**HOW TO CHOOSE THE RIGHT DRILL FOR THE JOB**

The table below should be used when selecting a drill for a particular job type. This is accomplished by identifying the appropriate range of cutting speeds (as measured by RPM) when the material and size of hole being drilled are known. Different material types are shown in the left column. Various hole sizes are shown on the top row. Using these two pieces of information, the appropriate cutting speed range for the application is displayed in RPMs.

### DRILL SPEED GUIDE

<table>
<thead>
<tr>
<th>Material</th>
<th>Surface Pl./Min.</th>
<th>Size of Hole to Be Drilled (mm)</th>
<th>Recommended Cutting Speed Range (rpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel Alloy 300-400 Brinell</td>
<td>20-30</td>
<td>1.16 1.30 1.40 1.50 1.60 1.80 2.00</td>
<td>1200 1800 660 600 300 250 200 175 150</td>
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<tr>
<td>Stainless Steel</td>
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<td>1.30 1.40 1.50 1.60 1.80 2.00 2.50</td>
<td>1800 2500 900 800 450 350 300 250 225</td>
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<tr>
<td>Tool Forgings</td>
<td>40-50</td>
<td>1.50 1.60 1.80 2.00 2.50 3.00 3.50</td>
<td>2100 3100 1200 1000 600 500 400 350 300</td>
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<tr>
<td>Aluminum / Brass</td>
<td>50-60</td>
<td>1.70 1.80 2.00 2.50 3.00 3.50 4.00</td>
<td>3100 4300 1300 1100 600 500 400 350 300</td>
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<tr>
<td>Medium Hard</td>
<td>60-70</td>
<td>1.90 2.00 2.50 3.00 3.50 4.00 4.50</td>
<td>4300 7000 2500 2000 1000 800 600 500 400</td>
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<tr>
<td>Bronze, High Tensile Strength</td>
<td>70-100</td>
<td>2.10 2.20 2.50 3.00 3.50 4.00 4.50</td>
<td>6100 9000 2800 2300 1200 1000 800 700 600</td>
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<tr>
<td>Malleable Iron</td>
<td>80-100</td>
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<td>8000 12000 3500 3000 1500 1250 1100 1000 900</td>
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<td>90-110</td>
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<td>10000 15000 4500 4000 2000 1750 1500 1250 1000</td>
</tr>
<tr>
<td>Cast Iron, Soft / Plastic</td>
<td>100-150</td>
<td>2.70 3.00 3.50 4.00 4.50 5.00 6.00</td>
<td>12000 18000 5000 4000 2000 1700 1500 1250 1000</td>
</tr>
<tr>
<td>Aluminum / Brass</td>
<td>200-300</td>
<td>3.00 3.30 3.50 4.00 4.50 5.00 6.00</td>
<td>15000 22000 6000 4900 2600 2250 2000 1750 1500</td>
</tr>
<tr>
<td>Magnesium</td>
<td>250-600</td>
<td>3.50 4.00 4.50 5.00 6.00 7.00 8.00</td>
<td>20000 30000 8000 6600 3700 3300 3000 2500 2250</td>
</tr>
<tr>
<td>Fiberglass / Wood</td>
<td>300-600</td>
<td>4.00 4.50 5.00 6.00 7.00 8.00 9.00</td>
<td>25000 40000 10000 8600 4400 4000 3600 3200 2800</td>
</tr>
</tbody>
</table>

Actual drilling or cutting RPM will be approximately 80% of rated spindle speed of tool. Surface Feet Per Minute = .26 x RPM x Drill Diameter in Inches.

---

**PNEUMATIC DRILLS**

SIOUX Tools Available From:

SIOUX Tools are known around the world for quality, durability and performance. Our extensive array of industrial power tools are engineered and built to make jobs easier, safer and more efficient. SIOUX tools are designed to stand up to the demanding specifications required by today's industrial manufacturing, assembly and finishing needs. SIOUX offers a wide array of pneumatic drills.

**A HEADS-UP ABOUT SAFETY**

Any discussion of drills should begin with an understanding of safety. While these tools have amazing capabilities, certain precautions should be followed without exception.

**KEEP THE EYES PROTECTED:** 

You and those around you. Drilling creates chips that fly off the drilled material. These chips can cause eye injury, so it is essential that the operator and those in the surrounding area wear proper eye protection at all times.

**Drill bits themselves can break and cause eye injury—another reason to keep operator and bystander eyes protected.**

**KEEP CLEAR OF THE DRILL:**

The drill should be held firmly when in motion. Stop the drill, turn off the air supply to the drill and unplug the drill before performing any adjustments, maintenance or service— including changing accessories. The body should always be well positioned with proper footing when operating a drill.

