GREEN MOUNTAIN WOODWORKS

INSTALLATION AND CARE OF YOUR HARDWOOD FLOORS 2011

HANDLING AND STORAGE

Green Mountain hardwood flooring is made from lumber that has been kiln-dried. To maintain the moisture level, do not unload it in the rain, snow or other excessively humid conditions. Cover it with a tarpaulin or vinyl if the atmosphere is foggy or damp. Kiln-dried flooring should be stored in an enclosed building that is well ventilated with weather proof windows and located in areas where similar fine millwork is stored. The storage area within the building should be clean and dry. Leave adequate room for good air circulation around stacks of flooring. Continual dry heat may over-dry flooring, which may later result in buckled floors when flooring is delivered to the job and installed without proper acclimation or spacing.

JOB SITE CONDITIONS

Check the job site before delivery. Be sure the flooring will not be exposed to excessive periods of high humidity or moisture. The surface grade or slope should direct water away from the building. Basements and crawl spaces must be dry and well ventilated. In joist construction with no basement, outside cross ventilation through vents or other openings in the foundation walls must be provided with no dead air areas. A surface cover of 6 mil polyethylene film is essential as a vapor retarder in crawl space construction.

The building should be closed in with outside windows and doors in place. All concrete, masonry, sheetrock and framing members, etc. should be thoroughly dry before flooring is delivered to the job site. In warm months the building must be well ventilated; during winter months heating should be maintained near occupancy levels at least five days before the flooring is delivered and until sanding and finishing are complete.

Because materials used to provide energy efficient structures trap moisture in a residence, it may be necessary to delay delivery and installation of flooring to allow the excessive moisture trapped during construction to evaporate. The average moisture content of framing members and sub-flooring should be below 12%-14% before delivery of the flooring. Moisture contents above 12%-14% can cause moisture related problems. Sub-floor moisture content below 5% has also been noted to cause shrinkage as it draws moisture from hardwood flooring planks.

When job site conditions are satisfactory, have the flooring delivered and broken up into small lots and stored in the rooms where it will be installed. Allow 4 to 5 days or more, for the flooring to become acclimated to job site conditions depending on the difference between the jobsite and the warehouse climates.

From the time flooring is delivered and until occupancy, temperature and humidity should be maintained at or near occupancy levels. After occupancy, continue to control the environment. Extended times (more than 1 month) without HVAC controls can promote elevated moisture conditions which can adversely affect flooring.

Protect flooring from excessive heat. Flooring installed over a heating plant or un-insulated heating ducts may develop cracks unless protection from the heat is provided. Use a double layer of 15 lb., or a single layer of 30 lb. asphalt felt/building paper, or 1/2" standard insulation board between joists under the flooring in these areas. Over a heating plant the insulation used should be non-flammable.

INSTALLATION OVER WOOD JOIST CONSTRUCTION

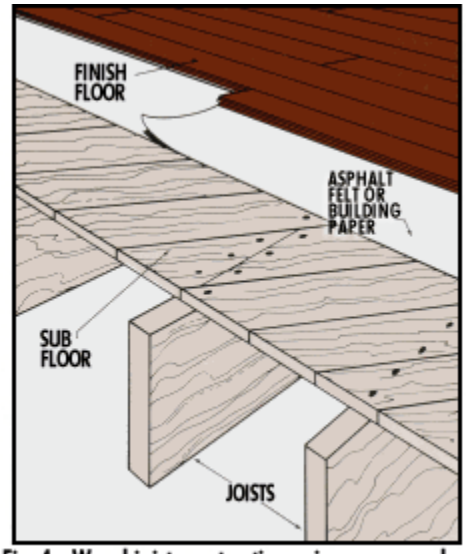

Fig. 4. Wood joist construction using square-edge board subfloor.

Outside cross ventilation in the foundation walls must be provided through vents or other openings with no dead air areas. A surface cover throughout the crawl space (100%) of 6 mil polyethylene film is essential as a moisture retarder.

