

GREENWOOD FLOORING INTERNATIONAL

Greenwood Flooring International Solid Hardwood Flooring Installation Instructions

READ ALL OF INSTRUCTIONS THOROUGHLY BEFORE BEGINNING INSTALLATION. IN ADDITION TO THESE INSTRUCTIONS, WE RECOMMEND THAT THE INSTALLER FOLLOW ALL INSTALLATION GUIDELINES SET FORTH BY THE NATIONAL WOOD FLOORING ASSOCIATION (NWFA.ORG). WHERE THESE INSTRUCTIONS DIFFER FROM NWFA THESE GUIDELINES, THIS DOCUMENT TAKES PRECEDENCE.

General Information

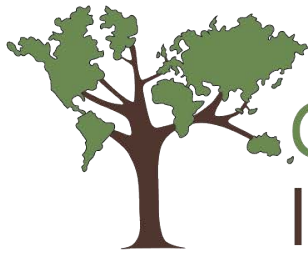
Owner/Installer Responsibility

Beautiful hardwood floors are a product of nature and therefore, not perfect. Our hardwood floors are manufactured in accordance with accepted industry standards, which permit grading deficiencies not to exceed 5 %. These grading deficiencies may be of a manufacturing or natural type. When flooring is ordered, 5% must be added to the actual square footage needed for cutting and grading allowance (10% for diagonal installations).

- The owner/installer assumes all responsibility for final inspection of product quality. Inspection of all flooring should be done prior to installation. Carefully examine flooring for color, finish and quality before installing it. If material is not acceptable, do not install it. Contact the seller immediately.
- Prior to installation of any hardwood flooring product, the owner/installer must determine that the job-site environment and the sub-surfaces involved meet or exceed all applicable standards. Recommendations of the construction and materials industries, as well as local codes, must be followed. These instructions recommend that the construction and subfloor be clean, dry, stiff, structurally sound and flat. The manufacturer declines any responsibility for job failure resulting from, or associated with, subfloor and substrates or job-site environmental deficiencies.
- Prior to installation, the owner/installer has final inspection responsibility as to grade, manufacture and factory finish. The installer must use reasonable selectivity and hold out or cut off pieces with deficiencies, whatever the cause. Should an individual piece be doubtful as to grade, manufacture or factory finish, the installer should not use the piece.
- Use of stain, filler or putty stick for touch-up and appropriate products for correcting subfloor voids is accepted as part of normal installation procedures.

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Tools & Accessories Needed

NOTE: IT IS EXTREMELY IMPORTANT TO USE THE PROPER ADAPTERS, FACE PLATES, AS WELL AS STAPLES OR CLEATS. IMPROPER FASTENERS, MACHINES AND AIR PRESSURE CAN CAUSE SEVERE DAMAGE. THE MANUFACTURER OF THIS FLOORING PRODUCT IS NOT RESPONSIBLE FOR DAMAGE CAUSED BY USE OF IMPROPER TOOLS OR MISUSE.

- Chalk line & chalk
- Recommended hardwood flooring cleaner
- Nail set
- Tape measure
- Hammer
- Electric power saw
- NIOSH-designated dust mask
- Electric drill and bits
- Compressor and hose w/in-line regulator for pneumatic tools
- "Blind" fastening machine for $\frac{3}{4}$ " (19 mm) flooring (see note below)* w/1-1/2" or 2" (4-5 cm) fasteners
- Pneumatic finish nailer with 1-1/2" or 2" (4-5 cm) nails
- 6-8d finish nails
- Moisture meter (wood, concrete or both)
- Broom
- Hand saw or jamb saw
- Eye protection
- Transition and wall moldings
- Urethane construction adhesive for floors wider than 4" (10 cm)

*Use a "Blind" nailing machine designed for installing $\frac{3}{4}$ " (19 mm) hardwood flooring using staples or cleats. The nailing machine MUST HAVE a protective foot attachment to prevent edge bruising and finish damage. Use one of the following: Stanley Bostitch (multiple models) with M-4 foot, Powernail (multiple models) with NailerShoe, Primatech (multiple models) with Trak-Edge.

