Allwood™

Wood Flooring Installation Instructions

Installer/Owner Responsibilities

Beautiful hardwood floors are a product of nature and therefore have variations that are natural for the product. Allwood Hardwood and Bamboo floors meet or surpass accepted industry standards, which permit a defect tolerance not to exceed 5%. The defects may be of a manufacturing or a natural type.

- The installer assumes all responsibility for final inspection of product quality. This inspection of all flooring should be done before installation. Carefully examine flooring for color, finish and quality before installing it. If material is not acceptable, do not install it and contact the seller immediately.

- Prior to installation of any hardwood-flooring product, the installer must determine that the job-site environment and the sub-surfaces involved meet or exceed all applicable standards and recommendations of the construction and materials industries. These instructions recommend that the subfloor be dry, stiff and flat, thermostat/humidistat set to regular living setting and the flooring acclimated under this setting. The manufacturer declines any responsibility for job failure resulting from or associated with sub-surface or job-site environment deficiencies.

- During installation, the installer must use reasonable selectivity and hold out or cut off pieces with defects, 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 defect correction during installation should be accepted as normal procedure.

- When flooring is ordered, add 5% to the actual square footage needed, for cutting and grading allowance.

- Use of appropriate products for correcting subfloor voids should be accepted as a normal industry practice.

- Follow NWFA Installation Guidelines if any of the instructions in this manual differ from or conflict with the former.

Getting Started

Required tools: Hygrometer, moisture meter,chalk line & chalk, measuring tape, square, miter, jig/table & jamb saw, safety glasses, tapping block, hammer & bar, wedges, masking tape.

Additional tools (depending on installation method): Glue-down adhesives (Determined by the job site conditions, subfloor, etc.), adhesive cleaner, trowel, stapler/cleat nailer & nails, air compressor if pneumatic nailer.

Pre-Installation Procedure

Job Site Inspection

- The building should be closed in 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.
- Exterior grading should be complete with surface drainage directing water away from the building. All gutters and downspouts should be in place.
- Basements and crawl spaces must be dry and well-ventilated, and meet the minimum requirements of the International Residential Code (IRC), as detailed in IRC Section R408.
- Subfloor must be checked for moisture content (MC) using the appropriate testing method.
- Air conditioning and heating systems should be in place and operational. The thermostat and humidistat should be set at normal living levels, with recommended temperature of 60 – 75° F and relative humidity (humidity) of 30 – 50%, at least seven days prior to installation. This humidity range between 30% and 50% should be maintained during acclimation, installation, and after installed.

Storage & Acclimation

- Handle and unload cartons with care. Cartons should be stored on “on-grade” concrete floors, in a location with at least a 4” air space under the cartons. Flooring should not be delivered until the building has been closed in, with windows and doors in place and until cement work, plastering and all other “wet” work is completed and dry. Concrete should be at least 60-days old before moisture testing should take place.
- Acclimate the flooring under occupied conditions until the flooring’s moisture content (MC) and temperature reach equilibrium of moisture content (EMC), which may take 1 to 4 weeks, depending on the environment and the flooring. Within the recommended range of temperature (60° – 75° F) and relative humidity (RH) (30% – 50%, or 35% – 55%), the EMC is primarily a function of the relative humidity and can be estimated by using the chart below:

Relative Humidity (%)	30	35	40	45	50	55	60
EMC (%)	6.2	6.9	7.7	8.5	9.2	10.1	11

- Determine the indoor RH range and the corresponding EMC in the home/construction. The indoor RH range depends on local weather conditions, cooling/heating system used, and living habits. In some extremely humid or dry locations or on extremely dry or humid days, additional dehumidification or humidification may be needed to keep the RH within the 30% – 50% range.
- Ensure facility is capable of, and being maintained at normal living conditions, as defined within these instructions. Moisture content of the floor relies on these conditions. For example, if the humidistat is set to 40% and the indoor RH fluctuates between 35% and 45%, then the flooring MC should be around 6.9% – 8.5% before installation.
- For solid flooring acclimation, open the packages onsite, under occupied conditions. Normal acclimation time is 10 – 14 days, but more time may be required, depending on the environmental conditions as compared to the flooring MC level. Measure the flooring MC before installation to ensure the flooring is properly acclimated.
- For engineered flooring, do not open packages until you are ready to install. Ensure the facility is capable of, and being maintained at, a temperature 60 – 75F and an RH 30 – 50%” Once this has been validated, and documented, you may install the flooring.

Doorway & Wall Preparation

Undercut door casings. Remove, if any, existing base, shoe molding or doorway thresholds. These items can be replaced after installation. All door casings should be notched out or undercut to avoid difficult scribe cuts.

Inspect the Flooring before Installation

Real wood and bamboo flooring contains natural variations in color and grain pattern. In order to prevent color grouping or repetitive grain patterns in the finished floor, it is recommended that several packages be opened and that boards from each of these packages be racked (sorted to be visually pleasing) before the floor is permanently installed.

