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FLOOR SANDING PROFESSIONAL MARKET

FORM #8311

REFINISHING TRAINING MANUAL

A GUIDE FOR PROMOTING EXCELLENCE

IN THE WOOD FLOORING INDUSTRY

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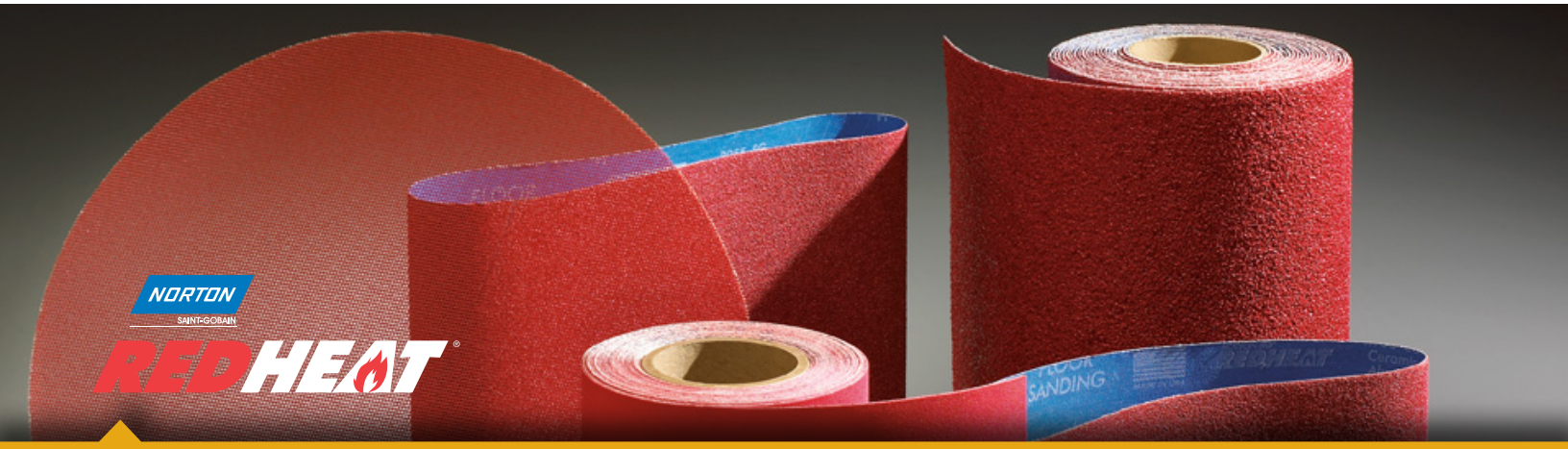

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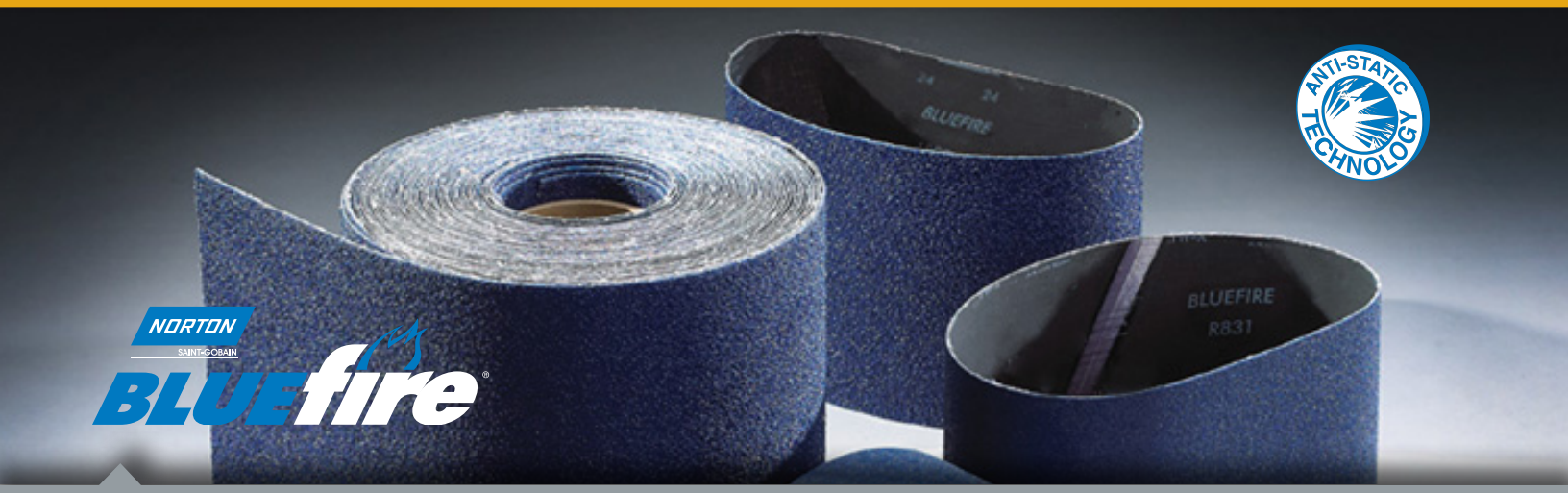

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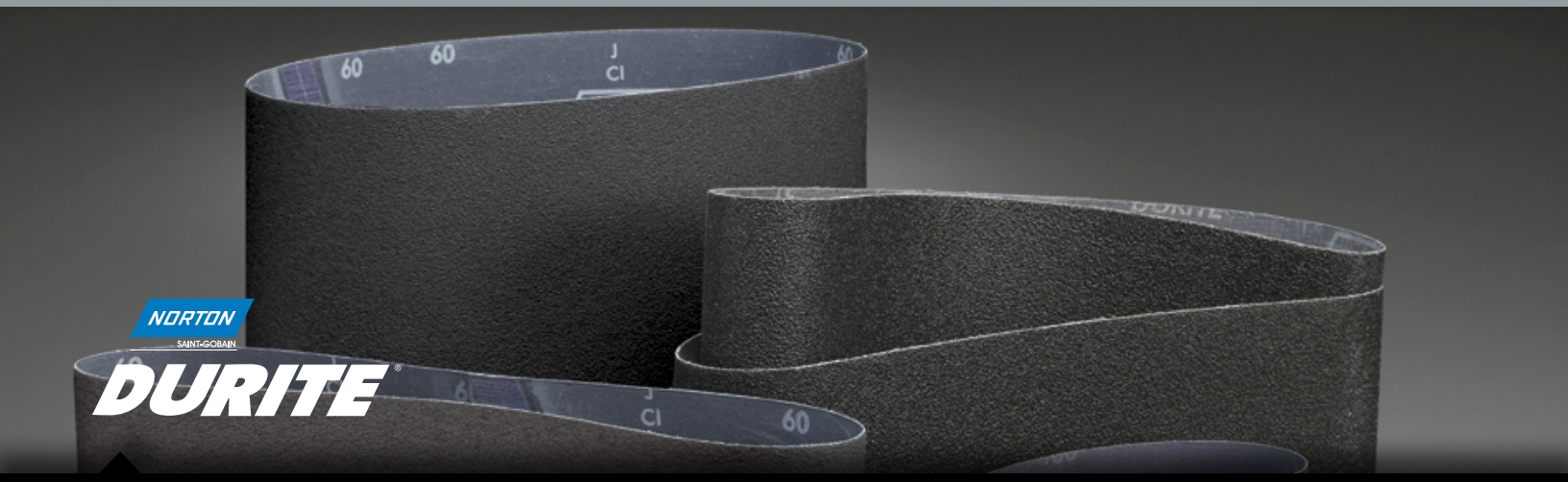

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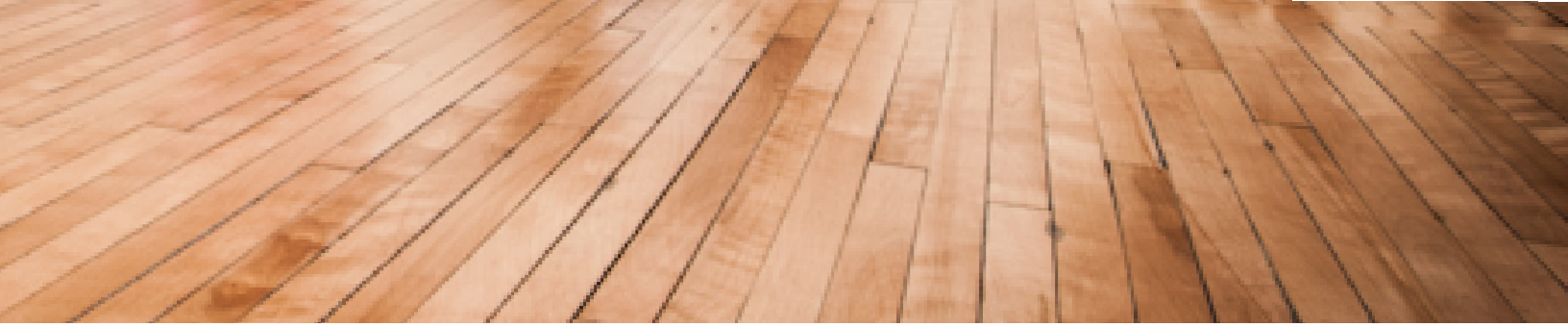