Sub -flooring. With 3/4" thick strip flooring use either kiln-dried boards of No. 1 or No. 2 Common Pine or other dense, Group 1 softwoods suitable for sub-floors over wood joists, or exterior sheathing grade plywood. If plywood, 5/8" (19/32") or 3/4" (23/32") performance rated products are preferred also, 3/4" (23/32") OSB is a comparable substrate. With 1/2" thick strip flooring use a 3/4" (23/32") sub-floor. Thinner materials cannot be recommended as a preferred sub-floor material.

Install sub-floor panels as recommended by the panel manufacturer. They should be installed with grain of faces at right angles to joists, nailed every 6" along each joist with appropriate nails and with appropriate spacing at panel ends and edges unless otherwise recommended by the panel manufacturer.

For a board sub-floor, use only flat, dry 3/4" dressed square edge boards no wider than 6". Lay diagonally across the joists; allow 1/4" to 3/8" expansion space between boards. Don't use tongue and groove boards. Nail to every bearing point (includes blocking) with two 8d common nails. All mitered joints must rest on joists.

Mark location of joists so flooring can be nailed into them. Good nailing is important. It keeps the boards rigid, preventing creeping sometimes caused by shrinkage in sub-floor lumber. Without adequate nailing it is impossible to obtain solid, non-squeaking floors.

LAYING AND FASTENING THE FLOORING

The following instructions apply to strip flooring laid on plywood-on-slab, on screeds, and plywood or board sub-floors. With plywood or board sub-floors, start by re-nailing any loose areas and sweeping the sub-floor clean. Mark location of joists on perimeter walls so that starting runs and finishing runs, which require face nailing, can be nailed into joists. Then cover subfloor with a good grade of 15 lb. asphalt felt/building paper, lapped 2"-4" along the edge seams. This helps keep out dust, retards moisture movement from below, and helps prevent squeaks in dry seasons.

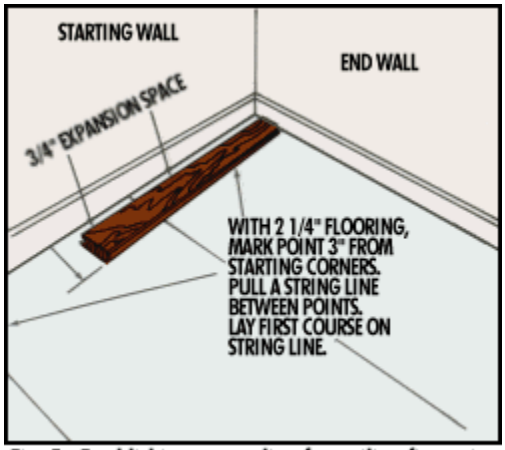

Fig. 5. Establishing starter line for nailing first strip.

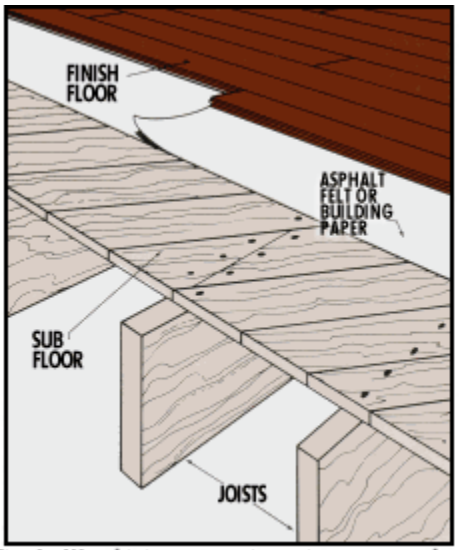

Fig. 4. Wood joist construction using square-edge board subfloor.

Direction of finish flooring should be at right angles to the joists as shown in Fig. 4. This is generally the longest dimension of the room or building and gives

best appearance.

Begin flooring installation along the longest continuous wall parallel to the flooring direction of most rooms. (i.e. Down a long hallway wall.) Work from there into the room. Use a slip-tongue to reverse direction and complete the rooms. Glue and blind nail the slip tongue. At any change of direction, always provide tongue and groove engagement either with a slip tongue, or factory edge or end.

