 mm .3543 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | | | | EV E |
| 5/16" .3125 3/8" - 16 NC ST- 8.0 mm .3150 9 mm - 1.00 0 .3160 9 mm - 1.00 P .3230 9 mm75 21/64" .3281 1/8" - 28 BSP 0 .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 10 mm - 1.50 R .3390 10 mm - 1.50 11/32" .3438 10 mm - 1.25 S .3480 9.0 mm .3543 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | | | 0 1 05 | EX-5 |
| 8.0 mm .3150 9 mm - 1.00 0 .3160 9 mm - 1.00 P .3230 9 mm75 21/64" .3281 1/8" - 28 BSP Q .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 10 mm - 1.50 R .3390 10 mm - 1.50 11/32" .3438 10 mm - 1.25 S .3480 9.0 mm .3543 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | | | 9 mm - 1.25 | 07. |
| 0 .3160 9 mm - 1.00 P .3230 9 mm75 21/64" .3281 1/8" - 28 BSP 0 .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 10 mm - 1.50 R .3390 10 mm - 1.50 11/32" .3438 10 mm - 1.25 S .3480 9.0 mm .3543 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | 3/8" - 16 NC | | | SI-4 |
| P .3230 | | | | | | |
| 21/64" .3281 | | | | | | |
| Q .3320 3/8" - 24 NF 1/8" - 27 NPT 8.5 mm .3346 R .3390 10 mm - 1.50 11/32" .3438 10 mm - 1.25 S .3480 9.0 mm .3543 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | | | 9 mm75 | |
| 8.5 mm | | | | | | |
| R .3390 10 mm - 1.50 11/32" .3438 10 mm - 1.25 S .3480 9.0 mm .3543 10 mm - 1.00 T .3580 10 mm - 1.00 10 mm - 1.00 U .3680 7/16" - 14 NC | | | 3/8" - 24 NF | 1/8" - 27 NPT | | |
| 11/32" 3438 10 mm - 1.25 S .3480 9.0 mm .3543 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | | | | |
| S .3480 9.0 mm .3543 | | | | | | |
| 9.0 mm 3.543 10 mm - 1.00 T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | | | | | 10 mm - 1.25 | |
| T .3580 10 mm - 1.00 23/64" .3594 U .3680 7/16" - 14 NC | _ | | | | | |
| 23/64" .3594 U .3680 7/16" - 14 NC | | | | | | |
| U .3680 7/16" - 14 NC | | | | | 10 mm - 1.00 | |
| 5 13335 1333 | | | | | | |
| 0.5 mm 2740 11 mm 1.50 | | | 7/16" - 14 NC | | | |
| | 9.5 mm | .3740 | | | 11 mm - 1.50 | |
| | 3/8" | | | | 11 mm - 1.50 | ST-5 |
| V .3770 | V | .3770 | | | | |
| W .3860 | W | .3860 | | | | |
| 25/64" .3906 7/16" - 20 NF | 25/64" | .3906 | 7/16" - 20 NF | | | |
| 10.0 mm .3937 | 10.0 mm | | | | | |
| X .3970 | | | | | | |
| Y .4040 | | .4040 | | | | |
| | | | | | | EX-6 |
| Z .4130 12 mm - 1.50 | Z | .4130 | | | 12 mm - 1.50 | |
| 10.5 mm .4134 12 mm - 1.50 | 10.5 mm | .4134 | | | 12 mm - 1.50 | |
| 27/64" .4219 1/2" - 13 NC 12 mm - 1.25 | 27/64" | .4219 | 1/2" - 13 NC | | 12 mm - 1.25 | |
| 11.0 mm .4331 | 11.0 mm | .4331 | | | | |
| 7/16" .4375 1/4" - 18 NPT | 7/16" | .4375 | | 1/4" - 18 NPT | | |
| 11.5 mm .4528 | 11.5 mm | .4528 | | | | |
| 29/64" .4531 1/2"-20NF,1/2"-24NS 1/4" - 19 BSP | 29/64" | .4531 | 1/2"-20NF,1/2"-24NS | 1/4" - 19 BSP | | |
| 15/32" .4688 14 mm - 2.0 ST- | 15/32" | .4688 | | | 14 mm - 2.0 | ST-6 |
| 12.0 mm .4724 14 mm - 2.0 | 12.0 mm | .4724 | | | 14 mm - 2.0 | |
| 31/64" .4844 9/16" - 12 NC | 31/64" | .4844 | 9/16" - 12 NC | | | |
| 12.5 mm .4921 14 mm - 1.5 | 12.5 mm | .4921 | | | 14 mm - 1.5 | |