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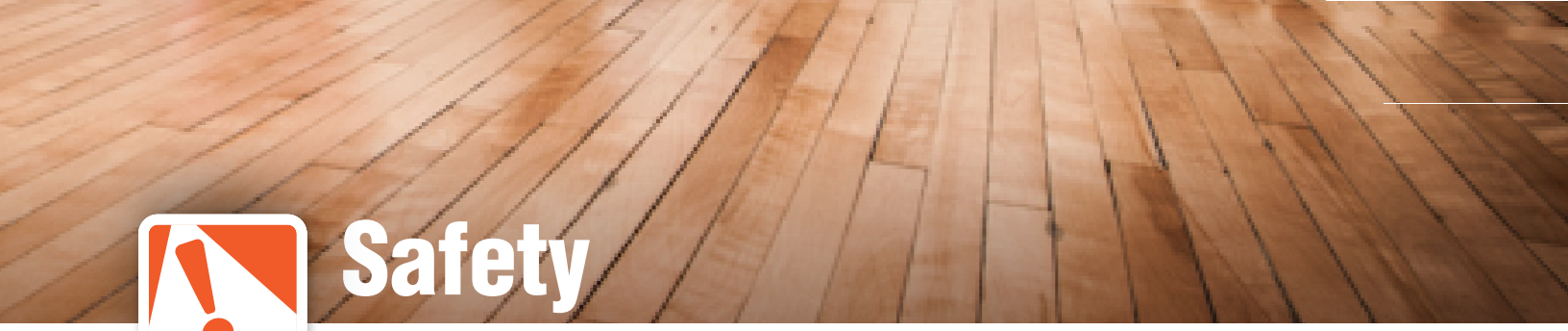
PROFESSIONAL FLOOR SANDING | TRAINING MANUAL

Jobsite Preparation

SECTION ONE

Pre-Sanding Guidelines

- Sweep and vacuum the floor.
- Set any exposed nails and spot fill nail holes. Check for staples and nails that could have remained from carpet removal.
- Check for any damaged or discolored boards that could stand out when the floor is finished. On old floor refinishing, inspect for boards that may be stained from pets or water damage. It is easier to fix them now than after the floor is done.
- Inspect for joints in the floor. Any joints wider than 1/16" should be filled with slivers of wood.
- Locate breaker panel. See if there are electric stove or dryer hookups, or if you will need to hook up to the panel.
- Cover vents and returns with air filter material to protect HVAC system.
- Use plastic on doorways to protect other areas from dust. Cover cabinets, bookcases and any electronics that are in the area being sanded.
- Use runners and protective material to protect carpets, tile, and other areas that you will be walking through.



Safety

SECTION TWO

Electrical Safety

Multimeters
Have a multimeter on hand to test for proper voltage and bad connections in your cords.

Adapters
Have multiple adapters already made up to connect to different types of stove and dryer outlets.

Electrical Panel Hookup
Know how to properly tie into breakers in the electrical panel. If unsure how to do this, then hire an electrician or have an electrician teach you how.

Power Booster
Know when you need to use a power booster.

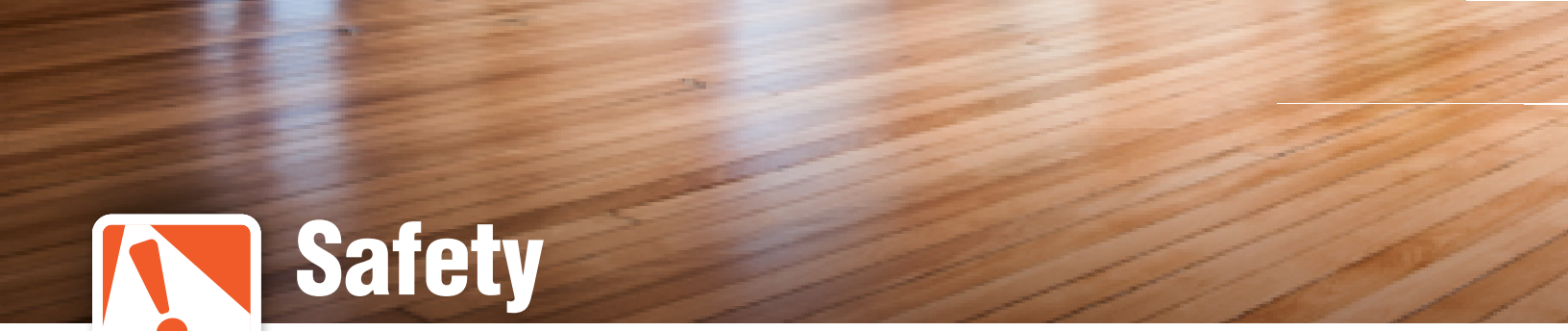
Cord Safety
Keep your cords in good condition. Check and tighten connections regularly. They can become loose over time. Check for nicks and frayed wires. NEVER drape cord around your neck.

Gauge
Use correct gauge cord for application.

Power
Disconnect all power when leaving jobsite.

Personal Protective Equipment (PPE)

- Safety Glasses
- Hearing Protection
- Respirators
- Knee Pads
- Appropriate Shoes



Safety

SECTION TWO - CONTINUED

Fire Safety

Keep a fire extinguisher in your vehicle as well as multiple extinguishers on the jobsite. Know how to use them.

CAUSES OF FIRE:

Wood Dust

- Dust is the most common source of fire on jobsites.
- Never leave dust in the machine bag unattended or overnight. Empty frequently, don't overfill.
- Never leave dust in trash bags in or around the jobsite. Dispose of properly every day.
- Never leave dust in backpack vacuum. The fine dust, combined with the fact that it sits directly on a hot motor, makes it highly flammable.
- Dust from old finishes like lacquer and varnish are very flammable. Take extra care when sanding these types of finishes.
- Don't overuse your abrasives. A worn belt or disc generates a lot of heat from friction. If it's hot enough to leave a burn mark on the floor, then it's hot enough to cause a bag fire.
- Sparks are a major cause of bag fires.
- Look out for raised nails or staples.
- Check belt tracking frequently. An improper tracking belt will make sparks.

Finish Vapors

- Any solvent-based finishes can ignite under the right circumstances.
- Make sure there is adequate ventilation when applying finishes.
- Turn off pilot lights and other sources of ignition when applying finish.
- DO NOT SMOKE.

Rags

- Oil-based stains and finishes cure through oxidation. This generates heat which can lead to spontaneous combustion of rags.
- Never leave wet rags on the jobsite.
- Never throw wet rags in with the sanding dust.
- You can keep a bucket of water to contain the rags until you can dispose of them properly.
- You can also lay the rags outside to dry. Once dry, they are safe to dispose of.

New EPA Guidelines for Lead Paint

- The EPA enacted new regulations for working in homes built prior to 1978 that could contain lead paint. Floor contractors need to be certified to work in these homes.
- Follow the links below to the EPA website to get details on the new regulations and certification in your area.

http://www.epa.gov/lead/pubs/renovation.htm

http://www.epa.gov/fedrgstr/EPA-TOX/2008/April/Day-22/t8141.htm

http://cfpub.epa.gov/flpp/searchrrp_training.htm

Machine Overview

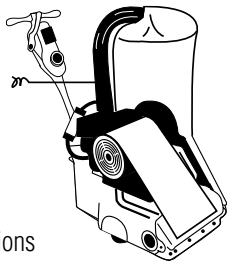
SECTION THREE

Belt Sander / Drum Sander

Safety

- PPE. Be sure to wear safety glasses, dust mask, and hearing protection.
- Empty dust bags frequently. Never leave dust bags on machine overnight.
- Unplug machine when changing belts/ paper or making adjustments.
- Pay attention to where your cords are so you don't run over them with machine.
- Do not drape cords over your shoulder or neck.

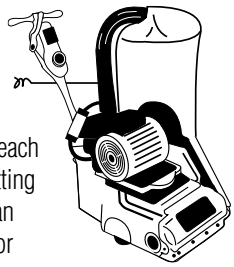
Electrical



- Panel hookup
- Alligator clips
- Power boosters
- Cords and connections

Machine Setup and Inspection

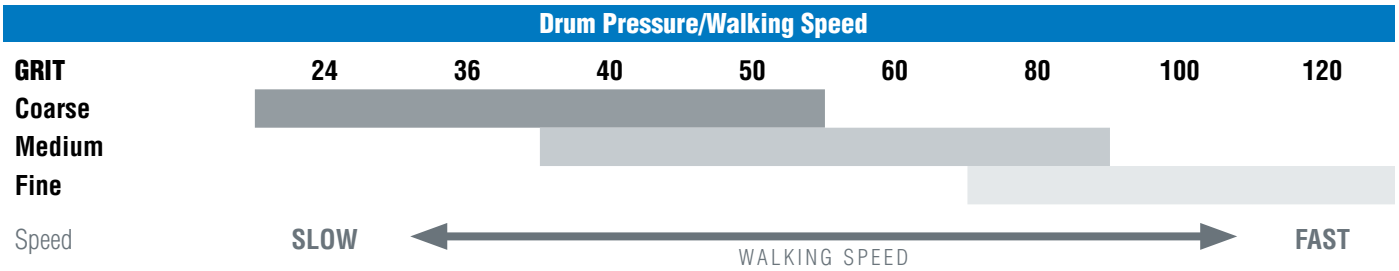
- Frequently inspect the condition and setup of the sander.
- Check the condition of belts, bearings, drums, upper rollers and wheels.
- Worn bearings can cause vibration which can cause chatter marks.
- Worn belts, or improperly tightened belts, can vibrate and cause chatter marks.
- Loosen the tension on the belts or remove when not in use. If left on the machine, the belts can set in that shape and cause vibrations until they are run for awhile and warm up and become more flexible. This is more noticeable when cold.
- Inspect wheels before sanding and between each grit. Debris or filler stuck on the wheels, even small pieces of grit, will cause the wheels to be out of round and leave waves in the floors.
- Use a scraper to lightly remove the debris. Don't be too aggressive or use sandpaper as this will make the wheel out of round, causing waves.
- Never leave the machine sitting on the wheels for long periods of time or for storage. The wheels can develop flat spots which will lead to waves.
- Use a dolly to store and transport the machine. Never drag the machine over sidewalks and walkways.
- Belt sanders should cut even. Check the machine to see if it is cutting even and make adjustment if necessary.
- Drum sanders are set up to cut slightly uneven so that one side of the drum feathers the cut. Drum sanders are typically set up this way to cut right to left so that the drum feathers on the right side as you move across the room.
- Inspect the drum for signs of wear, nicks or lines as these will transfer through the belt or paper to the floor.
- Belt sanders always sand left to right. This is because of the wheel configuration.
- The right side of wheel track is behind the drum. The left wheel is offset from the drum. As you sand left to right, the left wheel always tracks on a freshly sanded surface leaving a much flatter floor.
- Check the belt tracking whenever you change the belt.
- Manufacturer specs vary, but in general, the belt should overhang the drum about 1/8" on each side. If the belt is cutting too far in or out, it can leave lines in the floor or cause machine damage.



