

INSTALLATION TOOLS



PART I Hand Tools

Hand tools are non-powered. They include anything from hammers to squares. The greatest hazard posed by hand tools results from misuse and improper maintenance. Appropriate personal protective equipment should be worn due to hazards that may be encountered while using hand tools. Common hand tools used in the wood flooring industry include:

- Moisture meters
- Thermo-hygrometers
- Batteries
- Tape measures
- Chalk line
- Pencil/pen
- Squares & straight edges
- Laser level/string-line
- Utility knife
- Prybar
- Wall-jacks
- Straps and clamps
- Chisels
- Nail sets
- Hammer/flooring mallets
- Nail pullers
- Screw drivers
- Trammel points
- Scrapers & files
- Surfacing block plane
- Trowels
- Extension cords
- Tapping blocks
- Pliers and wrenches

PART II Power Tools

There are several types of power tools, based on the power source they use. A power tool is a tool powered by electricity, battery, compressed air, or fuel. Power tools also are classified as either portable or stationary. Appropriate personal protective equipment should be worn due to hazards that may be encountered while using power tools. Wood flooring professionals should be trained in the proper use of all tools and should understand the potential hazards and the safety precautions of each tool. The following are some of the more common power tools used in the wood flooring industry along with some of the options each has to offer.

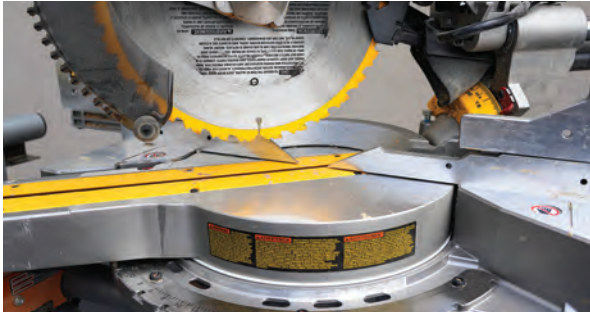
Dust Collection System

- A. WHAT IS IT: A dust collection system is an air quality improvement system used in industrial, commercial, and home production shops to improve breathable air quality and safety by removing particulate matter from the air and the environment. Each tool should have a collection point where you can attach a collector hose.



- B. TOOL OPTIONS: There are many different types of dust containment systems available. These systems range in size and capacity. Be sure to completely understand the maintenance of the dust collection system as well as its capabilities and limitations when connecting to any power tool. Some installations and jobsites may require use of HEPA or similar regulatory dust containment. Collecting dust from the tools results in a cleaner jobsite and safer environment.





Miter Saws

- A. **WHAT IS IT:** A miter saw sits on a fixed base, with a blade mounted to an arm that can be pivoted from 0 degrees to -45 or +45 degrees. As the name suggests, these saws cut through the work piece at a set miter angle. They are used for crosscutting, mitering, or beveling wood, nonferrous metals, and plastics.
- B. **TOOL OPTIONS:** There are three general types of miter saws: standard miter saws, compound miter saws, and sliding compound miter saws. It is important to understand the capabilities of each type, to determine which is most suitable for your needs.
1. **Standard Miter Saw:** This is the simplest version of a miter saw. It is any wood cutting saw with a blade on an arm, mounted to a base, and capable of making between -45 and +45 degree cross-cut angled cuts.
 2. **Compound Miter Saw:** This saw is capable of cutting both a bevel and miter. A compound miter saw adds the ability to make bevel cuts from 0 to +45 degrees in addition to its mitering ability. There are two types of compound miter saws: single bevel or double bevel options. A single bevel will only tilt in one direction, while a double bevel can go either left or right.
 3. **Sliding Compound Miter Saw:** This saw is a type of miter saw that adds rails to let the saw blade slide front to back across the wood. It gives you a much greater cutting capacity than the same size miter saw without rails. There are two types of sliding compound miter saws: single bevel or double bevel options. A single bevel will only tilt in one direction, while a double bevel can go either left or right.