Starting to lay the floor. Location and straight alignment of the first course is important. Place a mark 3/4" plus the width of flooring (3" for 2 1/4" flooring) on the end wall near a corner of starting wall. (Figure 5.) Place similar mark at opposite corner and insert nails into each mark. Pull string line between nails. Nail the first strip with its leading edge on this line.

The gap between that strip and the wall is needed for expansion space and will be hidden by the shoe mold (Fig. 1).

If you're working with screeds on slab make the same measurements and stretch a line between nails. Remove line after you get the starter board in place.

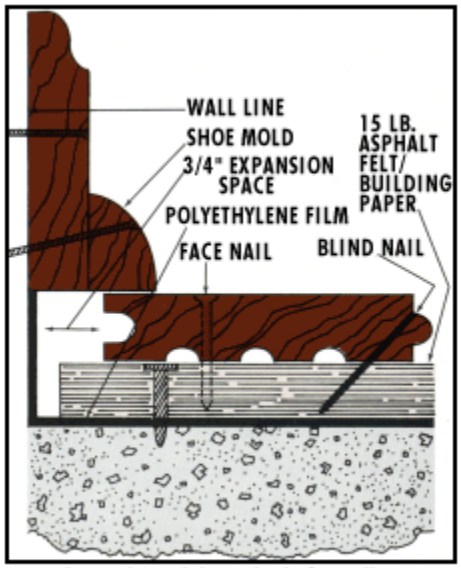

Fig. 1. Plywood-on-slab method of installing strip oak flooring

Lay the first strip along the starting string line, tongue out, and drive 6d or 8d flooring nails or casing nails (galvanized or screw shank hold best) 1" from the grooved edge. Nails should be driven into the top surface of strips and counter sunk (face nailing). Position nails over supporting joists, and near ends of strips or into each screed crossed. Keep the starter strip aligned with the string line. Pre-drilling nail holes will prevent splits. Also, blind nail starting strip through the tongue according to nailing schedule.

Rack the floor. Lay out seven or eight rows of flooring end to end in a staggered pattern with end joints at least 6" apart. Find or cut pieces to fit within 1/2" of the end wall. Watch your pattern for even distribution of long and short pieces and to avoid clusters of short boards (Fig. 6).

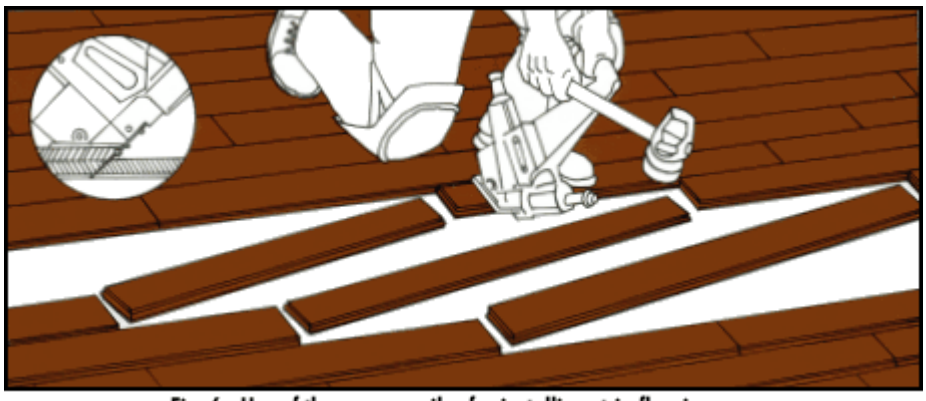
Fig. 6. Use of the power nailer for installing strip flooring.

NAILING THE FLOOR

With plywood on slab construction the face nails should be cut to slightly less than 1 1/2". After the starter run, fit each run of successive strips snug, groove-to-tongue. Blind nail through the tongue along the length of the strip according to the schedule shown in the nailing schedule table. Countersink all nails. After the second or third run is in place you can change from a hammer to a floor nailing machine which drives nails mechanically or pneumatically,

and does not require additional countersinking. Various floor nailing machines use either a barbed cleat or staples, fed into the machine in clips. The nailing machine drives fasteners through the tongue of the flooring at the proper angle.