Machine Overview

SECTION THREE - CONTINUED

Belt Sander / Drum Sander (continued)



Sanding Procedure

- The decision of whether to use an operator belt is a matter of preference, but using one will translate to a better sanding job. Using the belt takes the strain off of your back and arms and puts it on your hips. This gives you more control of the sander and allows you to sand with a more fluid motion. It also frees up your hands to better handle the cord and to better control the handle to feather the drum and minimize drum marks.
- For new and old floors, your first cut should be at a 7-15 degree angle. This will help flatten the floor and remove any existing chatter or waves.
- If a floor is heavily cupped or crowned, you should make your first pass with the grain to knock off the high spots on the floor, then sand at an angle to flatten.
- There are some cases where you don't want to cut the floor at an angle, such as an old home with uneven floors that could gouge if sanded at an angle, or floating or engineered floors that you don't want to sand too aggressively.
- Stagger your long and short runs with each cut to minimize the chance of leaving a visible line where you stop the machine. These can be hard to see and remove and will typically only be noticeable during finishing.
- When doing your short run, stagger your stops and make sure to feather your stop 2 to 3 feet past the stop from the long run.
- Be aware of focal points such as entryways, large windows and direct can lighting as these can highlight stop marks from the sander. Try to keep your stops away from these areas.

Borders

- Start with sanding the field like a normal floor, making the first cut at an angle.
- When you reach the border, sand into the border along the length of the room.
- On the butt ends, sand slightly onto the border to help level it with the field and make edging easier.
- For the remaining cuts, sand with the grain of the field regardless of whether the border is regular strip or plank or a mosaic design.
- Sand as much of the border as you can with the belt sander on the butt ends of the room to minimize the amount of sanding with the edger.
- Keep a pencil handy to mark defects in the floor as you sand so you don't forget to correct them. Excessive over wood or drum marks may have to be edged first to remove, and then gone back over with the belt sander to feather out.

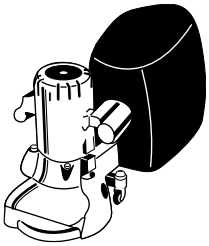
Edger

Safety

- PPE. Always wear safety glasses, dust mask, and hearing protection.
- Never leave dust in the bag overnight or unattended for any length of time.
- Do not remove the ground terminal from cords.
- Never trust the power switch. Always put the edger on its side before plugging it in.
- If you trip a breaker, put the edger on its side before you reset the breaker.

Edger Setup

- For the edger to perform properly and leave a flat smooth finish, it needs to be set up and maintained properly.
- Follow the manufacturer's guidelines for adjusting the wheels to get the proper sanding angle for the machine.
- Once the wheels are adjusted, the pad will need to be dressed so that it cuts properly and does not vibrate.
- A properly adjusted edger should be able to be run with one hand.
- Never leave the edger standing upright on its pad. This will leave a flat spot in the pad and cause a vibration.



- Store the edger in a case, or at least secured on its side and off its wheels, and pad it for transport to avoid being knocked out of adjustment or damaging the edger.

Machine Overview

SECTION THREE - CONTINUED

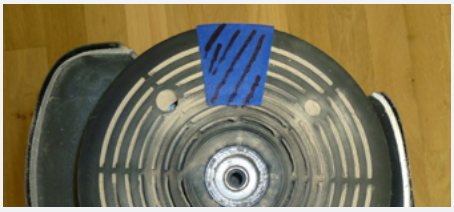
Edger (continued)

Clocking the Edger

- The edger can be set up to cut in three different positions.

  1. *To the left at 10-11 o'clock*
  2. *In the center at 12 o'clock*
  3. *To the right at 1-2 o'clock*

- Knowing where your edger is set to cut can help you get better results and minimize edger marks when sanding. This is called clocking.



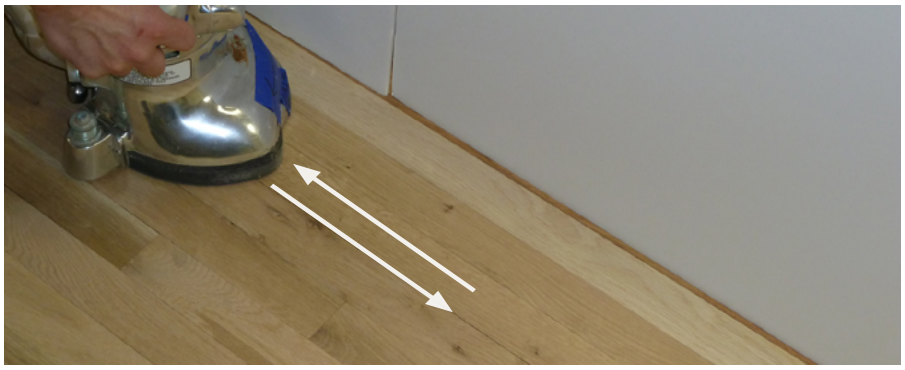
The edger in this picture is set up at 12 o'clock

- The edger only cuts on a small area of the pad; about a 1-1/2"x1-1/2" square area.
- With the edger sanding directly across the boards, the sanding marks run across the grain almost perpendicular to it.
- If you clock the edger so it is at about a 45 degree angle to the board, the sanding marks more closely follow the grain of the wood minimizing visible sanding marks.

Techniques

- There are many techniques for sanding with the edger, but here are a few that work very well:

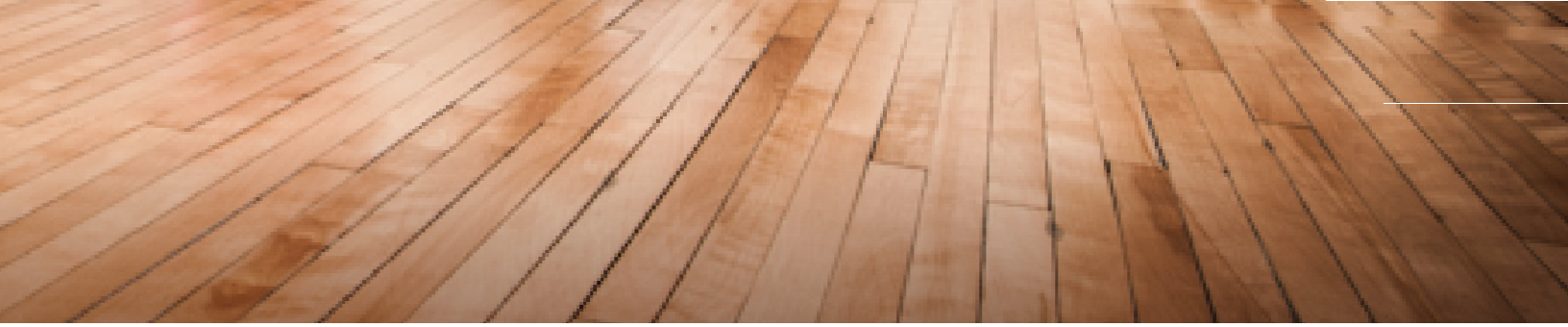
1. *Along the length of the room, sand back and forth with the direction of the floor keeping the edger clocked to minimize marks. Feather the sanding 4 to 5 inches past where the belt/drum sander stopped.*



2. *Along the butt ends you can use two different techniques.*

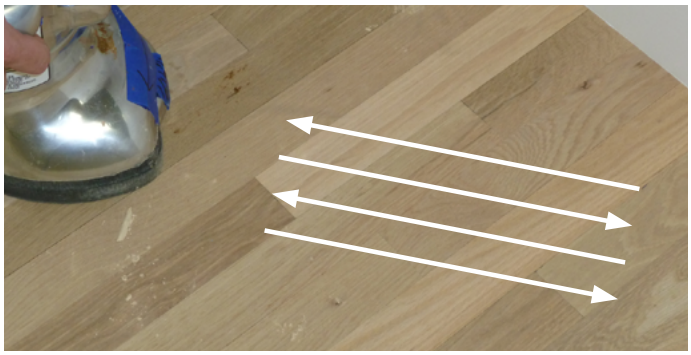
a. With the edger clocked, sand back and forth across the boards making sure to feather the sanding 6 or more inches past the drum stop mark.

b. With the edger clocked, sand with the grain of the wood in an elliptical motion feathering the sanding 6 or more inches past the drum stop mark.

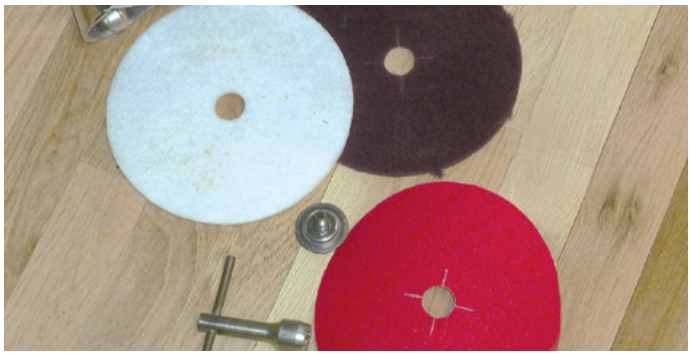


Edger (continued)

Techniques (continued)



- Optionally, for rough cuts, to flatten the floor you can sand back and forth at a 45 degree angle, then switch to one of the techniques above to refine the scratch. This helps flatten the floor faster.
- You will need to keep light pressure on the edger to sand properly.
- Apply light pressure when pulling the edger toward you to flatten and remove marks, and lighten up on the pressure when moving the edger away from you to feather the sanding and blend and minimize marks.
- As you are sanding, use your hand to feel the floor to see if you are leaving any gouges, waves or over wood. Your hand will pick up imperfections that your eyes can't.
- Use a work light angled low on the floor to help see what you are sanding and help to see and remove edger marks from previous grits.
- If you feel compelled to put extra pressure on the edger to flatten the floor, this indicates a need for a coarser abrasive.
- Be careful not to dig into corners excessively to reduce the amount of time you have to spend scraping.