Table Saws

- A. **WHAT IS IT:** The table saw consists of a circular saw blade, mounted on an arbor that is driven by an electric motor (directly, by belt, or by gears). The blade protrudes upward through the surface of a table, which provides support for the material being cut. They are commonly used for crosscutting, ripping, and other straight cuts, as well as for dadoing and molding.
- B. **TOOL OPTIONS:** There are two basic types of saws: portable and stationary. It is important to understand the capabilities of each type, to determine which is most suitable for your needs.
1. **Portable Table Saws:** There are three general types of portable table saws. Because they are designed to be portable, they are normally smaller and lighter weight.
 - a. Bench-top Saws: smaller rip capacity and table, with no stand or transport wheels.
 - b. Compact Saws: may include features such as stands, or surfaces made of cast iron.
 - c. Jobsite Saws: heavier duty components that can produce more accurate results, and often larger rip capacity.
 2. **Stationary Table Saw:** There are three basic types of stationary table saws. Compared to portable saws, they are much larger and heavier, more accurate, and more powerful. They are not really portable, although they can be mounted to a mobile base for transportation around the workshop.
 - a. Contractor Saws: a cheaper alternative to a full-size cabinet saw that may weigh as much as 200-300 lbs. They are much more powerful than a portable saw.
 - b. Cabinet Saws: Cabinet saws are extremely precise, heavy, bulky, and made to last for decades. Each component of a cabinet saw is designed to be durable and robust, and to withstand heavy-duty use.
 - c. Hybrid Saws: Hybrid table saws offer some of the advantages of cabinet saws at a lower price than traditional cabinet saws. Hybrid saws offer an enclosed cabinet to help improve dust collection. The cabinet can either be similar to a cabinet saw with a full enclosure from the table top to the floor or a shorter cabinet on legs.

Band Saws

A. **WHAT IS IT:** The band saw is a saw with a long blade that consists of a continuous band of flexible steel with saw teeth, stretched between two or more idler wheels. Band saws cut fast and accurately due to continuous tooth blade action and a slow-moving blade, which allows for more finesse and control. The blade comes down from an upper wheel, through a bearing/saw guide yoke and into an opening in the table to a lower wheel. The table is where the workpiece is moved into the moving saw blade to create cuts. While the blade is continuously moving, only a small part of it should be exposed by adjusting the elevation of the guide post, which holds a blade guard above the cutting area.



- B. **TOOL OPTIONS:** In general there are three types of band saws used with flooring installations: floor standing, benchtop, and portable. It is important to understand the capabilities of each type, to determine which is most suitable for your needs.
1. **Floor Standing:** powerful saws with a larger workspace, table size, and positioning capabilities, for use when making more-intricate cuts or ripping larger boards.
 2. **Benchtop:** Benchtop band saws are more-mobile versions of floor standing models.
 3. **Portable:** Portable band saws are about the size of a handheld circular saw and are mostly used for jobsite work, often trimming excessive pieces off.



Circular Saws

A. **WHAT IS IT:** A circular saw consists of a motor, blade, blade guard, and a base. It is a power tool that cuts materials using a round-toothed or abrasive blade. They are available in corded or cordless options. Most circular saws used in the wood flooring industry are hand-held types, and are specifically used to cut wood. These saws may also be equipped with blades designed

to cut masonry, plastics, or metal. The most common-size blade used for cutting wood and framing is 7 1/4" designed for crosscuts or rips in various wood and synthetic rigid materials.

- B. **TOOL OPTIONS:** Circular saws are available in many styles:
1. **Sidewinder/In-Line Circular Saws:** This is the most-common type of circular saw used. The motor is normally mounted on the side of the blade, making it a compact tool. The blade rotation speed is either 1,725 or 3,450 RPM, based on the motor direct-drive rotation speed.
 2. **Worm Drive and Hypoid Circular Saws:** The motor is mounted toward the back of the tool, making it significantly longer and heavier than a sidewinder. The gears of these saws are what differentiate them from each other, but provide more torque than a sidewinder. The blade rotation speed is normally about 4,500 RPM. The blade is normally positioned to the left side of the motor.

Plunge-Cut Saw/Track Saw

- A. **WHAT IS IT:** A plunge-cut saw has a blade that spins and cuts similarly to a circular saw, but with a fixed guard, which provides superior dust collection and safety features. The saw moves in a metal track along a straight line. When you want to cut, simply attach the metal track on to the workpiece, place the saw on the track, then plunge the saw into the work-piece and move it forward along the guide (or the track).
- B. **TOOL OPTIONS:** Many plunge-saws have variable speeds, which allow for cutting through a variety of materials. The track comes in many length options. These saws are designed for plunging into a material, and most have a depth setting for precision cuts.



Oscillating Saw (Multi-Tool)

- A. **WHAT IS IT:** An oscillating saw is a compact, corded or cordless, portable power tool that accepts a wide range of interchangeable blades. Because of the tool's short range of blade motion, small front-end profile, and blades that extend past the snout of the tool, it reaches in to places other power tools can't, including narrow spaces, tight corners, and awkward angles.