- Immediately prior to installation, unpack 1 to 3 cartons to get a sense of the range of color variation and arrange the planks to achieve a satisfactory appearance (rack the boards).
- When racking, inspect all boards for visible manufacturing defects. Do not install any defected boards. Boards with manufacturing defects in excess of industry standards (5% of total quantity) may be replaced by the dealer under the terms of the product warranty. Once installed, boards will be considered to have been accepted by the customer and will not be eligible for replacement (See Warranty for details).
- Be attentive to staggering the ends of boards in adjacent rows at least 6″ when possible. This will help ensure a more pleasant overall appearance of the floor.

Subfloor Types and Requirements: See Appendix A
Radiant Heat: See Appendix B
Estimate Dimensional Movement: See Appendix C
Sound Control: See Appendix D
Moisture Testing & Vapor Retarders: See Appendix E

Choose Installation Method

Depending on the sub-floor and personal preference, engineered flooring with tongue and groove structure can be installed using one of three ways: floating, glue down or nail/staple down methods. Engineered flooring can be installed on, above or below grade level.

IMPORTANT: Never install a wood floor over a known moisture condition. A known moisture condition is one that you are aware of, and could pose future damage to the flooring, the building, or the occupants. It is best practice to always test for moisture regardless of conditions so that any unknown conditions can become known conditions, which then can be handled appropriately.

Medthod One — Floating Floor

Step 1: Establish a Starting Point

- Choose an adhesive made for installing floated tongue and groove wood flooring. For more information selecting a glue that fits your installation, refer to the NWFA Installation Guidelines.
- Installation parallel to the longest wall is recommended for best visual effects, however, the floor should be installed perpendicular to the flooring joists, unless the subfloor has been reinforced to reduce subfloor sagging. Find appropriate subfloor from “Subfloor Type” section in this instruction manual.
- When possible, always begin layout or installation from an outside wall, as these are normally the straightest.
- Pre-plan the floor by counting the number of planks (in width) that it will take to complete the floor. Avoid finishing out with a rip narrower than 2”. Plan to start the first row with a partial board, ripping it to the necessary width to avoid a narrow rip on the final wall.
- In at least two places 12” – 16” from the corner, measure out equal distances from the starting wall and snap a chalk line. The chalk should be of a bright color so that it is visible through the underlayment or adhesive. If a partial, ripped board is required (as above) it can be installed after the balance of the flooring has been completed. Adjust the starting line to allow for the width of the board plus 3/8” for expansion. Ascertain that the wall is straight. If it is not, scribe the first row to allow for irregularities.
- Install a starter board on the inside edge of the chalk line aligned to create a straight edge to work against. Attach the starter board to the subfloor using nails appropriate to the subflooring materials. Install the underlayment before installing the starter board.

Step 2: Installing the Underlayment

- Refer to the NWFA Installation Guidelines for recommendations on selecting an underlayment that fits your installation.
- Roll the underlayment in the same direction that the wood flooring is to be installed.
- Extend the underlayment a few inches up the wall. Excess will be trimmed off prior to installing trim or moldings.
- Firmly bond the sheets together to cover the entire floor. The floating floor underlayment already has double-sided tape for ease of taping the precut overlapping seams.

Step 3: Installing the Floor

- Always allow 3/8” expansion around all vertical objects.
- Select your first board and, following the manufacturer’s instructions of the glue you’ve seleced, apply a continuous bead of glue to the top of the tongue on the end of the board. Do not apply glue to the side-tongue at this time.
- Lay the first board with the grooves facing the edge of the starter board and the left wall of the room. (Always leave expansion space).
- Complete the first row. Cut the last board allowing for 3/8” clearance between the wall and the floor. (Use the remaining end of the cut board as a starter board for any row after). Use an installation bar to pull the last board into place. Install wedges into the gap and tighten.
- If any glue gets on the surface of the flooring, wipe off immediately with a damp cloth.
- Start the second row by applying a continuous bead of adhesive along the top side of the tongue of row one.
- In the remaining rows, stagger joints at least 6” apart. When installing boards together, use a tapping block against the tongue, not the groove. Apply a bead of adhesive to the tongue on the end and side. Tap the boards into place by tapping with a hammer on the tapping block. Do not tap directly on the boards with the hammer. Be sure all joints are tight. Use spacers on the long and butt walls Use an installation bar to tighten the joints from the ends. Remove excess adhesive with a damp towel.
- The final row of boards, in most installations, will need to be ripped lengthwise to fit. The cut has to compensate for uneven walls and the expansion clearance or gap necessary between the wall and the flooring. First, lay the last row face-up on top of the last row permanently installed. Now, using a stub of a board and a pencil, scribe the proper guide lines and cut the board.
- Use an installation bar to pull in the last row and install wedges.
- Remove the starter board and install the final row using the installation bar as above.
- Allow the completed floor to rest undisturbed (no foot traffic) for a minimum of 8 hours before removing the wedges.
- Before leaving the job site, check the floor under proper lighting for any trace of glue on the surface. Use adhesive cleaner to remove stubborn glue. Install molding the following day. Refer to the floor care and maintenance section for maintaining your wood flooring.