- Backup pads can be used on the edger to protect the drive pad of the edger or to soften the cut of the abrasives.
- Backup pads can be either non-woven maroon or white pads, or felt pads.
- Using a backup pad for the final cuts will leave a much finer finish and minimize edger marks.

Machine Overview

SECTION THREE - CONTINUED

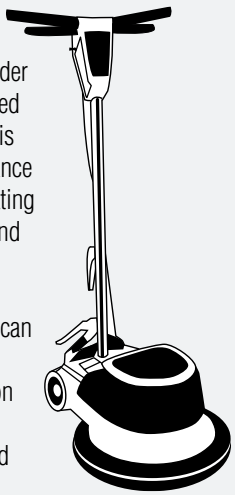
Buffer

Safety

- Dust mask
- Hearing protection

Buffer Operation

- Don't leave standing or stored on the drive plate. This will deform the plate and cause the buffer to wobble.
- For best results, use a screen driver pad under the screen. This pad is designed for driving screens and prevents the screen from sliding off during use like it can with thick white and maroon pads.
- For best performance, use a screen driver pad under a maroon pad attached to the drive plate. This will give a good balance of aggressive flat cutting and the ability to blend out scratch marks.

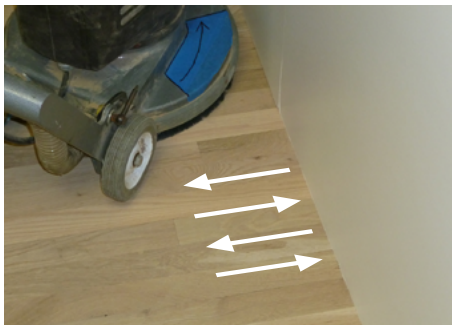


- For a softer cut, you can add another maroon pad to further cushion the screen, or use a thick white or red pad to drive the screen.

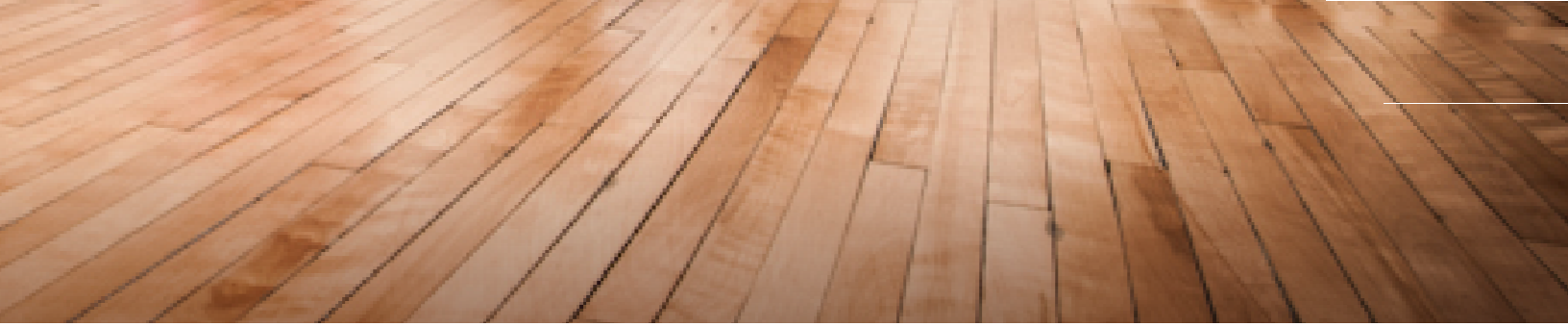
Clocking the Buffer

- For the best possible sanding and minimal sanding marks, the buffer can be clocked like the edger.
- The buffer cuts on the right-hand side of the machine between 2 and 4 o'clock. It rotates counterclockwise.
- The other side of the buffer feathers the cut.
- With the buffer sanding perpendicular to the grain of the wood, the screen sands across the grain of the wood which can leave visible marks.
- Clocking the buffer at about a 45 degree angle to the grain of the wood leaves an optimal scratch pattern to minimize sanding marks. The scratches follow the grain of the wood more closely.

Sanding Procedure

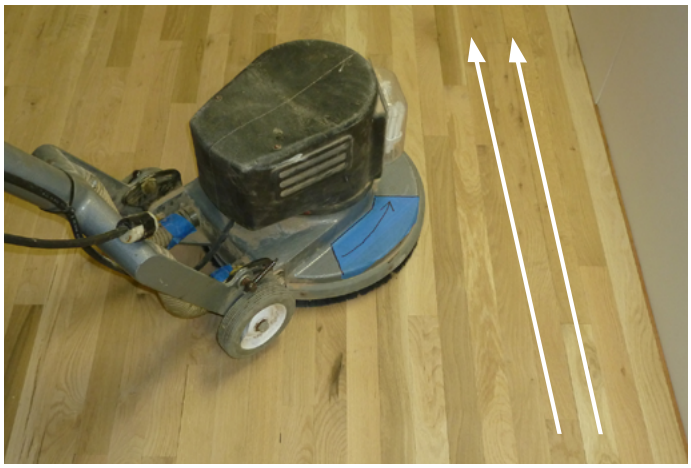


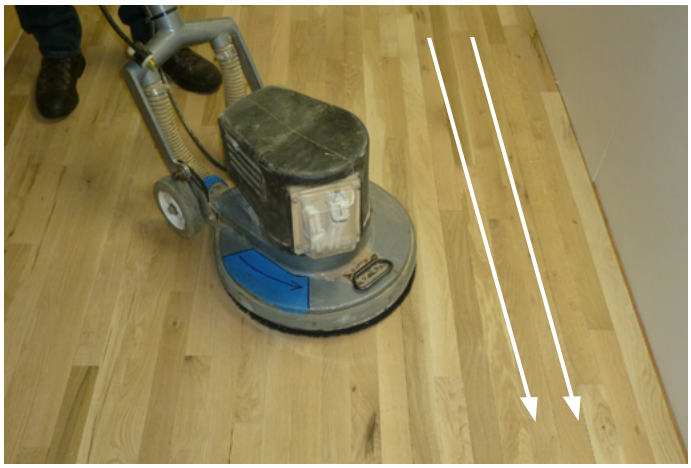
- Sand the perimeter of the floor first in an elliptical pattern against the walls making sure to come out far enough to blend the edger marks and drum stop marks. Sand the perimeter counterclockwise.
- After the perimeter is sanded, proceed to sand the field of the floor.
- Sand in the direction of the flooring.
- Work from each side toward the center of the room. This will help blend any inconsistency in the scratch pattern as the screen wears or if the screen needs to be flipped in the middle of a room.
- With buffer clocked, move in the direction of the floor. When you get to the other side and need to change direction, just rotate the buffer so that it is pointing 45 degrees in the opposite direction. The cutting area of the buffer is now sanding the section right below the area you sanded, while that section is being feathered by the other side of the buffer. You only need to shift the buffer down a section when you reach the right side of the room. This technique gives very consistent results and helps minimize scratch marks.



Buffer (continued)

Sanding Procedure (continued)





Hard Plating

- Hard plating is an optional step in the sanding process that occurs before the final screening, and can be done with either a physical hard plate with bolt-on paper or a double-sided disc.
- The paper discs cut more aggressively than a screen, making it easier to blend edger marks and sanding marks.
- The rigid surface of the hard plate and double-sided disc help flatten the floor and prevent dish out of soft grain.
- It can help remove minor chatter marks and waves.
- Defects such as drum marks will be highlighted so they can be easily spotted to correct. A screen would conform to these defects and make them hard to see until the finish was applied.
- Hard plating provides much better results than screening alone when sanding parquets, borders and mixed species floors by more easily removing cross grain marks and preventing dish out of softer woods and grain.
- Double-sided discs should be driven by a screen driver pad for best results under only a maroon pad to keep the disc as flat as possible.
- For flatter and more aggressive cutting with the double-sided disc, you can sandwich the screen driver pad between two double-sided discs.
- The hard plating should be followed up by a screen to blend the coarser scratches left from the process. Because the aggressive sanding was done by the hard plate, you don't have to worry about dishing out soft grain with the screen as it is simply blending the scratches from the hard plate. You can use an extra pad or a thicker pad to drive the screen to get a much finer scratch pattern and minimize scratch marks.

Sanding Guidelines

SECTION FOUR

Sanding Pre-Finished Floors

Sanding pre-finished floors can be a difficult process. Aside from the extra time involved, there is a lot more waste of belts and paper because they wear out quickly on the tough finish.

Here are some sanding techniques that will make it easier to sand off even the toughest pre-finished coatings. But first, it helps to understand what makes these finishes so tough. There is aluminum oxide in these finishes but it has nothing to do with how tough they are. Aluminum oxide is used as filler. What makes the finishes so tough are the resins that are used and the UV curing process during manufacturing.

When sanding pre-finished floors, most people think they need to use very coarse paper like 24 grit because the finish is so hard. The opposite is true. You need to start with a finer grit like 80 grit to break the surface of the finish, then come back with 40 or 50 grit to remove the finish.