When using the floor nailing machine to fasten 3/4" thick strip or plank flooring to plywood laid on a slab, be sure to use a 1 1/2" staple or cleat, not the usual 2" cleat which may come out the back of the plywood and prevent nails from countersinking properly and tearing the vapor retarder. In all other applications the 2" cleat is preferred. Continue installing across the room, ending up on the far wall with the same 3/4" expansion space as on the beginning wall. It may be necessary to rip a strip to fit. Avoid nailing into a sub-floor joint. Position flooring strips so that they do not meet over sub-floor joints. Blind nail by hand where the nailing machine can not be used. Face nail the last runs when unable to blind nail by hand. With 2 1/4" strip face-nailing is required the last 2 or 3 runs and in a ripped piece of a strip if one has been used. Use an offset pry bar or lever device to tighten these last face nailed runs all at once before face-nailing.

Nailing to screeds- When nailing direct to screeds (no solid sub-floor), nail at all screed intersections and to both screeds where a strip passes over a lapped screed joint. Since flooring ends are tongue and grooved, all end joints do not need to meet over screeds but end joints of adjacent rows should not break over the same void between screeds.

Some boards may not be straight. A large screwdriver, sharpened pry bar, or wedges can force such boards into position or pull two or three runs together.

Shoe moulding- Nail this to the baseboard or between the hardwood and baseboard and into the sub-floor. Do not nail shoe moulding to the hardwood flooring.

NAILING SCHEDULE

Hardwood Flooring must be installed over a proper sub-floor.*

Tongue & Groove Flooring is blind nailed on the Tongue Edge with face nailing required on starting runs (1-2) and finishing runs (2-4).

Inadequate nailing contributes to cracks and noisy floors by allowing movement of the flooring.

SIZE FLOORING	SIZE NAIL TO BE USED	SPACING
¾" thick T&G x 2 ¼" or 3" wide faces	2" barbed flooring cleat,* 7d or 8d flooring nail, or 2" 15 gauge staples with 1/2" crowns*	10" - 12" apart 8" - 10" preferred
¾" thick T&G x 4 – 8" wide faces	2" barbed flooring cleat,* 7d or 8d flooring nail, or 2" 15 gauge staples with 1/2" crowns*	8" apart

Blind nail along the length of strip/plank and near the ends (1"-3").

Minimum of 2 nails per strip/plank.

(Plank flooring may require face nailing and/or screws for additional fastening)

(Do not mix types of fasteners when blind nailing the field, except near walls where hand nailing is required.)

WIDE PLANK FLOORING

Wide plank over 5" requires extra care to ensure good performance over time. Proper acclimation before and after installation is critical. After acclimation and before installation, sealing the back surface may help prevent some cupping normally associated with wider widths. Random width plank is installed in the same manner as strip flooring, alternating courses by widths. Installation pattern will be provided by Green Mountain Woodworks based on the quantities of the widths shipped.

The general practice is to blind nail through the tongue as with conventional strip flooring. Use 1" nails if the flooring is laid over 3/4" plywood on a slab. Use 1" to 1 1/4" in wood joist construction or over screeds. Some applications may require face nailing/screwing in addition to other fastenings. Another practice sometimes recommended is to leave a slight expansion crack, about the thickness of a putty knife, between planks.

ANTIQUE HAND DISTRESSED WIDE PLANK FLOORING

Our Antique Distressed flooring is milled to longer than standard lengths. It is pre-sanded and hand worked to the customer's specification. On most projects we also stain the planks to the desired color to enhance the antique effect and pre-finish each board with 3 coats of a Tung Oil / Resin based flooring finish to seal in the color.

Installation is the same as with our un-finished flooring as noted previously, following all recommended nailing schedules and gluing as necessary. Professional contractors should note that chopping boards to fit a run or up to edges (flush mount vents, nosing, etc.) will require "pillowing over" the freshly cut edge with an orbital sander to match the Antique Distressed flooring edges. The new edge will need to be re-stained to match the surrounding floor. A can of the custom color stain will be provided with each flooring order to assure a seamless floor. If we notice any material which does not meet grade while we are pre-sanding or finishing, we will chop and groove the new edges. In some cases a board may have 2 grooved ends. In this case, loose spline is provided to adapt double grooved board ends as necessary.