Method Two — Glue-Down

Step 1: Preparation

- Choose an adhesive made for installing glue-down wood flooring. For more information selecting a glue that fits your installation, refer to the NWFA Installation Guidelines.
- Read the instructions for your chosen adhesive carefully before proceeding. Open time and curing time of adhesives can vary dependent upon the type of adhesives, subfloor porosity, air movement, humidity and room temperature. Typical working time for urethane adhesives is about 60 minutes, and polymeric resin adhesives 90 minutes.
- Urethane adhesives have a shortened work time in high humidity environments whereas polymeric resin adhesive working time will be lengthened. In areas of low humidity, open time will be longer with urethanes and shorter with polymeric resins. Adjust the amount of adhesive spread accordingly. The adhesive should not be applied if subfloor or room temperature is below 65° F.
- Use Kneeler Board. Avoid installing from the surface of the flooring. If necessary, distribute weight using a kneeler board. Always refer to specific adhesive instructions on the adhesive label.
- Padded underlayment will not be used in this application.

Step 2: Spreading the Adhesive

- Always follow the adhesive manufacturer's recommendation for proper subfloor, spread rate and trowel notch.
- When troweling out adhesive, the trowel will leave ridges of adhesive and very little adhesive between the ridges. This will allow you to still see the chalk lines between the ridges and provide the recommended spread rate. If the adhesive skins over and fails to transfer, remove and spread new adhesive to achieve proper bonding to the subfloor. Working time will vary depending on job site conditions.
- During the installation occasionally remove a piece of flooring from the subfloor and inspect the back for proper adhesive transfer. Adequate adhesive transfer is necessary to ensure sufficient holding strength.
- When not in use, keep the adhesive container tightly closed to prevent thickening. Thickening will cause difficulty in spreading the adhesive.
- Proper ventilation within the room must be provided. An electric fan is helpful.
- If the floor is to be covered, use a breathable material such as cardboard. Do not cover with plastic. Do not tape the protective material directly to the floor. Do not let tape remain on flooring longer than 24 hours. Avoid use of masking tape that leaves an adhesive residue.

Step 3: Installation of Flooring

- The first row of planks should be installed with the edge of the groove lined up against the starter board. The tongue should be facing the starting wall. The first row must be aligned and seated in the adhesive as all additional rows will be pushed back to this original row.
- Apply a bead of adhesive to all of the end tongues prior to installing into the adhesive. Gluing of the edges is not necessary in glue-down applications.
- Use wedges against the starting wall to prevent movement. Tighten or loosen as necessary to allow for variations in the wall, always keeping planks aligned with the chalk line.
- Avoid working from the surface of the newly installed floor to prevent scooting. Use a kneeler board if necessary to distribute weight.
- When installing planks, engage the end-joint first as close to the side (long) tongue and groove as possible and then slide together tightly to engage side (long) joint tongue and groove. To avoid adhesive bleedthrough and memory pull-back, avoid sliding pieces through the adhesive as much as possible when placing them in position.
- Check for a tight fit between all edges and ends of each plank. End-joints of adjacent rows should be staggered 6" when possible to ensure a more favorable overall appearance.
- Use a glue-down tapping block and a hammer to tighten all joints. Note that Allwood engineered floor collections are purposely designed with tight tongue and groove connections for better hold-in-place before the glue is cured.
- To eliminate minor shifting or gapping of product during installation, use masking tape to hold the planks together. After installation is complete, remove all the mask tape from surface of newly installed flooring. Do not let tape remain on flooring longer than 24 hours. Avoid use of masking tape that leaves an adhesive residue.
- Be sure to spread adhesive only within your current work area.
- Complete the installation using this same technique for the remainder of the floor.
- Remove the starter board and install the final row as above.
- Avoid heavy foot traffic on the flooring for at least 24 hours. Lift the furniture or fixtures back into place after 24 hours.