- B. **TOOL OPTIONS:** Most oscillating saws offer variable speeds. The blade vibrates– or oscillates– back and forth at very high speed (from 11,000-21,000 oscillations per minute). This tool is often called a multi-tool due to the wide variety of tasks it can perform, including cutting, scraping, rasping, sanding, polishing, and grinding.

Reciprocating Saw

- A. **WHAT IS IT:** A type of saw in which the cutting action is achieved through a “push and pull” reciprocating motion of the blade. It is generally used in demolition work.



- B. **TOOL OPTIONS:** These saws may be used to cut metal, pipes, wood, nail-embedded wood, and other materials dependent upon the blade being used. Many reciprocating saws also have an orbital action setting, which moves the blade in a slightly circular motion as it moves in and out of the tool. This allows faster cuts in softer materials and facilitates faster chip removal from the blade path.

Jigsaw (Saber Saw)

- A. **WHAT IS IT:** A jigsaw is a saw that uses a reciprocating blade to cut straight lines or irregular curves in wood. It will also make interior cuts, or cuts within a board without cutting through the work from an outside edge.



- B. **TOOL OPTIONS:** Most jigsaws come with variable speed options, which allow for adjustment based on the material being cut. Most blades cut on the upstroke, which is good when used for rough cutting. Reverse-tooth blades have downward facing teeth, which produce clean cuts on the face of the board. These saws also have an adjustable base that allows for beveled cuts to be made through the wood.

Scroll Saw

- A. **WHAT IS IT:** A scroll saw is a small electric or pedal-operated reciprocating saw used to cut fine, intricate



profiles and patterns. The fineness of its blade allows it to cut more delicately than a jigsaw. Scroll saws come with a variable speed control to modulate the rate of cut through materials and for adjusting to various blade-cutting capabilities.

- B. **TOOL OPTIONS:** The throat size determines the size of the workpiece capable of being cut. Throat size can vary from 12” to 30” or more. Most scrolls saws offer a small light on a flexible arm that illuminates the work area and a dust blower nozzle to keep the work space clear while working.



Router

- A. **WHAT IS IT:** A machine with a revolving vertical spindle and cutter for milling out the surface of wood. Routers are used as a “hand-shaper” to create profiles, decorative cuts, shaping, making joints, and trimming wood.

- B. **TOOL OPTIONS:** Most routers have a variable speed option to adjust based on the material being cut. Routers normally have either a ¼” or ½” collet, which will determine the bit used with the tool. Routers can be divided into two general groups: fixed-base and plunge-base routers.
1. **Fixed-Base Routers** are locked at a fixed location in the base, and the cutting bit cannot move, or plunge, from top to bottom. These routers are commonly used as router tables, where they are mounted underneath a stationary table.
 2. **Plunge-Base Routers** move up and down on the base, which has spring-loaded arms on either side that allow the user to manually “plunge” the cutting bit down into the material from above.

Drill/Driver

A. WHAT IS IT:

A hand-held tool that has a chuck (keyed or keyless) used to hold bits in place for drilling, driving, or hammering.



B. TOOL OPTIONS:

There are many types of drills and drivers, but for the purposes of the wood flooring industry, we will focus on these general categories: drills, impact drivers, hammer drills/rotary hammers, and drill presses.

1. **Drills** are used to create a hole with a rotating drill bit into a material. Drills are rated by the maximum capacity of their chuck.

2. **Impact Drivers** have a rotary impulse mechanism that allows the tool to drive fasteners into a material.



3. **Hammer Drills/ Rotary Hammers** use an impacting/hammering action in combination with, or without, rotation. These drills use specially designed bits to drill holes into masonry materials or for demolition.



4. **Drill Press** is a mounted style of drill that includes a base, column (or pillar), adjustable table, spindle, chuck, and drill head.



Grinder (Handheld and Bench)

A. WHAT IS IT: Grinders are highly versatile tools capable of accepting a variety of attachments and accessories that allow the tool to be used for cutting, grinding, sanding, polishing, sharpening, or wire brushing.

B. TOOL OPTIONS:

1. **Handheld Grinder** attachments include cut-off discs, abrasive grinding discs, sanding discs, wire brush wheels, grinding stones, and polishing pads. Attachments are normally available in 4", 4.5", 5", 6", 7", 9", and 12" sizes.



2. **Bench Grinders** are mounted to a bench or pedestal, and used specifically to drive abrasive wheels. They normally are used for sharpening cutting tools, cleaning or polishing workpieces, or for rough shaping metal pieces.