Preparation

Storage and Handling

Solid hardwood flooring should be stored in the environment in which it is expected to perform. Deliver the materials to an environmentally controlled site. The wood subflooring materials must



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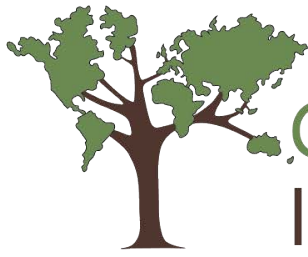
not exceed 13% moisture content. Using a reliable wood moisture meter, measure and document the moisture content of both the subfloor and the hardwood flooring to determine proper moisture content. The difference between the moisture content of the wood subfloor and the wood flooring must not exceed 4% (3% for plank). Acclimate the hardwood flooring on or off the job, as necessary, to meet these requirements. Store in a dry place, being sure to provide at least a four-inch air space under cartons which are stored upon "on-grade" concrete floors. Flooring should not be delivered until the building has been enclosed, with windows and doors in place, and until cement work, plastering, painting, Drywall and all other "wet" work is completed and dry. Concrete should be at least 60 days old.

Job-Site Conditions

- The building should be enclosed with all outside doors and windows in place. All concrete, masonry, framing members, drywall, paint and other "wet" work should be thoroughly dry. The wall coverings should be in place and the painting completed, except for the final coat on the base molding. When possible, delay installation of base molding until flooring installation is complete. Basements and crawl spaces must be dry and well ventilated.
- Exterior grading should be complete with surface drainage, offering a minimum drop of 3" in 10' (7.6 cm in 3.05 m), to direct flow of water away from the structure. All gutters and downspouts should be in place.
- Solid hardwood flooring may be installed on- or above- grade level. Do not install in full bathrooms. Installation of a suitable subfloor is required over concrete.
- Crawl spaces must be a minimum of 18" (46 cm) from the ground to the underside of the joists. A ground cover of 6–20 mil black polyethylene film is essential as a vapor barrier with joints lapped 6" (15 cm) and sealed with moisture resistant tape. The crawl space should have perimeter venting equal to a minimum of 1.5% of the crawl space square footage. These vents should be properly located to foster cross ventilation (Figure 1). Where necessary, local regulations prevail.
- Permanent air conditioning and heating systems should be in place and operational. The installation site should have a consistent room temperature of 60–75° F (16–24° C) and humidity of 35–55% for 14 days prior to and during installation and until occupied.

Subfloor Conditions

- CLEAN – Subfloor must be free of wax, paint, oil, sealers, adhesives and other debris.
- LEVEL/FLAT – Within 3/16" in 10' (5 mm in 3 m) and/or 1/8" in 6' (3 mm in 2 m). Sand high areas or joints. Flatten low spots with a maximum 6 layers of 15# builders felt, plywood or shims (not leveling compounds).
- DRY – Check and document moisture content of the subfloor with the appropriate moisture test. Install moisture retardant materials if needed or desired. Moisture



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retardant materials must meet minimum perm standards of $3 > 50$ ASTM D4869-88, Type I or F.S. UU-B-790a, Type I, Grade D, Style 1a. Most asphalt saturated papers, #15 felt or Grade D kraft paper meet this perm rating. Common brown kraft builder paper and red rosin generally do not qualify as vapor retarders. Concrete subfloors must be a minimum of 30 days old before testing begins.

- **STRUCTURALLY SOUND** – Nail or screw any areas that are loose or squeak. Wood panels should exhibit an adequate fastening pattern, glued/screwed or nailed as system requires, using an acceptable nailing pattern. Typical: 6”(15 cm) along bearing edges and 12”(31 cm) along intermediate supports. Flatten any swollen edges as necessary. Replace any water-damaged, swollen or delaminated subflooring or underlayments.

NOTE: Avoid subfloors with excessive vertical movement. Optimum performance of hardwood floor covering products occurs when there is little horizontal or vertical movement of the subfloor. If the subfloor has excessive vertical movement (deflection) before installation of the flooring, it is likely it will do so after installation of the flooring is complete.