This may seem counterintuitive, but here is the reason. On a coarse grit paper, each piece of grain is very large and there are less pieces of grain than on a finer grit paper. Because of this, there is a lot of pressure on each piece of grain. When the coarse grain hits the hard surface of the finish, it just breaks in half and stops cutting or bounces off the finish.

On a finer grit paper, like 80 grit, there are more pieces of grain, so less pressure on each piece. The grain can break the surface of the finish without failing prematurely.

After the finish has been broken by the finer grit, the coarser grit has something to dig into and remove the finish.

Proper abrasive selection is critical to getting the best performance when sanding these finishes. Norton SG Red Heat was designed for sanding these tough coatings. The seeded-gel Ceramic Grain gives you the longest life and fastest cut rate when sanding these finishes.

USING THIS PROCESS WILL SAVE TIME AND ABRASIVES

STEP 1
Sand with 80 grit on the belt sander and edger quickly just to break the surface.

STEP 2
Use 40 or 50 grit on the belt sander and edger to remove the finish.

Sanding Sequence / Grit Selection

Diagram 1

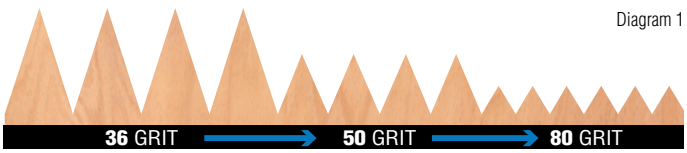


Diagram 1 shows what happens when a proper sanding sequence is followed, not skipping more than one grit between each cut.

- The 36 grit flattens the floor and leaves deep scratches.
- The 50 grit refines those deep scratches, removing the "peaks" left by the 36 grit.
- The 80 grit then refines the scratch even further leaving a surface that is appropriate for staining or finishing.

Diagram 2

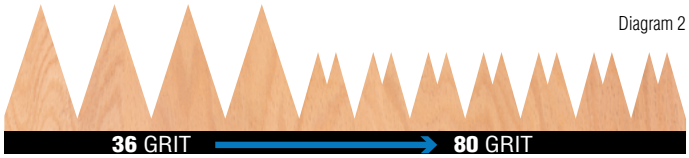
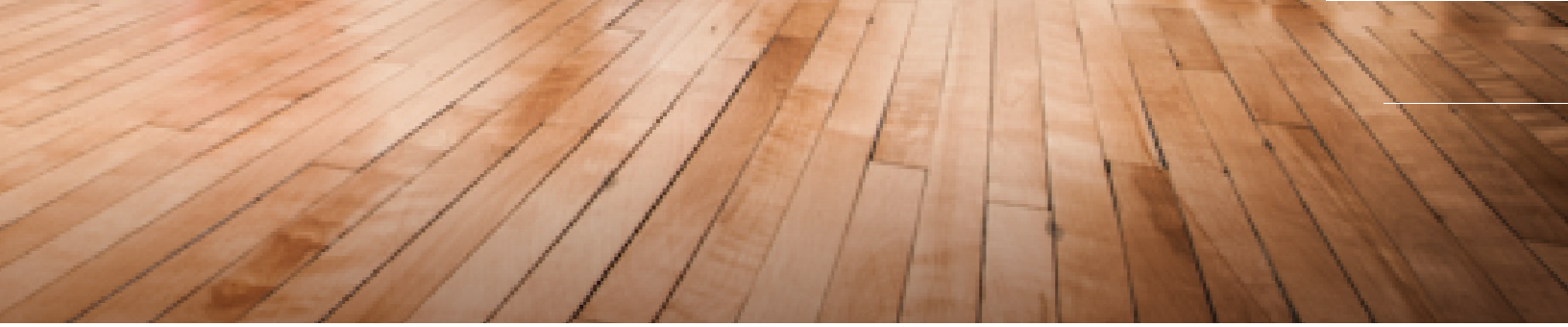


Diagram 2 shows a common practice, skipping more than one grit between each cut. Contractors may think this saves time and money.

- The 36 grit flattens the floor and leaves deep scratches.
- The 80 grit removes the peaks from the scratches left by the 36 grit, but cannot remove the deep "valleys."
- These deep scratches cannot be removed by screening. They will also be highlighted by staining and finishing.
- The deep scratches will also require more finish to be used, since more finish will be needed to fill in the deep "valleys" left from the 36 grit. This will ultimately lead to a finish that fails prematurely.



Floor Surface Finishing Sequence

STEP	OLD FLOOR POOR CONDITION	OLD FLOOR GOOD CONDITION	NEW FLOOR	PARQUET FLOOR OLD OR NEW
Belt/Drum Sander	**1st Cut**			**1st Cut**
	Sand floor at angle to flatten. Use 36 or 40 grit If paper loads, then switch to open coat paper. 24, 20,16,12 grit (then sand with 36 or 40 grit)	Sand floor at angle to flatten. Use 40 or 50 grit.	Sand floor at angle to flatten. Use 50 or 60 grit 40 or 36 grit may be needed to sand harder exotics and domestics.	Sand at a 45 degree angle to pattern. Use 40 or 50 grit to flatten. 36 grit may be needed to flatten some parquets.
Belt/Drum Sander	**Sand with the direction of the floor with same grit as 1st cut**			**Sand opposite to direction of 1st cut**
	Angled sanding marks are more difficult to remove. Sanding with the grain with the same grit as the 1st cut ensures that those marks will be removed, and further flattens the floor.			Sand at 45 degree angle in opposite direction with next grit in sequence to further flatten floor. 50 or 60 grit.
Edger Sander	**1st Cut**			**1st Cut**
	Rough cut with 36 or 40 grit. If paper loads, then switch to open coat paper. 24,20,16,12 grit,then sand with 36 or 40 grit .	Rough cut with 40 or 50 grit.	Most new floors can be edged with only one cut, 80 or 100 grit. For harder woods and poor milling, first cut with 50 or 60 grit.	First cut with 50 or 60 grit to flatten edges.
Fill Floor	**Spot or Trowel Fill Floor if Needed**			**Spot or Trowel Fill Floor if Needed**
Belt/Drum Sander	**Intermediate Sanding**			**Intermediate Sanding**
	Sand with 50 or 60 grit to remove coarse sanding marks. If floor was rough sanded with 50 or 60 grit then proceed to final sanding.			Sand with 80 or 100 grit in direction of pattern.
Edger Sander	**Final Sanding**			**Final Sanding**
	Final sand with edger with 80 or 100 grit. Optional extra cut with 120 grit for stains or woods that show sanding marks more easily.			Parquets should be sanded to 120 grit to minimize the amount of screening to remove cross grain sanding marks.
Belt/Drum Sander	**Final Sanding**			**Final Sanding**
	Final sand with belt or drum sander with 80 or 100 grit in direction of floor. Optional extra cut with 120 grit for stains or woods that show sanding marks more easily. Final sanding should be done with belt or drum sander following final cut with edger to remove most of the edger marks and make screening easier.			Sand in direction of pattern with 120 grit to minimize the amount of screening to remove cross grain sanding marks.
Buffer	**Hard Plating (Optional)**			**Hard Plating**
	Hard plate with bolt on paper or double-side discs to remove and blend sanding marks and flatten floor. This also prevents dish out of soft grain. Use same grit as final sanding grit.			Parquets should be hard plated to remove cross grain sanding marks easier and to prevent dish out of floor. Hard plate with same grit as final sanding or one grit coarser if cross grain marks are hard to remove.
Buffer	**Screening**			**Screening**
	Screen with 80 or 100 grit screen to final sand to remove edger marks and blend edges and field for uniform finish. Screen with 120 grit for floors being stained or to minimize grain raise for water based finishes. Optional screen with 150 or 180 grit after screening with 120 grit for special applications. Optional final sand with Blue SandDollar after screening with 120 grit for a fine finish and to minimize swirl marks.			Screen with 100 or 120 grit after hard plating. Screen with 150 or 180 grit after screening with 120 grit depending on finish desired.

Sanding Guidelines

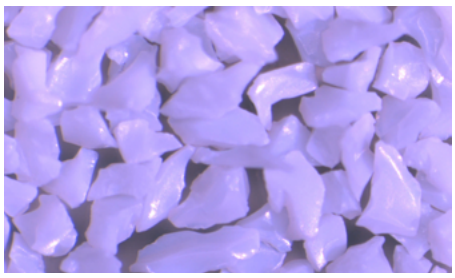
SECTION FOUR - CONTINUED

Coated Basics

There are 3 basic components or raw materials used in the production of coated abrasive floor products and each performs an important function:

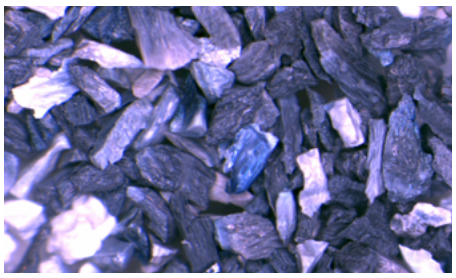
1. *Grain or abrasive mineral: Either synthetic or mineral, it cuts/abrades the material surface*
2. *Backing: the base to which the abrasive is adhered*
3. *Adhesive Bond: the substance which adheres the grain to the backing*

Grain Technology



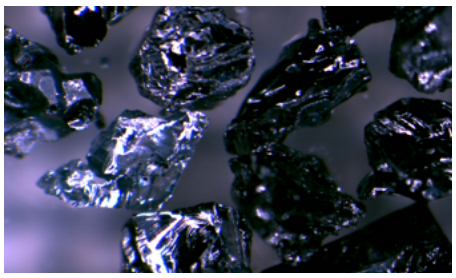
Ceramic Alumina (Seeded Gel)
(Norton Red Heat)