Guillotine-Style Shear Cutter

A. WHAT IS IT: A non-powered, compact guillotine-style cutting tool designed to cut through thin-profile engineered

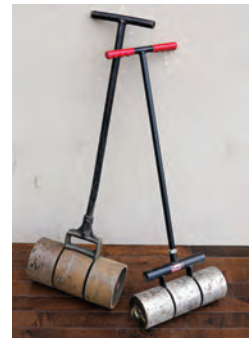


wood flooring as well as other types of flooring materials. These cutters have a long handle that provides the leverage necessary to cut through different types of flooring.

B. TOOL OPTIONS: These cutters are available in different sizes to accommodate different types of flooring. Due to the nature of how these cutters work, there is no power necessary to operate the tool, and no dust produced during operation.

Floor Roller

A. WHAT IS IT: A non-marking, segmented roller, required with some adhesives, that exerts even pressure on a glued-down wood floor, cork, or underlayment, ensuring that the adhesive is transferred to the back of the installed floor.



B. TOOL OPTIONS: Floor rollers are available in different sizes and different weights. The weight is determined by the adhesive manufacturer.

PART III Pneumatic Tools

Pneumatic tools are powered by compressed air.

Air Compressors

A. WHAT IS IT: Air compressors are tools that convert power into stored energy in the form of compressed air.

B. TOOL OPTIONS:

1. **Tank Capacity (gallons):** For small jobs like installing trim or flooring repairs, the pneumatic guns can operate on the air supplied by a relatively small tank. For most wood floor installations, more air is required to be delivered to the constant demand of a flooring nailer. When more than one gun is being used on one compressor, a larger tank will also be required. The larger the tank, the longer the job can be done at the required PSI before the compressor needs to rebuild pressure in the tank.
2. **Oil or Oil-free:** Oil-free designs are most common and require less maintenance.
3. **SCFM:** Standard Cubic Feet per Minute (SCFM) is a measure of air (under standardized conditions) being delivered by the compressor to the air tool. Compressors with a higher SCFM rating provide more air. SCFM requirements should be dictated by the tools being used.
4. **PSI:** Pounds per square inch is the measure of air-force delivered by the compressor. For one flooring nailer to operate, the compressor should be able to continuously deliver 80-110 PSI at 3½" cubic feet of air per minute.



Hoses

A. WHAT IS IT: Compressor air hoses are used for conducting compressed air to the tool.

B. TOOL OPTIONS:

1. **Hose size** is measured by its inner diameter. Most pneumatic nailer manufacturers recommend the use of a minimum 3/8" diameter hose supply connectors and a 50' or smaller hose.



2. **Fittings:** Hose connections should be designed for the pressure and service indicated on the tool. All connectors and couplers should be compatible with and designed for the hose and tool being used.

Flooring Nailers

A. WHAT IS IT: A type of tool used to drive flooring nails or staples into wood flooring.

B. TOOL OPTIONS:



1. **Mallet-Actuated Nailers/Staplers:** Flooring nailers are mallet-actuated nailers capable of driving staples or flooring cleats/nails into the tongue of a piece of wood flooring. Each model has different capabilities and magazine cartridges for use with specifically designated fasteners.



2. **Trigger-Activated Nailers/Staplers** are engaged by a trigger and capable of driving the flooring fastener into the tongue of a piece of wood flooring. Each model has different capabilities and magazine cartridges for use with specifically designated fasteners.

3. **Manual Nailers** are not powered using compressed air, but rather plunger-driven by blunt force. These may be available as multi-hit or ratcheting mechanism to allow the user to strike multiple times.



Pneumatic Nailers

A. **WHAT IS IT:** A type of tool used to drive nails into wood or some other kind of material.

B. **TOOL OPTIONS:**

1. **Finish Nailers:**

Available as pneumatic or electric.

These nailers drive 14g to 16g nails, upwards of 2½" in length.

They normally are used where flooring nailers cannot be used.



2. **Brad Nailers:** Available as pneumatic or electric. These nailers drive 18g brads, upwards of 2" in length, leaving smaller holes in the surface of the board.

They normally are used where flooring nailers cannot be used, or for temporary hold power while adhesive sets up.



3. **Pin Nailers:** This is the smallest nailer in the trim-nailer family. These nailers normally drive 23g, headless nails, upwards of 2" in length.

These fasteners leave a very small hole in the surface of the board, oftentimes not needing to be filled. They normally are used for temporary hold power while adhesives set up, or for delicate trim work.



PART IV Blades and Bits

Circular Saw Blades

A. Blades used for miter saws, table saws, circular saws, and radial arm saws.

B. Saw teeth may be made of steel or carbide.



C. The cutting edge of each tooth is ground to a specific profile, which controls how it cuts. Flat teeth shave the wood fibers like a plane, beveled teeth cut them in two like a knife, and triple-chip teeth are mixed with flat teeth to cut tough materials. The mix of teeth on a blade is known as the grind.