Subfloors with Radiant Heat

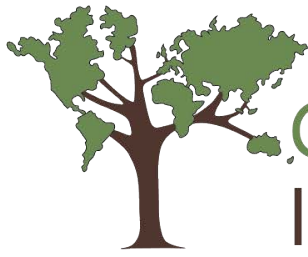
NOTE: Do not install this product over Subfloors with Radiant Heat.

Subfloor/Underlayment Requirements

NOTE: Solid hardwood flooring can be fastened to most existing flooring materials providing they can be penetrated with the fastener and the subfloor/underlayment materials meet or exceed the recommended subfloor/underlayment requirements. Laminated rosin paper or 15# builders felt (tar paper) acts as a moisture retarder and may be used to reduce movement caused by changes in subfloor moisture, thereby reducing cupping and warping. (This is especially helpful over crawl spaces and basements.) In addition, the use of these materials can give the flooring a more solid feeling, reduce sound transfer, prevent noise caused by minor irregularities and debris, and make it easier to slide the hardwood together across the surface of the subfloor. Kraft paper may be used to make installation easier but DOES NOT serve any other purpose.

Wood Subfloors and Underlayment

General: The wood subflooring materials must not exceed 13% moisture content. Using a reliable wood moisture meter, measure the moisture content of both the subfloor and the hardwood flooring to determine proper moisture content. The difference between the moisture content of the wood subfloor and the hardwood flooring must not exceed 4% for strip and 3% for plank flooring. When installing parallel to the floor joists it may be necessary to stiffen the subfloor system by installing an additional minimum of 3/8”(9.5 mm) approved wood underlayment.



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Applicable standards and recommendations of the construction and materials industries must be met or exceeded.

NOTE: As flooring manufacturers, we are unable to evaluate each engineered joist/subfloor system. Spacing and spans, as well as their engineering methods, are the responsibility of the builder, engineer, architect or consumer who is better

Wood Structural Panel Subfloors and Underlayment

NON-ENGINEERED

Structural panels/underlayment must be installed sealed side down. When used as a subfloor allow 1/8" (3 mm) expansion space between each panel. If spacing is inadequate, cut in with a circular saw. Do not cut in expansion space on tongue and groove panels.

- **Plywood:** Must be minimum CDX grade (exposure 1) and meet US Voluntary Product Standard PS1-95 performance standard or Canadian performance standard CAN/CSA 0325-0-92. The preferred thickness is 3/4" (19 mm) as a subfloor [minimum 5/8" (16 mm)] . When using an underlayment panel a minimum 3/8" (9.5 mm) thickness is recommended.
- **Oriented Strand Board (OSB):** Conforming to US Voluntary Product Standard PS2-92 or Canadian performance standard CAN/CSA 0325-0-92 construction sheathing. Check the underside of the panel for codes. When used as a subfloor, the panels must be tongue and groove, and installed sealed side down. Minimum thickness to be 23/32" (18 mm) thick when used as a subfloor or 3/8" (9.5 mm) as an underlayment. Some board manufacturers' recommendations vary.

Solid Wood Subfloors

- Minimum 3/4" (19 mm) thick with a maximum width of 6" (15 cm) installed at a 45° angle to the floor joists.
- Group 1 dense softwood (Pine, Larch, Douglas Fir, etc.) No. 2 common, kiln dried with all board ends bearing on joists.

CONCRETE (REQUIRES ADDITIONAL SUBFLOOR)

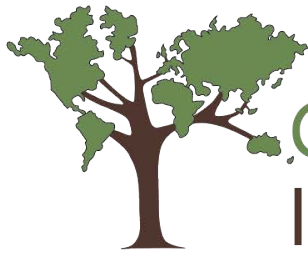
NOTE: We do not recommend solid hardwood flooring be installed directly to concrete without the addition of other subflooring materials to which the flooring can be fastened. Some adhesive manufacturers have had substantial success with direct glue applications using a variety of different adhesives and moisture retardant systems. Follow the adhesive manufacturer's recommendations and check their warranty coverage. We will not be responsible for claims associated with direct glue applications of our solid hardwood flooring products since we neither make nor recommend an adhesive for that purpose.