**KNOW WHEN TO DISCONNECT DRILLS:**

Drills can start up unexpectedly when connected to an air supply. Before doing any adjustments, maintenance or service—including changing accessories—be sure to do the following:

- Turn off air supply to the drill
- Activate the trigger to release air pressure
- Disconnect the drill from the air supply

**HOW DRILLS ARE USED**

When most people think of drills, they think of drilling holes in wood, metal or plastic. But drills actually perform a much more extensive range of functions.

- **Drilling** – Creating a hole in material using a fluted (twisted groove) bit.
- **Reaming** – Expanding or creating a specific sized hole from an existing drilled hole, or aligning two or more offset holes.
- **Tapping** – Cutting threads in a drilled hole so it can accept threaded fasteners.

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Snap-on Power Tools, Inc.
250 Snap-on Drive
Murrysville, PA 15668

Customer Service: 866-259-7291

Email: stechsup@sioouts.com

See the full line of SIOUX products:

www.sioouts.com

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Fiberglass / Wood

Steel, Tool Annealed, .00 - 1.20 Carbon

Soft / Plastic

Steel, Mild .20 – .30 Carbon

Medium Hard

Bronze, High Tensile Strength

Malleable Iron

Steel, Mild .20 – .30 Carbon

Cast Iron, Soft / Plastic

Aluminum / Brass

Magnesium

Fiberglass / Wood
A pneumatic drill is powered by compressed air. Inside the drill, the compressed air is directed over the vanes of the drill motor, rotating the motor and providing the energy needed to power the drill when at work. A gear reduction system adjusts this output to an appropriate RPM range and torque for the application. Moving down the barrel of the drill, the gearing is then connected to the spindle and drill chuck. The chuck holds one of any number of bits or other accessories for drilling, reaming, tapping and hole sawing. These bits are affixed to the drill chuck ("chucked") by the operator. How do you know which type of drill to use? Motor output power (HP), free-speed RPMs, chuck capacity/drill bit size and handle style are all key factors.

**UNDERSTANDING DRILL COMPONENTS**

**Body** – Drills come in four basic handle configurations: Pistol Grip, Inline, D-Handle and T-Handle. The body's handle serves several purposes. The drill body provides the operator with a place to hold the drill during operation, absorbs vibrations, and provides access to manipulate the throttle. Higher-quality drills have handles that are soft, textured and ergonomically shaped for a firm and easy grip. Many have multiple adjustments to fit the palm and fingers of users. The body is typically made of lightweight and durable material such as aluminum, and may have a rubberized handle.

**BASIC DRILL CONFIGURATIONS**

- **Pistol Grip**
- **Inline**
- **D-Handle**
- **T-Handle**

**GEARING** – Gear assemblies are used to control the RPM range (and torque) in order to suit the application at hand. Pneumatic drill gearing consists of a set of bearings, pinions, washers and other parts designed and engineered for durability and reliable performance under extreme conditions.

**Motor** – The heart of the drill, the motor converts compressed air into rotational power that drives various drilling applications. Pneumatic drill motors are offered with both reversible and non-reversible configurations, and in a wide range of unique RPM and torque settings.

**Throttle Valve** – The stream of incoming compressed air is controlled by the throttle valve, which is located in the drill handle. Using the trigger, the operator can open and close this valve to adjust the RPM to suit the application.

**Trigger** – Much like in a pistol, the trigger of a pneumatic drill controls the action of the tool. As the trigger is pulled, compressed air enters the handle and is fed into the motor via the Throttle Valve. This jet of air turns the motor, which ultimately rotates the attached bit within a predefined RPM range.

**Chuck** – Located on the barrel of the drill, the chuck clamps down and secures the bit or other attachment being used and is mechanically connected to the spindle. There are 2 basic types of chucks: keyed and keyless. Keyed chucks require the use of a chuck key to affix the bit to the drill. Keyless chucks perform this without the need for a chuck key. Chucks are often categorized by their capacity, as measured by the outside diameter of the bit to be inserted.

**PNOPERANT DRILLS COVER A WIDE RANGE OF INDUSTRIAL NEEDS**

**Production Drilling** – Continuous, heavy-duty usage, such as preparing holes on an airframe, drilling pilot holes for furniture assembly, or drilling holes for attachment points on fabricated steel or fiberglass.

**Tapping and Chasing Threads** – Preparing a hole to receive a fastener (e.g., a bolt) by creating threads (tapping) and cleaning threads (chasing).