- Ceramic alumina is a man-made grain
- Mainly designed for hard substrates like exotics and pre-finished floors, but also works well on softwoods
- Ceramic alumina is long with extremely sharp edges
- Ceramic alumina micro-fractures in millions of sub-micron particles allowing it to last for extreme durations of time
- Used in applications where very fast, consistent cut over long periods of time is needed
- Ideal for hardwoods and softwoods
- Leaves a finish as fine as silicon carbide but with 3 to 4 times the life



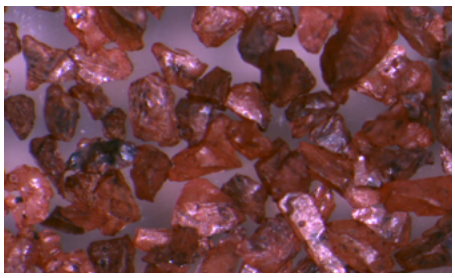
Zirconia Alumina
(Norton BlueFire)

- Zirconia alumina is a man-made grain
- It is designed for sanding most hardwoods and some exotics
- It is sharp with a pointy, “spindly” shape
- Zirconia alumina is designed to micro-fracture in small pieces leaving very sharp edges after fracture
- Used in applications where heavy stock removal, longer life and consistent cut rate are needed
- 2X the life of Durite



Silicon Carbide
(Norton Durite)

- Silicon carbide is a man-made grain
- It is quite pointy in shape and extremely sharp
- It macro-fractures like aluminum oxide; however, after the grain fractures it leaves a very sharp edge
- Used in applications where value, initial cut rate, heavy stock removal and a fine finish is needed
- Ideal for softwoods and most hardwoods
- Leaves a very fine scratch pattern
- Because it macro-fractures, it has a third the life of ceramic grains



Aluminum Oxide
(Norton SandDollar/PSA Rolls/Maroon Pad)

- Aluminum oxide is a man-made grain
- It is ideal for low pressure applications like between coats sanding
- Aluminum oxide is blocky in shape with sharp edges
- It macro-fractures in big pieces under low pressure
- Used mostly where soft surface finish and low stock removal is needed
- Ideal for all types of floor finishes

NORTON SAINT-GOBAIN DURITE®

NORTON SAINT-GOBAIN SANDDOLLAR™

Sanding Guidelines

SECTION FOUR - CONTINUED

Backings

The backing is the base on which the abrasive and bond are deposited. For coated abrasive floor products, the most common backing types are: paper, combination, cloth, and screen mesh.

Paper

Due to the fine surface of paper, a consistent finish is produced. Paper weights range in thickness, flexibility and strength. With coated abrasive floor products, E-and F-weight papers are used primarily for more aggressive mechanical operations. E-weight, 40 grit or finer, is a thick weight paper for heavy sanding applications. F-weight, 24 to 36 grit, is more durable and heavier than E-weight for heavy stock removal with less flexibility.

Combination

Heavyweight backing reinforced by polyester fibers that are interwoven into the ply of the paper, resulting in a sturdy and shock-resistant backing ideal for coarse grit (12 to 24 grit) floor sanding products.

Cloth

Primarily used in floor sanding belts and some rolls, cloth is required when a very durable and strong backing is needed due to strenuous sanding applications and heat buildup. The interwoven, flexible nature of cloth and its tear resistance make it ideal for high-speed, high-stock removal applications. X- and Y-weights are common in hardwood floor sanding. X-weight is heavy cloth that ranges in flexibility, strength and durability and is used on the broadest range of applications. Y-weight is a heavier cloth used on heavy-duty, high-stock removal operations. Several cloth types are used: cotton, polyester, nylon, and polyester/nylon and polyester/cotton blends.

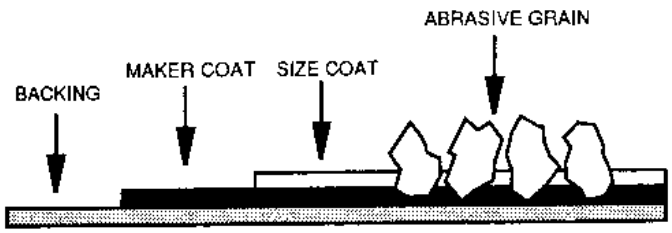
Screen Mesh

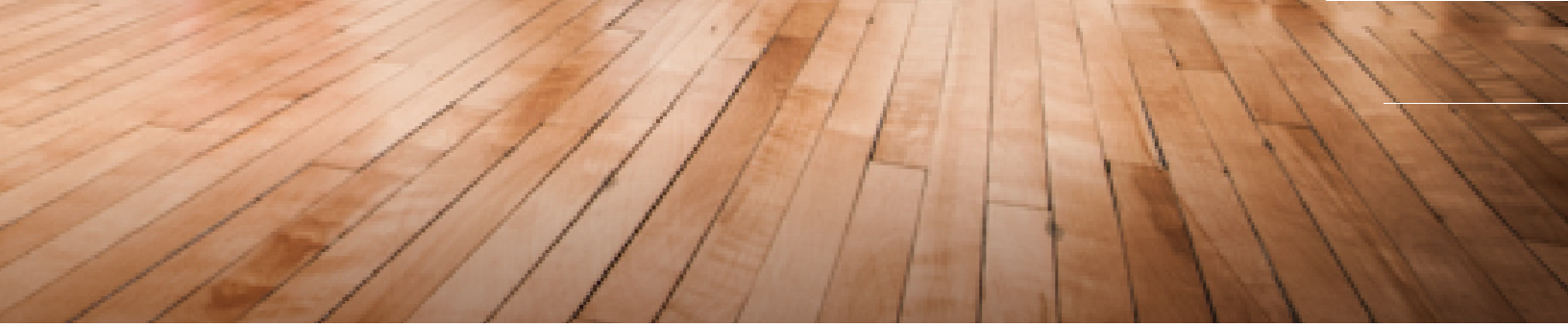
Very popular in the floor sanding industry, screen mesh is interwoven polyester knit backing coated with abrasive grain on two sides. The benefits of the screen mesh are: it is load resistant, it can be rinsed and reused for longer sanding life, and it tends to cut more aggressively than paper or cloth.

Bonds

The agent that holds abrasive grains or minerals to the backing is a bond. During sanding, the pressure against the grain is tremendous as the abrasive cuts through the material. Therefore, the bond must be strong enough to hold these sharp grains and not break down under heat. The two most popular bonds are glue and resin. Mild properties of glue make it more useful during the finishing phase. Whereas, the strength and durability of resin make it more useful in the roughing phase where heavy pressure is applied and more heat generated.

During the manufacture of a coated abrasive, the bond is laid onto the backing in two layers. The coat adhering to the backing ready to accept the abrasive is the “make coat.” The layer anchoring the abrasive in place is the “size coat.”





Coated Process

Grain Application

The process of applying the grain to the adhesive coated backing is done one of two ways:

- Electrostatic
  a. Uses an electrical charge to embed the grain up into the backing adhesive so the thickest end of the grain is bonded to the backing and the sharp point is exposed as the cutting point
  b. All coated abrasive floor products use this application process

- Gravity
  a. Grains are allowed to fall onto the backing, which allows for more grain adhesion, but potentially exposes fewer sharp points

Grit size or grading is determined by the size of the grain coated to the backing as it passes through a series of screens containing openings of carefully controlled sizes. With the more openings per linear inch in a screen, the smaller the abrasive size or the finer the grit. The ANSI/CAMI (North America) and FEPA (Europe) grading standards set the number of openings corresponding to a particular grit size.

There are two types of abrasive mineral coatings used in the process: open coat and closed coat.

- Open coat refers to a coating in which 50%-75% of the coated abrasive surface is covered by abrasive grain. There are evenly spaced voids between particles of grain, which help reduce the effect of loading caused by wood dust.

- Closed coat refers to a coating in which the entire coated abrasive surface is covered with abrasive grain, with no voids between particles. This is by the far the most general coating in use and permits the greatest degree of stock removal and longest product life.

Flexing

Flexing is the controlled cracking or breaking down of the coated abrasive bond. It is performed for one of the following reasons:

1. *Shape control of the product in use*
2. *Flexibility to conform to the workpiece contour*
3. *Control of grain breakdown and/or control grain pullout to improve performance*
4. *Material handling during the manufacturing process*

There are two basic flexes used in floor sanding products:

1. 90 Flex: Creates flex lines or cracks that are perpendicular to the edge of the material. Provides flexibility in the lengthwise direction only.

2. CF Flex: Flex lines are a 45-degree angle to the edge of the belt or material, in both directions, making a series of Xs. Provides moderate flexibility in all directions. Most floor sanding abrasives are CF flexed.

- Flexing is an important step in creating a high-quality, abrasive product. The best abrasive life on most products results with using the least amount of flex that will do the job satisfactorily. Generally, the least amount of flex will produce a more aggressive cut and longer abrasive life.

Sanding Guidelines

SECTION FOUR - CONTINUED

Proper Abrasives Storage

- Constant levels of humidity and temperature should be maintained. Optimum conditions are 70°F and 50% relative humidity to resist curling and adhesive bond damage.
- Cartons should be kept away from outside walls and floors as they may absorb moisture.
- Store coated abrasives away from heat sources - steam-heated radiators, steam pipes, hot air inlets, heat ducts or rooms near furnaces or ovens.
- Keep products in original packages. These packages facilitate handling and may be stacked in the most practical and convenient manner for best protection.
- Bulk rolls should not be allowed to stand on edge after they have been unpacked. Store flat on shelves or pallets.
- Belts that have been removed from the packing case should be rolled up and stood on edge on a clean shelf. Belts may be draped over a large cylinder, such as a gallon can, brake drum or flanged hanger like the one used for a garden hose. NEVER hang a belt from a nail or peg as the backing will crease and the abrasive may crack.
- Precondition coated abrasive products to the temperature and conditions that you will be working under before use for maximum use efficiency.