Concrete Moisture Tests

All concrete subfloors should be tested, and results documented, for moisture content. Visual checks may not be reliable. Test several areas, especially near exterior walls and walls containing

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plumbing. Acceptable test methods for subfloor moisture content include:

- **Tramex Concrete Moisture Encounter Meter** Moisture readings should not exceed 4.5 on the upper scale.

NOTE: The following tests are required in commercial applications. Either or both tests are acceptable.

- **Calcium Chloride Test (ASTM F 1869):** The maximum moisture transfer must not exceed 3 lbs./1000 ft² in 24 hrs. with this test.
- **RH Levels in Concrete Using In-situ Probes (ASTM F 2170-02)** should not exceed 75%.

"DRY" CONCRETE, AS DEFINED BY THESE TESTS CAN BE WET AT OTHER TIMES OF THE YEAR. THESE TESTS DO NOT GUARANTEE A DRY SLAB. ALL NEW CONSTRUCTION CONCRETE SLABS SHOULD HAVE A MINIMUM OF 10 MIL POLY FILM MOISTURE BARRIER BETWEEN THE GROUND AND THE CONCRETE.

Wood/Concrete Subfloor Systems

FASTENED TO CONCRETE

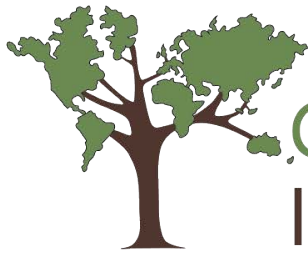
Concrete must be of high compressive strength, 3000 PSI or better. Install a suitable moisture retardant followed by a plywood subfloor with a minimum thickness of ¾" (19 mm). Allow ½" (13 mm) expansion space around all vertical objects and 1/8" (3 mm) between all flooring panels. In general, smaller panels [less than 4' x 8' (1.2 m x 2.4 m)] oriented at 45 degrees (preferred) offer better results. The panel must be properly attached to the subfloor using a minimum of one fastener per square foot, and more if necessary. Use pneumatic or powder actuated fasteners. Do not hand nail the subfloor with concrete nails. Install a moisture retardant barrier with joints lapped 6" (15 cm) and begin installation of flooring using 1-1/2" (4 cm) fasteners.

FLOATING SUBFLOOR

Install a suitable moisture retardant followed by a plywood subfloor with a minimum of 3/8" (9.5 mm) [1/2" (13 mm) preferred]. Allow ½" (13 mm) expansion space around all vertical objects and 1/8" (3 mm) between all flooring panels. Install a second layer of plywood, the same thickness, at a right angle to the previous panels, offsetting the joints 2 (61 cm). Staple together with staples that will not penetrate the first layer of the subfloor. The staples should have a crown width of 3/8" (9.5 mm) or more. Install a moisture retardant barrier with joints lapped 6" (15 cm) and begin installation of flooring using 1-1/2" (4 cm) fasteners.

SCREEDS/SLEEPERS

Solid hardwood flooring 4" (10 cm) and above in width cannot be installed directly to screeds. Screeds should be installed 9" (23 cm) apart, in rivers of adhesive, at right angles to the flooring to be installed. Do not begin installation until all adhesives are properly cured. Install moisture retardant over the screeds prior to installation of the flooring.