NOTE: *Clean adhesive from the surface of the floor frequently using the recommended adhesive cleaner. Do not use blue tape before adhesive is removed. Use a clean towel, changed frequently to prevent haze and adhesive residue.*

Method Three — Staple/Nail-Down

Step 1: Establish a Starting Point

- The floor should be installed perpendicular to the flooring joists unless subfloor has been reinforced to reduce subfloor sagging. Find appropriate subfloor from "Subfloor Type" section in this instruction manual.
- When possible, always begin layout or installation from an outside wall, as these are normally the straightest.
- Pre-plan the floor by counting the number of planks (in width) that it will take to complete the floor. Avoid finishing out with a rip narrower than 2". Plan to start the first row with a partial board, ripping it to the necessary width to avoid a narrow rip on the final wall.
- In at least two places 12" – 16" from the corner, measure out equal distance from the starting wall and snap a chalk line. The chalk should be of a bright color so that it is visible through vapor retarder. If a partial, ripped board is required (as above) it can be installed after the balance of the flooring has been completed. Adjust the starting line to allow for the width of the board plus 3/8" for expansion. Ascertain that the wall is straight. If it is not, scribe the first row to allow for irregularities.

Step 2: Installing Vapor Retarder

- A vapor retarder that meets the Class II permiability requirements as defined by the IRC should be installed onto any unconditioned space prior to stapling/nailing the wood flooring.

Step 3: Installation of Flooring

- Lay one row of planks along the entire length of the working line. The groove should be facing the starting wall.
- It is not recommended to top nail wood flooring. Instead, in locations where blind nailing is prohibitive, use flooring adhesive per manufacturer's specifications, to secure flooring to subfloor. Each successive row should be blind-nailed wherever possible as follows.
- Use narrow crowned staples or hardwood flooring cleats 1-1/4" – 1-1/2" in length designed for engineered flooring spaced every 3 – 4" and within 1 – 2" of end joints.
- Add each additional row of flooring. Distribute lengths, avoiding "H" patterns and other discernible patterns in adjacent runs. Stagger end joints of boards row to row a minimum of 6".
- During installation of flooring pieces, push or gently tap boards flush to the previous row. Tap against the tongue; tapping the groove may damage the edge. To prevent damage to the finish, avoid tapping the face of the board with a rubber mallet. Note that Allwood engineered floor collections are purposely designed with tight tongue and groove connections for better hold-in-place before the glue is cured when using floating and glue down installation methods.

Method Four — Glue-Assisted Nail-down

Due to the reduction in the amount of fasteners used per square foot of flooring width, wide plank (>5" widths) solid and engineered wood flooring should be installed using the glue-assisted installation method.

- When using the glue-assist method, you will no longer be able to install a traditional sheet-good vapor retarder. When nailing down wood flooring over a conditioned space that is maintained at the same conditions as the living/interior space, no vapor retarder is necessary. Wood floors installed in these conditions may be nailed with a glue-assist directly to the subfloor without use of a vapor retarder.
- Where wood flooring is being installed over unconditioned space, use of a liquid-applied, or similar Class II vapor retarder that is compatible with the flooring adhesive may be used to allow for a glue-assist directly to the subfloor.

Step 1: Preparation

- Choose an adhesive made for installing glue-down wood flooring. For more information selecting a glue that fits your installation, refer to the NWFA Installation Guidelines.
- Read the instructions for your chosen adhesive carefully before proceeding.
- Where mechanical fasteners on a nail-down installation are the primary installation method, the nailing schedule should remain the same as normal installation for the flooring being installed. The addition of adhesive is not intended as a replacement fastener mechanism, rather supplemental to the mechanical fastener.
- Where the adhesive is applied using a full-spread application, the fastener schedule is not to be considered the primary fastening method.
- The adhesive used should be a wood flooring adhesive with elastomeric qualities to allow for normal movement within the flooring system. The adhesive must also be compatible with the subflooring and any liquid-applied vapor retarder system used.
- The wood subfloor must be thoroughly vacuumed, and free of any debris to ensure adhesion between the subfloor and the wood floor.
- Test the adhesive to determine the mosteffective application method, and for compatibility with the subfloor. The adhesive application method should add supplemental holding power to the installation.
- The wood flooring adhesive may be applied to the subfloor or the backside of the board itself in a variety of methods to supplement the mechanical fastener. With any of the following application methods, use a notch trowel, or apply a continuous, minimum ¼" wide, uniform bead of adhesive directly to the subfloor, or to the back of the board using a glue gun to dispense the adhesive.
- The adhesive should be applied in a manner that covers the entire width and length of each plank, to within a minimum of 1" from the edges and ends of each board.

Step 2: Installation of Flooring

- Glue-down is the primary installation method. The adhesive application should remain the same as normal installation for the flooring being installed (see Glue-Down Installation Method). The addition of mechanical fasteners is not intended as a replacement fastening mechanism, rather a supplemental method.
- With full-spread installations over wood subfloors or screeds/ sleepers, it is sometimes necessary or helpful to blind-nail the flooring periodically in order to hold the flooring in place while the adhesive sets-up.
- This method may be appropriate where flooring needs to be driven tight during the installation.
- There is no recommended nailing schedule for this method, as the fasteners are strictly used as a supplement to the glue-down method.