D. **Ripping blades** are used for cutting parallel to wood grain, ripping to width. These blades have a large hook angle (20-25 degrees). These blades have fewer teeth and wide gullets, and are most commonly used with table saws.

E. **Crosscut blades** are used for cutting across the wood grain, cutting to length. These blades have a small hook angle (5-10 degrees). These blades have more teeth and narrow gullets, and are more commonly used with miter saws.

F. **Combination blades** are used for ripping and crosscutting wood. These blades have teeth arranged in sets of five - first a ripping tooth preceded by a wide gullet, then four crosscut teeth with narrow gullets. The hook varies between 5-25 degrees, depending on the tooth. These are commonly used with circular saws, and miter saws.

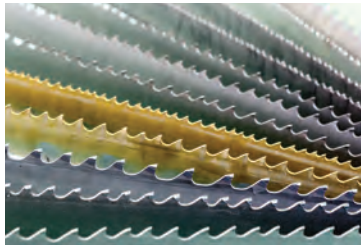
G. **Plywood blades** are used for cutting plywood. They are designed to make smooth cuts. These blades have small hook angles (5-10 degrees) with narrow gullets. For cutting hardwood veneer plywood, the blades normally have 80 or more small teeth, whereas when cutting OSB or other substrate plywoods, a more-aggressive blade configuration can be used, such as 24 tooth blades.

H. **Hollow ground planer blades** normally are used for sawing operations requiring a smoother cut. They have the same hook angle and tooth arrangement as combination blades, but the teeth have no set, and are only available in steel (not carbide).

I. **Thin-kerf blades** are used for ripping or crosscutting hardwood. They are available in rip, crosscut, and combination configurations, and are carbide-tipped only. The plate and teeth are approximately 2/3 the width of ordinary blades.

Bandsaw Blades

- A. **Standard-tooth blades** are best used for crosscutting, joinery cuts, and smooth surfaces. These also have more teeth per inch and can cut slower and smoother than other blades.
- B. **Skip-tooth blades** are best used for cutting curves and contours, or thick stock. The teeth have the same profile as standard blades, but are spaced much further apart. These blades also cut much faster.
- C. **Hook-tooth blades** are best used for ripping, resawing, cutting green or resinous wood, or thicker stock. The pitch is the same as the skip-tooth blade, but the rake angle is about 10 degrees, which allows for a more-aggressive cut.



Jigsaw Blades

- A. Blades vary in their effective cutting length, number of teeth per inch (tpi), and manner in which the teeth are set.
- B. **General Purpose:** 6-8 tpi, used for rough cuts in wood.
- C. **Smooth Cut:** 6-8 tpi, used for clean cuts in wood.
- D. **Plywood:** 12-14 tpi, used for cutting sheet materials.
- E. **Detail:** 12-14 tpi, used for cutting more-intricate patterns.
- F. **Laminate:** 10-14 tpi, reverse teeth used to cut laminated material on the down stroke.
- G. **Offset:** 6-8 tpi, offset blade used for cutting up to a corner.



Scroll Saw Blades

- A. **Scroll blades** for heavy-duty work in wood and soft metals (standard tooth).
- B. **Fret blades** for fine work in wood and soft metals (includes skip tooth, double-skip tooth, and reverse skip tooth).
- C. **Precision-ground blades** for cleaner cuts and better control (includes skip tooth).



- D. **Metal-cutting blades** for work in metals (standard tooth).
- E. **Spiral blades** for omnidirectional cuts in wood and soft metals (standard tooth).



Router Bits

- A. A router bit consists of a cylindrical shank and one or more flutes that cut the work. Bit flutes may be made of steel or carbide.
- B. Most bits have straight flutes. Bits with shear flutes leave a smoother cut, whereas bits with spiral flutes help clear material from plunge cuts. Stagger-tooth and chip-breaker flutes are made to cut plywood and particleboard.
- C. Some bits have pilot bearings, either on the top or bottom of the cutter head, to guide the bit along the edge of the work or template. Unpiloted bits may have top-cutting flutes or point-cut flutes that allow you to plunge into the wood.
- D. Although there are hundreds of types of router bits, they can all be organized into two categories:

1. **Groove-forming bits**, which cut grooves, dados, mortises, and recesses in the work.
2. **Edge-forming bits**, which cut rabbets, bevels, ogees, and other shapes around the perimeter of the work.