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Installation

General Installation Tips

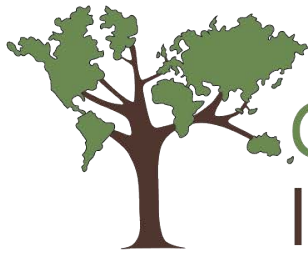
- Floor should be installed from several cartons at the same time to ensure good color and shade mixture.
- When possible, preselect and set aside boards that blend best with all floor mounted moldings used to ensure a uniform final appearance. Install these boards adjoining the moldings.
- Be attentive to staggering the ends of boards at least 4" to 6" (10–15 cm), when possible, in adjacent rows. This will help ensure a more favorable overall appearance of the floor.
- Large spans exceeding 20' (6 m) in hardwood flooring width, in areas of high humidity, may require the addition of internal or field expansion. This can be accomplished by using spacers, such as small washers, every 10–20 rows inserted above the tongue. Remove the spacers after several adjoining rows have been fastened. Do not leave spacers in for more than two hours.
- When installing products of uniform length, begin the rows with starter boards cut to various lengths. Avoid staggering the rows uniformly to prevent stair-stepping. Boards cut from the opposite end of the row may be used for the next starter boards.
- Always allow a minimum $\frac{3}{4}$ " (19 mm) expansion around all vertical obstructions.
- Always use a protective foot on the fastening machine to prevent mallet damage and edge bruising.

General Information for "Blind Fastening" Machines

- Avoid striking the edge of prefinished products with the fastener's mallet. Edge crushing can occur, causing unsightly cracks and splinters. Use a protective foot attachment to prevent edge bruising and finish damage.
- Improper adapter plates and air pressure settings can cause severe damage to the hardwood flooring and reduce performance. Always use an in-line regulator to control air pressure to the machine. Set pressure at 70–75 PSI to begin with and adjust until proper fastener setting occurs.

NOTE: SPECIAL INSTRUCTIONS FOR PLANK FLOORING

Seasonal distortion (shrinkage/cupping) in wide width flooring [4" (10 cm) and over] may be reduced by gluing the flooring to the subfloor, in addition to the use of mechanical fasteners. The installer should be reminded that adhesives used for this purpose will not perform their function when used in conjunction with a moisture retardant. Glue-assisted applications will not be satisfactory without direct contact with the subfloor. The glue should be a premium grade



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urethane construction adhesive applied in a serpentine pattern to the back of the hardwood.

STEP 1: Doorway and Wall Preparation

- Undercut door casings and jambs. Remove any existing base, shoe mold or doorway thresholds. These items can be replaced after installation. All door casings and jambs should be undercut to avoid difficult scribe cuts.
- Install the moisture retardant (if used) parallel to the flooring. Overlap the rows 6"(15 cm). Overlap (top) should be on the same side as the groove of the flooring so that the hardwood will slide smoothly into place. Staple the moisture retardant material as necessary to prevent excessive movement.

STEP 2: Establish a Starting Point

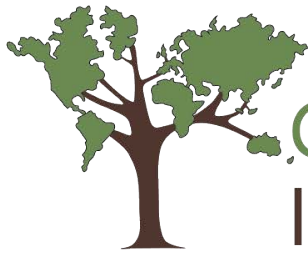
- Installation parallel to the longest wall is recommended for best visual effects; however, the floor should be installed perpendicular to the flooring joists unless subfloor has been reinforced to reduce subfloor sagging.
- When possible, always begin layout or installation from the straightest wall, generally an outside wall.
- In at least two places at least 18"(46 cm) from the corner, measure out equal distance from the starting wall the face width of the starter board plus 1"(2.5 cm) (do not include the width of the tongue in this measurement). Mark these points and snap a chalk line through them. This measurement allows for the required $\frac{3}{4}$ "(19 mm) expansion and the width of the tongue.

STEP 3: Installing First & Second Rows – Starting from Wall

- Use the longest, straightest boards available for the first two rows. For random and alternate width products use the widest plank for the first row. Align tongue of first row on chalk line. The groove should be facing the starting wall.
- Use a pneumatic finish nailer to face-nail the groove side $\frac{1}{2}$ "(13 mm) from the edge at 6"(15 cm) intervals and 1"–3"(2.5–7.6 cm) from each end. Then, blind nail using a finishing gun held at a 45° angle. Nail down through the nailing "pocket" on top of the tongue every 6"–8"(15–20 cm).
- If using finish nails, pre-drill the nail holes with a $\frac{1}{32}$ "(2 mm) bit approximately $\frac{1}{2}$ "(13 mm) from back (groove) edge, 1"–3"(2.5–7.6 cm) from each end, and at 6"(15 cm) intervals. Pre-drill at the same intervals at a 45° angle down through the nailing "pocket" on top of the tongue. Face-nail the groove side where pre-drilled. When complete, blind-nail at a 45° angle through the tongue of the first row. Fasten using 6 or 8d finish nails. Countersink nails to ensure flush engagement of the groove. Avoid bruising the hardwood by using a nail set to countersink the nails.
- Continue blind-nailing using this method with the following rows until blind nailer can be

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used.