IMPORTANT: When using a trigger-activated flooring nailer with the glue-assisted installation method, the installer must either stand on the floor, or apply a downward pressure to the surface of each board as it is being nailed. This will ensure the flooring does not lift away from the subfloor causing unnecessary vertical movement or hollow noises.

Appendix A — Subfloors and Requirements

The general requirement for subfloors is flat, dry and structurally sound. Under these criteria, wood panels/solid board, concrete slab and other existing floor covering materials can all be used as subfloor.

Wood Panels & Solid Board Subfloors

The subfloors must be flat

- For nail/staple down installations, the subfloor should be flat to within 1/4” in 10 feet or 3/16” in 6 feet radius.
- For glue-down and floating installations and installations using mechanical fasteners of less than 1-1/2”, the subfloor should be flat to within 3/16” in 10 feet or 1/8” in 6 feet radius.
- Edge swell should also be flattened. This can usually be accomplished by using an edger sander.
- Make sure the subfloor is free of debris before beginning installation.

The subfloors must be dry

- Installers should know the MC of the subfloor and the flooring. There should be no more than 2 percent difference in MC between properly acclimated wood flooring and subflooring materials before installation.
- Ensure that there is proper expansion space (1/8”) between the panels. If the subfloor panels are not tongue and grooved and if there is not sufficient expansion space, use a circular saw to create the specified space. Do not saw through joints on T&G subfloors.

The subfloors must be structurally sound

- Inspect the subfloor carefully. If there is movement or squeaks in the subfloor, refasten the subfloor to the joists in problem areas. Protruding fasteners are easily remedied by driving those fasteners deeper into the subfloor.
- Check for delaminated or damaged areas and repair those areas as needed.

Acceptable Panel Subfloors:

- On truss/joist spacing of 16” (406mm) o/c or less, the industry standard for single-panel subflooring is minimum 5/8” (19/32”, 15.1mm) CD Exposure 1 Plywood subfloor panels (CD Exposure 1) or 23/32 OSB Exposure 1 subfloor panels, 4’ x 8′ sheets.
- On truss/joist spacing of more than 16”, up to 19.2″ (488mm) o/c, the standard is minimum 3/4” (23/32”, 18.3mm) T&G CD Exposure 1 Plywood subfloor panels, (Exposure 1), 4’ x 8′ sheets, glued and mechanically fastened, or minimum ¾” (23/32″, 18.3mm) OSB Exposure 1 subfloor panels, 4’ x 8’ sheet glued and mechanically fastened.

Acceptable Panel Subfloors continued...

- Truss/joist systems spaced over more than 19.2" (488mm) o/c up to a maximum of 24" (610 mm) require minimum 7/8" T&G CD Exposure 1 Plywood subfloor panels, (Exposure 1), 4' x 8′ sheets, glued and mechanically fastened, or nominal 1" OSB Exposure 1 subfloor panels, 4' x 8' sheets, glued in accordance with the truss/joist manufacturer's recommendations and with local building codes. Some truss/joist systems cannot be cross-braced and still maintain stability.
- For double-layer subfloors, the first layer should consist of nominal 3/4" (23/32", 18.3mm) CD Exposure 1 Plywood subfloor panels (CDX), 4' x 8′ sheets or nominal 3/4" (23/32", 18.3mm) OSB Exposure 1 subfloor panels, 4' x 8' sheets. The second layer should consist of nominal 1/2" (15/32", 11.9mm) CD Exposure 1 plywood subfloor panels, (Exposure 1) 4' x 8' sheets. The 1/2" plywood should be offset by 1/2" panels in each direction to the existing subflooring. The panels may also be laid on a diagonal or perpendicular, with 1/8" spacing between sheets. Nail on a 12" minimum grid pattern, using ring shank nails or staples.
- Typical panel spacing and fastening requirements for truss/joist systems call for approximately 1/8" expansion space around the perimeter of each panel, with panels fastened every 12" (305 mm) along intermediate supports.

Acceptable Solid Subfloors:

- Allwood Solid Hardwood Collection (3/4" in thickness) can be installed directly over solid-board subflooring. Other collections must have a 3/8" or better plywood underlayment installed over solid board subflooring.
- Solid board subflooring should be: 3/4" x 5-1/2" (1" x 6"), Group 1 dense softwoods (SYP, Doug Fir, Larch, etc.), No. 2 Common, kiln-dried.
- Solid-board subflooring should consist of boards no wider than 6", installed on a 45-degree angle, with all board ends full bearing on the joists and fastened with minimum 8d rosin-coated or ring-shanked nails, or equivalent.