**Wire Brushing** – Cleaning metals or removing rust using a special drill bit having a wire brush affixed at the tip.

**Deburring** – Removing “burrs” or unwanted pieces of material.

**Screwdriving** – Drills are often used to install and remove screws.

**Hole Sawing** – Creating a hole by cutting out a circular section of material using a special drill bit.

**PNOPERANT DRILL TYPES**

**Pistol Grip Drill**

**Inline Drill**

**D-Handle**

**SERVICEABILITY**

Serviceability is a key factor in managing operating costs for industrial pneumatic tools. Sioux Tools manufactures its drills so that they can be serviced on-site, dramatically reducing total cost of ownership. Review the key components and the detailed drill diagram below to see how Sioux engineers design for serviceability.

- **1.** Tipper valve and valve seat are easily accessible.
- **2.** Drop-in motor can be replaced without the need for alignment (non-reversing motors only).
- **3.** Rotor pinion is case hardened to resist wear.
- **4.** Grease zerk allows convenient lubrication without disassembly.
- **5.** Planetary reduction gearing can be serviced without removing the chuck.
- **6.** Ring gear is integrated with motor retainer. Machined-in design makes assembly and disassembly easy.
- **7.** Planetary gear pins are slip-fit designed for easy assembly and disassembly.
- **8.** Front endplate bearing is slip-fit designed for easy access to the motor without disturbing rotor spacing.

The use of many interchangeable parts reduces stocking requirements for spare parts and cribs.

**GETTING A HANDLE ON DRILL MAINTENANCE** – The parts above need regular inspection, cleaning and lubrication. Contact your Sioux representative for specific details.
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4. D-Handle

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#2 in an Education Series

PNEUMATIC DRILLS

Pneumatic drills are powerful tools. Sudden and unexpected drill movements can happen and can cause injury. The operator needs to maintain control of the drill, which requires a little knowledge of physics and a lot of common sense. The body should always be well positioned with proper eye protection when operating a drill.

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Let's take a look.

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<table>
<thead>
<tr>
<th>Material</th>
<th>Surface Pl., Min.</th>
<th>1/16</th>
<th>1/32</th>
<th>1/16</th>
<th>1/32</th>
<th>1/16</th>
<th>1/32</th>
<th>1/16</th>
<th>1/32</th>
<th>1/16</th>
<th>1/32</th>
<th>1/16</th>
<th>1/32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel, Tool Annealed, .90 - 1.20 Carbon</td>
<td>10-40</td>
<td>3100</td>
<td>3700</td>
<td>3100</td>
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<tr>
<td>Cast Iron Medium Hard</td>
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<tr>
<td>Bronze, High Tensile Strength</td>
<td>70-150</td>
<td>4900</td>
<td>5600</td>
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<tr>
<td>Steel, Mild .20 - .30 Carbon</td>
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<td>9300</td>
</tr>
</tbody>
</table>

Recommended Cutting Speed Range (rpm)

- Steel Alloy 300-400 Brinell: 20-30, 1200-1800 rpm
- Stainless Steel Cast Iron, Hard: 30-40, 1800-2500 rpm
- Steel Forgings: 40-50, 2100-2600 rpm
- Steel Tool Annealed, .90 - 1.20 Carbon: 10-40, 3100-3700 rpm
- Steel .40 - .50 Carbon: 70-80, 4300-5000 rpm
- Cast Iron: 70-100, 4100-4800 rpm
- Medium Hard: 70-150, 4900-5600 rpm
- Malleable Iron: 80-90, 5900-6600 rpm
- Steel, Mild .20 - .30 Carbon: 80-110, 6700-7400 rpm
- Cast Iron, Soft / Plastic: 100-150, 6900-7600 rpm
- Aluminum / Brass: 200-300, 7900-8600 rpm
- Magnesium: 250-400, 8200-9000 rpm
- Fiberglass / Wood: 300-400, 8500-9300 rpm

Actual drilling or cutting RPM will be approximately 80% of rated spindle speed of tool. Surface Feet Per Minute = .26 x RPM x Drill Diameter in Inches.

The information contained herein is for informational purposes only and is not intended to provide instruction or to serve as a training manual. Applications for the tools described here vary. Additional and different steps or procedures may be required to properly complete a given task. Always wear safety glasses when operating power tools.

SIoux Tools Available From:

- Snap-on Power Tools, Inc.
  - 250 Snap-on Drive
  - Murphy, NC 28906
- Customer Service: 866-239-7291
- Email: stetchsup@sioutools.com
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