STEP 2–3 ALTERNATIVE: Installing First & Second Rows – Starting from Center of Room

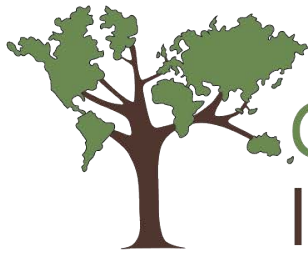
- Snap a chalk line down the center of the room.
- Install a sacrificial row that extends the entire length of the room on the centerline.
- Install three rows of flooring.
- Remove the sacrificial row and insert wood glue in the groove followed by a slip tongue (spline) in the exposed groove.
- Always glue and nail the slip tongue in place.
- Installation can now continue from the center in both directions.

STEP 4: Dry Lay (Racking) the Floor

- “Dry” lay (rack) materials to cover approximately two-thirds of the room. Begin dry laying (racking) approximately 6”(15 cm) from the edge of the previously installed rows. Avoid pulling boards too tightly together on the sides, as they must move freely when fastening begins.
- Do not cut final board until row has been installed. Cutting the board in advance may result in a board that is too short.
- Visually inspect flooring, setting aside boards that need to have natural character flaws cut out.
- Use these boards for the starting and finishing rows after objectionable characteristics have been removed.

STEP 5: Installing the Floor

- Use the blind nailer to fasten a sacrificial board to the floor. Check for surface damage, air pressure setting, tongue damage, etc., before proceeding. Make all adjustments and corrections before installation begins. Once proper adjustments have been made, remove and destroy the board.
- Begin installation with several rows at a time. Use the fastener schedule for proper spacing based on board width. Fasten each board with a minimum of two fasteners 1”–3”(2.5–7.6 cm) from the ends. To ensure a more favorable overall appearance end-joints of adjacent rows should be staggered a minimum of 4”–6”(10–15 cm) when possible.
- The last 1–2 rows will need to be face-nailed where clearance does not permit blind nailing with the stapler or brad nailer. Pre-drill and face-nail on the tongue side following the nailing pattern used for the first row.
- Rip final row to fit and face-nail. If the final row is less than 1”(2.5 cm) in width, it should first be glued to the previous UNINSTALLED row and the two joined units should be face-nailed as one.



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STEP 6: Complete the Installation

- Remove all tape and clean the floor with the recommended hardwood flooring cleaner.
- Install or re-install any transition pieces, reducer strips, T-moldings, thresholds, bases and/or quarter round moldings that may be needed. These products are available pre-finished to blend with your flooring. Nail moldings into the wall, not the floor.
- Inspect the floor, filling all minor gaps with the appropriate blended filler.
- If the floor is to be covered, use a breathable material such as cardboard. Do not cover with plastic.
- Leave warranty and floor care information with the owner. Advise them of the product name and code number of the flooring they purchased.
- To prevent surface damage, avoid rolling heavy furniture and appliances on the floor. Use plywood, hardboard or appliance lifts if necessary. Use protective castors/castor cups or felt pads on the legs of furniture to prevent damage to the flooring.

Greenwood Flooring International wants every customer to be happy and satisfied with their floor purchase. If there are claims or questions, or in the event that you are not totally satisfied with your hardwood floor, contact your local retailer first. If the retailer is unable to answer your questions, you may contact Greenwood Flooring International flooring at the following address:

ATTN: Customer Service, Greenwood Flooring International
8400-B Remington Avenue Pennsauken, NJ 08110 USA