Unfinished Antique floors are sanded but not sealed. Installers will want to lightly screen or buff the installed floor, vacuum well before applying stain or finish. When applying stains, experiment with smaller pieces before installation to test how the stain will look over a range of grain variations.

We use Waterlox Tung oil, a superior, fast drying penetrating oil that provides lasting protection, easy application, and is the best at bringing out the colors and warmth of natural wood. It is also very forgiving, which means that future scratches or heavy traffic wear areas can be easily spot repaired without having to sand and re-finish the whole floor. Simply rub out the blemish with a fine steel wool or fine sandpaper and rub in more finish. It will naturally blend with the surrounding finish and you are done.

INSTALLING OVER CONCRETE

The method that you choose when installing your floors over concrete will be determined by your height allowance. Please find the method that best matches your height allowance situation. Before you install your plywood subfloor and flooring, make sure that the concrete slab has cured and is thoroughly dry - at least one month. Concrete moisture meters and other tests can be useful in identifying moisture problem areas. National Wood Flooring Association guidelines specify using relative-humidity testing, calcium chloride testing or calcium carbide testing to identify the moisture content of the slab. If a slab tests too high in vapor emission, consider using a vapor retarder type product, installing a vapor retarder and a plywood sub-floor or using an alternative installation method.

IMPORTANT: The difference between the moisture content of the concrete and the GREEN MOUNTAIN solid plank flooring should not exceed 3%. We encourage the use of a plywood subfloor when installing our floors over a concrete slab. The additional plywood subfloor will make your floor warmer and more comfortable when walking on the finished floor. The thickness of the plywood and the milled solid planks can be altered to meet your height allowances.

The slab must be minimum 3000 psi and free from non-compatible sealers, waxes and oil, paint drywall compound etc. Do not try to glue a wood floor over a chalky or soft concrete slab. Burnished, slick or steel-troweled slabs may require screening with a 30 grit abrasive.

GLUING DIRECTLY TO CONCRETE (1/2- ¾" clearance)

The alternate method of gluing solid planks directly to a concrete subfloor requires special attention and is only necessary for height allowances less than 1". We recommend Bostik's Best®. (www.bostik-us.com/Files/TDSfiles/BostiksBest.pdf) or Sika® adhesive product for installations of this nature. For technical information about these products, please call the manufacturers directly- 978-777-0100 for Bostik's or 800-003-7452 for Sika.

TIPS FOR EASIER AND BETTER FLOORING INSTALLATIONS

"In-use" Moisture Content: Differences of more than 4% between the expected in-use average moisture content of flooring and the in-use average moisture content of under-floor construction are likely to cause problems such as cupping. The greater the difference, the more severe are the problems. A significant difference of 8% or more may result in buckling of the floor when the under-floor is the higher moisture content.

Finishing should proceed 1-3 weeks after installation is completed. Longer periods of exposure to job site conditions can result in future problems. Finishing immediately after installation does not allow the flooring adequate time to acclimate to its new environment.

Work from left to right: In laying hardwood flooring you'll find it easier to work from your left to your right. Left is determined by having your back to the wall where the starting course is laid. When necessary to cut a strip to fit to the right wall, use a strip long enough so the cut-off piece is 8" or longer and start the next course on the left wall with this piece.

Short pieces: For best appearance always use long flooring strips at entrances and doorways. Incorporate as many short pieces as possible at random in the floor. Do not group them in one area. Put a "frame" around obstructions.

You can give a much more professional and finished look to a strip flooring installation if you "frame" hearths and other obstructions, using mitered joints at the corners.

Reversing direction of strip flooring: Sometimes it's necessary to reverse the direction of the flooring to extend it into a closet or hallway. To do this, join groove edge to groove edge, using a slip tongue available from flooring distributors. Glue slip tongue in place and blind nail that edge. Proceed in the opposite direction nailing in the conventional manner.

Use only sound, straight boards for sub-floors: The quality of the sub-flooring will affect the finished flooring. Use only square edge 3/4" dressed boards no wider than 6". Boards which have been used for concrete form work are often warped and damp and should not be used.