Concrete Subfloors

The subfloors must be flat

- Flatness tolerance of 1/8"in a 6-foot radius and or 3/16" in a 10-foot radius. Many high spots can be removed by grinding, depressions can be filled with approved patching compounds, and slabs also can be flattened using a self-leveling concrete product.
- When sanding or grinding concrete, care must be taken to minimize the amount of silica dust produced. OSHA recommends using dust-collection devices, or applying water to the concrete before sanding. Approved respirators may also be used to minimize the amount of silica dust inhaled.
- The surface should be free from non-compatible sealers, waxes, oil, paint, drywall compound, etc. Check for the presence of sealers by applying drops of water to the slab. If the water beads up, there may be sealers or oils.
- Burnished or slick slabs may require screening or sanding with a 30-grit abrasive.

The subfloors must be dry

- NWFA guidelines specify using relative-humidity testing (ASTM F2170), calcium chloride testing (ASTM F1869) to identify the MC of the slab.
- Always use a class I vapor retarder when installing on, and below grade. When installing on an elevated slab, it is recommended, but not always necessary, depending on the moisture conditions of the slab.

The subfloors must be structurally sound

- Minimum 3000 psi.
- Over lightweight concrete (less than 3000 psi), if the flooring adhesive used has a higher shear strength than the concrete, use the floated subfloor installation method.
- If the psi of the concrete is unknown, use the floated subfloor installation method or contact the adhesive manufacturer. Rule of thumb: Draw a nail across the top; if it leaves an indentation, it is probably lightweight concrete.
- Do not attempt to glue a wood floor over a chalky or soft concrete slab.
- Allwood engineered and solid flooring collections cannot be installed directly over screed system, but the screed system needs to be overlaid with proper subflooring. The screed system must be overlaid with 23/32" Exposure 1 plywood subfloor panels, or 19/32" (15.1 mm), Exposure 1 plywood subfloor panels or 23/32" OSB Exposure 1 properly spaced and oriented perpendicular to screed direction, and across two or more spans.

Other Existing Surfaces as Subfloors

Acoustic Concrete*

Acoustic concrete normally contains large quantities of gypsum that may inhibit the adhesive's capability to properly bond. For glue-down applications, acoustic concrete must be primed with the concrete manufacturer's recommended primer/surface hardener. Resilient Tile, Resilient Sheet Vinyl & Cork Flooring (For Floating or Glue Down Installation Only).

If the tiles or sheet goods are well bonded, the flooring can be glued directly to the surface. Clean the surface thoroughly with a good quality household detergent. De-gloss flooring as necessary to create a good adhesive bond using an abrasive pad. If vinyl appears to have a coating of wax or other maintenance materials, it must be removed with the appropriate floor stripper. Allow ample drying time.
Note: *Do not sand any resilient products for they may contain asbestos fibers, which may be harmful.*

Do not direct glue to floors that exceed two layers; install as a floating system only under these circumstances. Cork floors must have all sealers and surface treatments removed before installation begins if a direct glue-down application is preferred.

Ceramic, Terrazzo, Slate & Marble*

All grout joints and broken corners that exceed 1″ must be filled with leveling compound mixed with Latex additive of a glue-down application is preferred. The surface should be cleaned and abraded to create a good bonding surface for the adhesive. Loose tiles must be re-adhered to the subfloor or filled as above for both glue-down and floated applications.

Cork (Acoustic)*

Floating floors can be glued or floated directly over full-spread, permanently bonded acoustic cork. The cork should have a density of no less than 11.4 lb/cubic foot and no more than 13 lb/cubic foot. The cork, in general, should be pure cork combined with a polyurethane binder. Cork thickness is to be no more than 1/4" (6 mm). Install cork in accordance with manufacturer's recommendations. Do not use cushion underlayment when floating over cork surfaces.

Installing Wood Panels Over Concrete

Floated Subfloor Installation — Method One

- Add vapor retarder before applying underlayment, unless the underlayment is a vapor retarder itself.
- Panel Material: 2 layers minimum 3/8" (10 mm) minimum CD Exposure 1 Plywood subfloor panels (CDX) 4' x 8′ sheets.
- Place the first plywood layer with edges parallel to wall, without fastening. Leave 3/4" space between wall and plywood.
- Lay second layer perpendicular or at 45 degree angle to the first.
- Plywood panels should be placed with 1/8" gaps between sheets and a 3/4" minimum expansion space at all vertical obstructions and along wall lines.
- Using urethane or construction adhesive, taple/screw and glue the second layer to first layer on 12" interior grid pattern (6" on the perimeter). Be careful not to penetrate the vapor retarder.

Floated Subfloor Installation — Method Two

- Add vapor retarder before applying underlayment, unless the underlayment is a vapor retarder itself.
- Alternate Wood panels: Use minimum 3/4" (23/32", 18.3 mm) CD Exposure 1 Plywood sheathing, 4' x 8' sheets.
- Cut sheets to 16" x 8' or smaller panels, scored on back 3/8" deep a minimum of every 12" across width.
- 16" planks oriented perpendicular or diagonally to the direction of the flooring.
- Panels staggered every 2', and spaced 1/8" between ends, with 3/4" minimum expansion space at all vertical obstructions.