Causes and Solutions to Common Problems During Sanding

Drum Marks

- For drum marks deeper than 1/8", board replacement will probably be necessary.
- Light drum marks can be sanded out with the edger, then sanded with the belt or drum sander.
- Deeper drum marks can be sanded out with the belt or drum sander.
- Sand over the drum mark at an angle in both directions.
- Work your way out to about a three-foot radius around the drum mark.
- Sanding out the drum mark will dish out the floor, so the further out you feather the sanding, the less noticeable it will be.
- Finish by sanding with the grain.

Chatter

- Light chatter can sometimes be removed by hard plating.
- If the chatter is bad, then you will waste time hard plating. It is easier and faster to sand again with the belt or drum sander at a 7 to 15 degree angle.

Waves

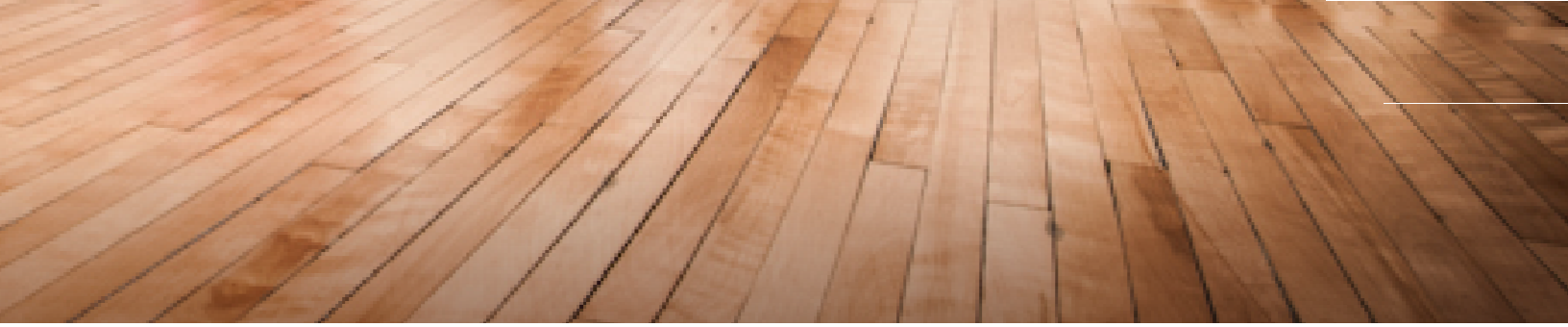
- These can be caused by filler or grit stuck to your wheels, or defective wheels. So check these between each cut.
- Inconsistent power to the machine can cause waves due to the motor running at varying RPMs.
- Walking speed can cause waves.
- The use of an operator belt will give you a more consistent cut and fluid motion with the sander.
- Slow down your walking speed on the medium and fine cuts if you are noticing waves.
- A bouncy subfloor can cause waves.
- Light waves can sometimes be removed by hard plating.
- Bad waves will need to be removed by sanding the floor at a 7 to 15 degree angle and determining the cause of the waves so it doesn't happen again.

Edger Marks

- Edger not set up properly.
- Pad not dressed.
- Sanding too fast and with an inconsistent sanding pattern.
- Slow down the sanding and sand at a consistent rate to give the abrasive time to blend the scratch marks.
- Use the techniques for clocking the edger.

Excessive Marks from Screening

- Vacuum floor before screening. Debris under the screen will leave swirl marks in the floor.
- Use quality abrasives that have consistent grading.



- Too coarse of a grit for the application.
- Soften the cut with a softer backup pad.
- Use the technique for clocking the buffer to get a more consistent scratch pattern.
- Final sanding with a Blue Norton SandDollar after you have screened with a 100 or 120 grit Norton Red Heat screen will eliminate virtually all of the swirl marks. Especially in difficult applications like staining maple.

Halos

- Not sanding the edges and field with the same grit.
- Sanding the edges with an orbital sander with too coarse or too fine of a grit. If you have to use an orbital sander, then use the same grit or one grit coarser than what you edged with. Then screen properly.
- Hand scraping the edges to remove marks and not sanding properly by hand.
- Most halos are caused by improper screening or not screening at all. Screening is not optional.
- Proper screening will fix all of the causes above except for sanding the edges and field more than one grit apart. For instance, sanding the field to 50 grit and the edges to 80 or 100 grit will be very difficult or impossible to blend.
- Using low quality screens that wear out too quickly will make it difficult to effectively blend the edges and the field.
- Using screens that are worn out. Don't be afraid to flip your screen or use extra. It's cheaper than resanding a floor.
- Use proper sanding technique with the buffer. Screen the perimeter first. This is where you need to spend most of your time blending the edges and field together.
- Using too fine of a grit screen to effectively blend the edges and field.

Lines or Streaks in the Floor from the Belt or Drum Sander

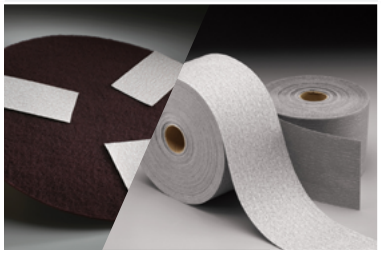
- Coarse grit scratches were not properly removed.
- The paper hit a nail or something else in the floor that is leaving a line in the paper.
- The drum is damaged. A nicked or gouged drum will transfer through the paper to the floor, leaving lines.
- Belt is not tracked properly.
- Too fine of a grit used during the screening process to remove normal sanding lines from belt or drum sander.

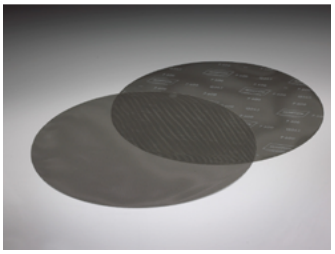
Between Coats Finishing

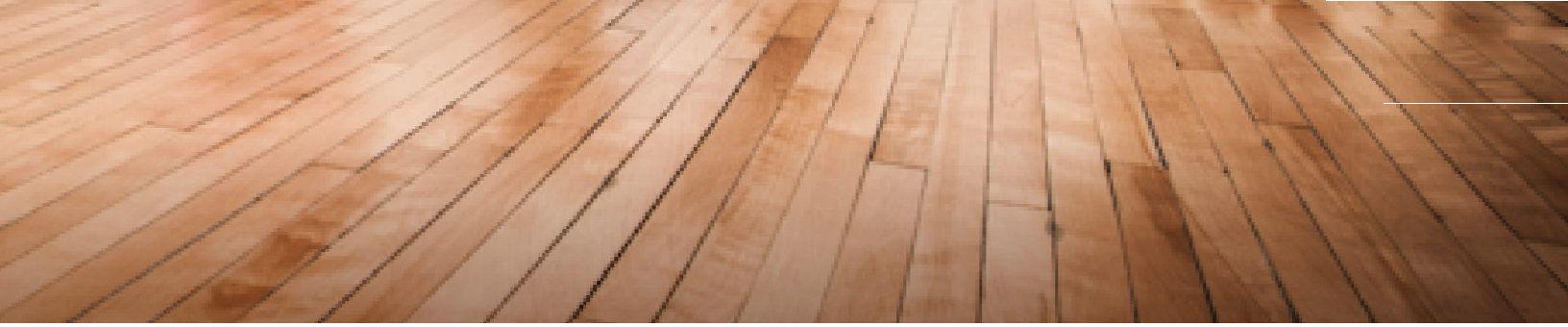
SECTION FIVE

Three Main Products for Prepping Finishes

APPLICATION GUIDE	BEST	BETTER	GOOD
Between Coats Applications	**Norton SandDollar Pads**	**Dark Maroon Pad and PSA Sheets**	**Screens**
Surface Prep/Recoat Heavy Scratches	Blue (Coarse) or Red (Medium)	N/A	100 or 120 grit
Surface Prep/Recoat Light Scratches	Red (Medium)	Dark Maroon Pad and 150 grit PSA	120 or 150 grit
Sealer Coat Solvent Base	Blue (Coarse)	Dark Maroon Pad and 150 grit PSA	150 grit
Sealer Coat Water Base	Red (Medium)	Dark Maroon Pad and 150 or 180 grit PSA	Not recommended for water base
Finish Coat Solvent Base	Red (Medium) or Yellow (Fine)	Dark Maroon Pad and 150 or 180 grit PSA	180 or 220 grit
Finish Coat Water Base	Yellow (Fine) or Green (Very Fine)	Dark Maroon Pad and 220 or 240 grit PSA	Not recommended for water base







Fixing Common Problems During the Finishing Process

Swirl Marks

- Swirl marks can be challenging to eliminate.
- They are highlighted by the species of wood, darker stains, and harsh lighting from can lights and windows.
- Using the proper product, grit and technique can help eliminate swirl marks.
- Use the same technique and procedure with the buffer as you do for bare wood.
- Clock the buffer to help minimize noticeable swirl marks.
- Screens are designed for bare wood sanding and abrading finishes, due to their aggressive cut. To avoid swirl marks, it is recommended to use a Maroon pad and strips or Norton SandDollar pads - particularly on darker woods, dark stained floors, waterbase finishes and floors that will be highly lighted with tendency to highlight visible concerns.
- Contaminants under the maroon pad and PSA strip will dig into the finish leaving swirls. Check and change out the strips often to avoid this.
- Abrading a finish that is not completely dry will leave swirl marks.
- Use the Norton SandDollar pads for a foolproof way to get a swirl-free finish in any application.

Finish Failure - Peeling, Flaking

- A common cause of finish failure is improper surface prep of the finish.
- A finish that is not properly abraded will not have a good mechanical bond with the next coat of finish.
- Using worn abrasives or overusing the abrasives will leave a dull burnished surface that does not provide a good mechanical bond.
- Even though a finish is being dulled by an abrasive, it does not mean it is properly abrading it.
- Worn screens should not be saved and used on job after job.
- PSA strips should be replaced every 100sf as they wear quickly.
- The cost of a few extra abrasive products is a lot less than having to resand a floor.