Don't pour concrete after flooring is installed: Concrete basement floors are sometimes poured after hardwood flooring has been installed. However, many gallons of water from drying concrete are evaporated into the house atmosphere where it may be absorbed by hardwood flooring and other wood components. This is not a recommended building practice since excessive moisture will cause problems with wood floors and other woodwork. Wood flooring should not be installed until after all concrete and plaster work are completed and dry.

Doorways, Stair Treads, and High Traffic Areas: If flooring direction changes, always use slip tongues or engage the flooring end matching into groove side of flooring to prevent movement and give a solid transition.

Sound deadening in multi-story building: Noise transmission from an upper to a lower floor can be reduced. Nail sub-floor to the joists in the normal manner and cover this with 1/2" or thicker cork or insulation board laid in mastic. Cover this with another 3/4" plywood sub-floor also laid in mastic. Nail the finish strip or plank floor to the plywood, or lay block or parquetry floors in mastic on the plywood. Note that specifications for some high-rise apartment buildings call for other types of sound-deadening construction.

MAINTENANCE & CARE OF YOUR HARDWOOD FLOOR

Wood floors, properly finished, are the easiest of all floor surfaces to keep clean and new looking unlike carpeted or resilient floors that show wear regardless of care. Wood floors can be kept looking like new, year after year, with minimum care.

What is minimum care? A good rule of thumb is to vacuum and/or dust mop weekly. A damp mop can be used for spills, and when necessary general cleanup on floors which have non-waxed polyurethane or a similar surface finish. When traffic areas of surface finishes begin to show significant wear, screening, scuff sanding the finish surface and re-coating an entire floor is the least involved choice for maintenance.

Wood and water don't mix. No matter what finish your wood floor has, NOFMA recommends, never pouring water on the floor. While a damp mop may be used on polyurethane and other surface finishes in good condition, excessive amounts of water seep between the boards and into small scratches causing deterioration of finishes. A damp mop should only be damp to the touch. It should be thoroughly wrung and not dripping.

Read the label. The recommendations made here are not intended to endorse specific products or brands but to serve as general guidelines in the selection and use of floor maintenance materials. Always follow label directions for finishes maintenance products, and corresponding products except for directions which call for using water on wood. And always use only products specifically designed for wood floors and the finish applied to your wood floor.

PREVENTATIVE MAINTENANCE

Preventative maintenance cannot be over-emphasized. Good preventative maintenance lengthens the intervals between the major renovation operations such as re-coating, re-waxing and refinishing. Here are some basic rules that apply to all types of floor finishes.

Keep grit off the floor. Use dirt-trapping, walk-off mats at all exterior doors to help prevent dirt, grit and sand from getting inside the building. Throw- rugs or small sections of carpet just inside the entrances are also recommended. Dirt and grit are any flooring's worst enemy, and that includes carpets and vinyl as well as hardwoods. Keep door mats clean.

In kitchens, use area rugs at high spill locations and at work stations-stove, sink or refrigerator. Cotton is generally the best fabric since it is easily washed. Mats with a smooth backing, i.e. rubber or vinyl, may trap water beneath.

Finishes and certain chemicals in wood oxidize and are affected by ultra violet light sources. This may cause the wood and finish to change color and develop a patina or aged appearance. To avoid uneven appearance, move area rugs occasionally and drape or shade large windows.

Put fabric glides on the legs of your furniture; they allow furniture to be moved easily without scuffing the floor. Grit can become embedded in glides; clean the glides over to prevent scratching. Some furniture may require barrel type roller casters as ball type casters may cause damage. Grey, non-marking rubber casters are the best.

Vacuum regularly, as often as you vacuum carpets: a brush attachment works beautifully. Sweep or use a dust mop as needed, but do not use a household dust treatment as this may cause your floor to become slick, dull the finish, or interfere with re-coating.

Wipe up food and other spills promptly with a dry cloth or paper towel. Use a slightly moistened cloth for sticky spills if necessary. Then wipe the floor dry with another cloth or paper towel.

Keep heels on shoes in good repair, especially high heels. Heels that have their protective cap missing or worn away exposing the steel support rod will dent any floor surface, even concrete.