Glue-Down Subfloor Installation

- Always follow the adhesive manufacturer's recommendation for proper subfloor, spread rate and trowel notch.
- Add vapor retarder before applying underlayment.
- Panel Material: Use minimum 3/4" (23/32, 18.3mm) CD Exposure 1 Plywood subfloor panels, (Exposure 1), 4' x 8' sheets.
- Cut the plywood panels to 2' x 8' or 4' x 4' sections.

Appendix B — Radiant Heat Installation Guidelines

Allwood Engineered Hardwood Collections and Classic Bamboo Engineered Collection can be installed over radiant heat as long as the guidelines below are followed.

Max allowable subfloor surface temperature is 80° F.

Even distribution of heat, heating system and subfloor materials

With water-heated radiant-heat systems, a pressure test must be performed and documented by a qualified plumber or the system installer prior to beginning the installation of the wood flooring. Electric under floor systems should also be tested prior to floor installation. Check heat system manufacturer guidelines. If flooring materials that conduct heat at different rates are on the same circuit or heating zone, check with the HVAC mechanical engineer and Radiant Panel Association before proceeding. Radiant-heated subfloor systems can be concrete, wood or a combination of both, as long as the material will distribute heat evenly.

The vapor retarder and the subfloor moisture content

Humid heat is to be avoided by using proper vapor retarder and dry subfloor, or a system to prevent moisture accumulation under the flooring. A 6-mil or better polyethylene vapor retarder and a foam or resilient underlayment should be installed over subfloors. Turn the heat on, regardless of the season, and leave it on for at least 5 – 6 days until the subfloor MC has dropped below 9%. Turn off the heat before the installation of the flooring begins, so the adhesive does not cure too quickly.

Flooring moisture content

The average Moisture Content of Allwood flooring is 7%, with limited moisture gain or loss (1%) during transportation and storage before the boxes are opened. The floor should be acclimated to 6% – 7% before installation.

Indoor humidity control

The indoor air humidity should be maintained at 50% – 60% or no less than 40% once the heat is turned on. For example, with radiant heat on at 85° F, the floor EMC is about 7% at 60% indoor air humidity and at 68° F temperature, EMC 6% at 50% humidity, and EMC 5.4% at 40% humidity. The indoor air humidity should be maintained at 30% – 40% or no more than 50% once the heat is turned off. For example, with radiant heat off, the floor EMC is about 6.2% at 30% indoor air humidity, EMC 7.7% at 40% humidity, and EMC 9.2% at 50% humidity.

Installation Methods

- Floating installation (recommended): Expect some heating season shrinkage and cooling season expansion. The flooring

**Floating or Glue-Down Installation Only*

should be installed at the median MC between the lowest and highest EMC of the on and off heating season. For example, if you would like to control the humidity to 40% year round, the EMC will be between 5.4% – 7.7%, and the suggested floor MC at installation is 6.5%.

• Staple/nail and glue-down installation: Staple/nail-down can be used if dry heat is achieved and the indoor air humidity can be controlled within a very tight range, about 50 – 60% at heating season and 30% – 40% at off heat season. Be sure fasteners are not so long as to penetrate heating tubes or heat sources for nail/staple down installation. Make sure the moisture induced by the glue is dissipated before the radiant heat is turned on when using glue down method. Use the glue formulated for radiant heat. Read the label on the bottle or consult the manufacture.

Turn on the Radiant Heat

To minimize the effect that rapid changes in temperature will have on the MC of the wood floor, the temperature difference between the flooring and the indoor air should be kept at less than 10° F during the heating up process. As the indoor air is heating up, the humidity will decrease if there is not adequate humidification control. Make sure to maintain the humidity at the acceptable level as the temperature increases.

The floor temperature can be increased faster when indoor air humidity is higher.

Floor MC and Environment Control

With radiant heat, the heat source is directly beneath the flooring, so the flooring may dry out faster than a similar floor in a home with a conventional heating system. Wood flooring can be installed over radiant heat as long as you understand radiant heat and how it can impact wood flooring, what precautions to take, and what type of wood flooring to use.

Scenario 1 — Radiant Heat as dry heat to the floor

Assumptions: Proper vapor retarder has been installed to prevent excess humidity moving towards the flooring from beneath the flooring when it is heated. The subfloor has been properly acclimated to have the same MC as the floor or to be within 2% variation (eliminated another humidity source towards the floor).

Under this dry heat scenario, assume the floor is installed and heated to no greater than 80° F, and the room temperature is maintained at 68° F, then the floor EMC will be about:

4% @ 30% indoor humidity
5% @ 40% indoor humidity
6% @ 50% indoor humidity
7% @ 60% indoor humidity

Once the heat is turned off, and the room temperature is maintained at 68° F, then the floor EMC will be about:

6.2% @ 30% indoor humidity
7.7% @ 40% indoor humidity
9.2% @ 50% indoor humidity
11% @ 60% indoor humidity

Clearly, the floor should be acclimated to below 7% before installation. The indoor humidity should be maintained at 50% – 60% or no less than 40% once the heat is turned on. The indoor humidity should be maintained at 30% – 40% or no more than 50% once the heat is turned off.