Buffing on Stain

SECTION SIX

tip

Buffing On Stain

Buffing on stain is a technique that is gaining in popularity due to the time savings over traditional methods and the use of fewer materials, like rags and stain.

Our screen driver pads in tandem with our maroon conditioning pads create the perfect system for applying stain with a rotary buffer. The unique design of the screen driver pad allows it to hold and apply stain evenly on the floor without slinging.
The maroon pad (with 7" center removed) is placed on top of the screen driver pad. This center hole creates a "trough" where the stain is poured. This system is then driven with either a screen driver or maroon pad on the buffer drive plate. The screen driver and maroon pad remain on the floor during the process. The operator only needs to tip back the buffer to add more stain to the "trough." This makes for less mess during the process.

Typical Process

- Edges are cut in and wiped off by hand in appropriate size section of floor
- Stain is applied to main section of floor with buffer
- A clean screen driver pad is put on the buffer to buff off excess stain left on floor
- Move to next section of floor

Note:

- Not all stain can be applied with this method, check with stain manufacturer
- Do not work too large of an area to avoid lap marks
- Dispose of used pads properly, they are flammable

Between Coats

Don't overuse your abrasive product when abrading between coats of finish. A worn out abrasive will still dull the surface, but it may not be putting the proper scratch into the finish to get a good mechanical bond for the next coat of finish. If the surface isn't abraded properly, you can wind up with finish peeling, flaking and chipping. It's a lot less expensive to use a few more abrasive products on the job than to go and re-sand a job because of finish failure.

Step 1 - Cut in edges, load pad with stain

Step 2 - Buff stain on section

Step 3 - Replace stain filled pad with clean pad

Step 4 - Buff off excess stain

Waxes/Hard Wax-Oil Finishes

SECTION SEVEN

Wax

Application:

Traditional paste waxes for floors can be applied in several different ways; steel wool pads, hand application, Tampico Brush, Red Buffer Pad and White Super Polish Pad. Regardless of the application method, it is important that only a thin layer of wax be applied to make the polishing step easier. To make applying the wax easier and faster you can make your own wax applicator. Take a ball of wax and place it in a piece of cheesecloth or cotton rag. Twist the top of the cloth tight around the wax until wax starts to seep out. This will allow you to apply a consistent even coat of wax to the floor by hand. You can also use the same technique for machine application. Place the cloth and wax in the center knockout of a Red Buffer pad or the center of a Tampico Brush and the weight of the buffer will force the wax out giving you a consistent application. It's a good idea to keep a separate drive plate for working with wax so you don't get cross-contamination with other types of finish.

Polishing:

By using several different floor pads and utilizing both low and high speed buffers, you can vary the sheen of the polished wax from a dull satin to a high gloss finish.

Red Buffer Pad

- On a low speed buffer will impart a dull satin finish

White Super Polish Pad

- On a low speed buffer will impart a satin finish
- On a high speed buffer will impart a semi-gloss finish

Grizzly Bear Lite and Aqua Ultra HSB

- On a low speed buffer will impart a satin to semi-gloss finish
- On a high speed buffer will impart a gloss finish

Hard Wax-Oil Finishes

These finishes have gained popularity over the last several years due to the natural look they give to a floor and their ease of application. There are a few different methods of application depending on the product; they can be buffed on, trowelled on, or rolled on. Once the finish is applied, any excess needs to be removed and the floor is given a final buffing. Knowing the correct floor pad to use can speed up the process and give better results.

Red Buffer Pad

- Used to apply finish to floor with buffer
- Used to remove excess finish after roller application or heavy trowel application

White Super Polish Pad

- First polishing step after Red Buffer pad
- Excess finish removal and initial polishing for trowel applied finish

Grizzly Bear Lite and Aqua Ultra HSB

- Final buffing of finish

Janka Hardness Scale

SECTION EIGHT

Wood Flooring Species

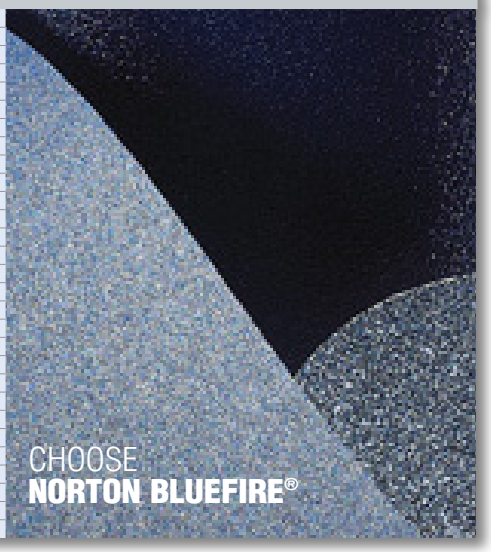
MEASUREMENT CRITERIA

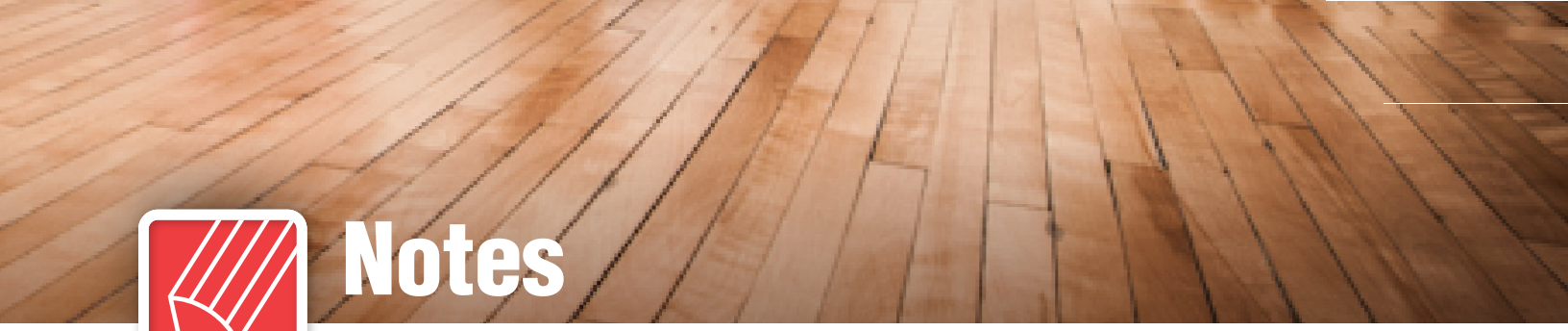
The Janka hardness test is a measurement of the force necessary to embed a .444-inch steel ball to half its diameter in wood. It is the industry standard for gauging the ability of various species to tolerate denting and normal wear, as well as being a good indication of the effort required to either nail or saw the particular wood.

HARDER

SOFTER

WOOD SPECIES	HARDNESS	SANDING PRODUCT
Imported Woods		
Ipe / Brazilian Walnut / Lapacho	3684	
Cumaru / Brazilian Teak	3540	
Ebony	3220	
Brazilian Redwood / Paraju	3190	
Angelim Pedra	3040	
Bloodwood	2900	
Red Mahogany, Turpentine	2697	
Spotted Gum	2473	
Brazilian Cherry / Jatoba	2350	
Mesquite	2345	
Santos Mahogany, Bocote, Cabreuva	2200	
Pradoo	2170	
Brushbox	2135	
Karri	2030	
Sydney Blue Gum	2023	
Bubinga	1980	
Cameron	1940	
Tallowwood	1933	
Merbau	1925	
Amendoim	1912	
Jarrah	1910	
Purpleheart	1860	
Goncalo Alves / Tigerwood	1850	
Hickory / Pecan / Satinwood	1820	
Afzelia / Doussie	1810	
Bangkirai	1798	
Rosewood	1780	
African Padauk	1725	
Blackwood	1720	
Merbau	1712	
Kempas	1710	
Locust	1700	
Highland Beech	1686	
Wenge, Red Pine	1630	
Tualang	1624	
Zebrawood	1575	
True Pine, Timborana	1570	
Peroba	1557	
Kambala	1540	
Sapele / Sapelli	1510	
Curupixa	1490	
Sweet Birch	1470	
Common Hardwoods		
Hard Maple / Sugar Maple	1450	
Coffee Bean	1390	
Natural Bamboo (represents one species)	1380	
Australian Cypress	1375	
White Oak	1360	
Tasmanian Oak	1350	
Ribbon Gum	1349	
Ash (White)	1320	
American Beech	1300	
Red Oak (Northern)	1290	
Softer Hardwoods		
Carribean Heart Pine	1280	
Yellow Birch	1260	
Movingui	1230	
Heart Pine	1225	
Carbonized Bamboo (represents one species)	1180	
Cocobolo	1136	
Brazilian Eucalyptus / Rose Gum	1125	
Makore	1100	
Boreal	1023	
Black Walnut	1010	
Teak	1000	
Sakura	995	
Black Cherry, Imbuia	950	
Boire	940	
Paper Birch	910	
Cedar	900	
Southern Yellow Pine (Longleaf)	870	
Lacewood, Leopardwood	840	
Parana	780	
Sycamore	770	
Shedua	710	
Southern Yellow Pine (Loblolly and Shortleaf)	690	
Douglas Fir	660	
Larch	590	
Chestnut	540	
Hemlock	500	
White Pine	420	
Basswood	410	
Eastern White Pine	380	





Notes

SECTION NINE

PROFESSIONAL FLOOR SANDING TRAINING MANUAL

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Unrivaled Performance.

Patented grain technology cuts cooler and provides a finer surface finish over conventional products.

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Prolongs pad life in extreme surface prep applications.

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Available in various widths and grades for application versatility with medium adhesion to surface.

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