| Dia./ | Dec. | Fractional | Pipe | Metric | Screw |
|---------|------------|----------------|---------------------|--------------------|-------|
| Туре | Equiv. | Тар | Tap | Tap | Ext. |
| 1/2" | .5000 | | | 14mm-1.25,14mm-1.5 | |
| 13.0 mm | .5118 | | | 14 mm - 1.25 | |
| 33/64" | .5156 | 9/16" - 18 NF | | | |
| 17/32" | .5313 | 5/8" - 11 NC | | | EX-7 |
| 35/64" | .5469 | | | 16 mm - 2.0 | |
| 9/16" | .5625 | | 3/8" - 18 NPT | | ST-7 |
| 37/64" | .5781 | 5/8" - 18 NF | | 16 mm - 1.5 | |
| 19/32" | .5938 | 11/16" - 11 NS | | | |
| 39/64" | .6094 | | | 18 mm - 2.5 | |
| 5/8" | .6250 | 11/16" - 16 NS | | | |
| 41/64" | .6406 | | | | |
| 21/32" | .6562 | 3/4" - 10 NC | | 18 mm - 1.5 | |
| 43/64" | .6719 | | | | |
| 11/16" | .6875 | 3/4" - 16 NF | | 20 mm - 2.5 | |
| 45/64" | .7031 | | 1/2" - 14 NPT | | |
| 23/32" | .7188 | | | | |
| 47/64" | .7344 | | | | |
| 3/4" | .7500 | | | | |
| 49/64" | .7656 | 7/8" - 9 NC | | | |
| 25/32" | .7812 | | | | |
| 51/64" | .7969 | | | | |
| 13/16" | .8125 | 7/8" - 14 NF | | 22 mm - 1.5 | EX-8 |
| 53/64" | .8281 | | | 24 mm - 3.0 | |
| 27/32" | .8438 | | | | |
| 55/64" | .8594 | | | | |
| 7/8" | .8750 | 1" - 8 NC | | 24 mm - 2.0 | |
| 57/64" | .8906 | | | | |
| 29/32" | .9062 | | | | |
| 59/64" | .9219 | 1" - 12 NF | 3/4" - 14 NPT | | |
| 15/16" | .9375 | 1" - 14 NS | | | |
| 61/64" | .9531 | | | | |
| 31/32" | .9688 | | | | |
| 63/64" | .9844 | 1-1/8" - 7 NC | | | |
| 1" | 1.0000 | | | | |
| 1-1/64" | 1.0156 | | | | |
| 1-1/32" | 1.0312 | | | | |
| 1-1/16" | 1.0625 | | | | EX-9 |
| 1-3/32" | 1.0938 | | | | |
| 1-1/8" | 1.1250 | | | | |
| 1-5/32" | 1.1562 | | 1" - 11-1/2 NPT | | |
| 1-3/16" | 1.1875 | | | | |
| 1-1/4" | 1.2500 | | | | |
| 1-5/16" | 1.3125 | | | | |
| 1-3/8" | 1.3750 | | | | |
| 1-7/16" | 1.4375 | | | | |
| 1-1/2" | 1.5000 | | 1-1/4" - 11-1/2 NPT | | |
| NC N | lational (| Coarse (USS) | NEE N | itional Extra Fine | |

NC = National Coarse (USS) NS = National Special

NF = National Fine (SAE)

NEF = National Extra Fine NPT = National Pipe Taper BSP = British Standard Pipe



Cutting Speeds - by Working Material Deep Hole Drilling Parameters

| Speeds for High Speed Steel Drills | SFM* |
|--|---------|
| Aluminum and its Alloys | 200-300 |
| Brass and Bronze (Ordinary) | 150-300 |
| Bronze (High Tensile) | 70-150 |
| Die Castings (Zinc Base) | 300-400 |
| Iron-Cast (Soft) | 100-150 |
| Cast (Medium hard) | 70-100 |
| Hard Chilled | 30-40 |
| Malleable | 80-90 |
| Magnesium and its Alloys | 250-400 |
| Monel Metal or High-Nickel Steel | 30-50 |
| Plastics or Similar Materials (Bakelite) | 100-300 |
| Steel - Mild (.2 carbon to .3 carbon) | 80-110 |
| Steel (.4 carbon to .5 carbon) | 70-80 |
| Tool (1.2 carbon) | 50-60 |
| Forgings | 40-50 |
| Alloy - 300 to 400 Brinell | 20-30 |
| High Tensile (Heat Treated) | |
| 35 to 40 Rockwell C | 30-40 |
| 40 to 45 Rockwell C | 25-35 |
| 45 to 50 Rockwell C | 15-25 |
| 50 to 55 Rockwell C | 7-15 |
| Stainless Steel | |
| Free Machining Grades | 30-80 |
| Work Hardening Grades | 15-50 |
| Wood | 300-400 |

^{*}Surface Feet per Minute (SFM)

 $RPM = \frac{SFM \times 3.82}{Drill Diameter}$

Feed Per Drill Revolution

| Drill Diameter Range | Light | Medium | Heavy |
|-------------------------|-----------|-----------|-----------|
| 1/16 to 1/8 | .00050010 | .00100020 | .00200040 |
| 1/8 to 1/4 | .00100030 | .00300050 | .00400050 |
| 1/4 to 3/8 | .00300050 | .00500070 | .00600100 |
| 3/8 to 1/2 | .00400060 | .00500080 | .00800120 |
| 1/2 to 3/4 | .00500070 | .00700100 | .00900140 |
| 3/4 to 1 | .00700100 | .00900140 | .01400200 |

Speeds and Feeds for Deep Hole Drilling

Holes that fall into the "deep-hole drilling" category are three or more drill bit diameters in depth. When you are drilling this deep, you must adjust your speeds and feeds accordingly. The deeper the hole is, the more probable that chips might lodge in the flutes and clog the drill. When the flute clogs, the amount of friction and heat will increase. Heat build-up in the drill bit could cause failure and breakage. Lubricants always help the dissipation of heat from the tip of the drill bit, which prolongs the drill's life. Removing the drill and evacuating the chips after drilling short distances, often called "step-drilling," will also lessen the chance of heat build-up. Some good rules of thumb when deep-hole drilling are to reduce your rate of speed and feed, remove the bit more often from the material, and use lubricant whenever you can.

Speed and Feed Reduction (Based upon hole depth)

| Hole Depth to Diameter (times drill diameter) | Ration Speed Reduction | Feed Reduction |
|---|---------------------------|-------------------|
| 3 | 10% | 10% |
| 4 | 20% | 10% |
| 5 | 30% | 20% |
| 6 | 35-40% | 20% |