Scenario 2 — Radiant Heat as humid heat to the floor.

Assumptions: Excess humidity from underneath the flooring is heated and moving towards the flooring. The subfloor has high MC (as another humidity source towards the floor). Under this humid heat scenario, moisture may accumulate between the radiant heat and the flooring, reaching saturation point (EMC up to 20%) for a period of time until the humidity is exhausted. The flooring would have high MC on the bottom side and lower MC on the top surface, which may cause the floor to buckle, cup and rupture.

Once the moisture is exhausted, the humid heat becomes dry heat, and Scenario I comes into play. The flooring will be dried to below 7% MC. Surface checks may appear, plus the remaining cupping. The wet-dry cycle may cause the floor to delaminate, which is most often the wood failure than the glue, because the glue used in the engineered flooring can mostly tolerate the severe condition. Clearly, the humid heat is to be avoided by using proper vapor retarder and dry subfloor, or a system to avoid the moisture accumulating under the flooring. Dry heat at higher indoor humidity and heat off at lower indoor humidity are the right settings.

Scenario 3 — Assume dry heat, indoor air temp 60° F

At 60% humidity of indoor air, the floor EMC is:

9.3% @ 65° F
8% @ 70° F
7% @ 75° F
6% @ 80° F
5.5% @ 85° F

At 50% humidity of indoor air the floor EMC is:

8% @ 65° F
7% @ 70° F
6.2% @ 75° F
5.4% @ 80° F
4.8% @ 85° F

Clearly, the floor temperature can be increased faster when indoor air humidity is higher. Suggestion: Use other heat source to keep the indoor air at 68 ° F or normal living temperature during installation and before turning on the radiant heat.

Scenario 4 — Assume dry heat, indoor air temp 50° F

At 60% humidity of indoor air, the floor EMC is:

7.0% @ 65° F
6.1% @ 70° F
5.4% @ 75° F
4.7% @ 80° F
4.1% @ 85° F

A 50% humidity of indoor air, the floor EMC is:

6.1% @ 65° F
5.3 % @ 70° F
4.6% @ 75° F
4.1% @ 80° F
3.5% @ 85° F

Clearly, the floor temperature should be increased at lower rate when indoor air temperature is lower. Suggestion: Use other heat source to keep the indoor air at 68° F or normal living temperature during installation and before turning on the radiant heat.

Appendix C — Estimate Dimensional Movement

Hardwood flooring will shrink when it loses moisture to the surrounding air, and will expand when it gains moisture. Under the same environmental conditions, solid flooring will shrink or expand more than engineered flooring. The shrinkage coefficient for engineered flooring is unavailable from publications, due to structural differences of various kinds of engineered flooring and species used. A reasonable estimate is that engineered flooring will shrink or expand half as much as the solid flooring under the same environmental conditions. Allwood is not responsible for the actual shrinkage variation of engineered flooring from this estimation due to the unproven nature of it. Do experiment or have the experiment done when a more accurate estimate is needed. To estimate the potential dimensional changes of the solid wood flooring, you need to know the interior relative humidity (RH) variation range after the flooring is installed in. A humidistat or hygrostat will regulate the interior RH range and give you the data to calculate the potential dimensional movement of the flooring.

Potential Dimensional Movement

Potential Dimensional Movement can be estimated by the following: (Potential dimensional movement = shrinkage coefficient of the wood species x MC change x the width of the flooring).

For example, 3-1/4" solid oak (mostly flatsawn) is acclimated to 7% MC before installation, for a room of 20' in width (about 77 rows). The interior humidity is to be controlled between 30% and 50% (EMC 6.2 – 9.2%) year round (with the help of air conditioning or additional humidification/dehumidification equipment if needed).

Known:
shrinkage coefficient = 0.00365
mc change @ 30% humidity = -0.8%
mc change @ 50% humidity = 2.2%

Then, accumulated potential dimensional change:
@ 30% RH, 0.00365(-0.8)*240 = -0.7" (shrinking) (less than 1/64" per board).*
@ 50% RH, 0.00365(2.2)*240 = 1.9" (expansion) (less than 1/32" per board).*

The potential dimensional change will be restrained by the neighboring boards, and will cause buckling/cupping/rupturing if too much expansion occurs or gapping if too much shrinkage occurs.

The rule of thumb is to control the RH within 20% variation which corresponds to 3% MC change, and the floor should be installed at a MC that is 1/3 – 1/2" from the lower end of the range. If MC of the floor is at the lower end of occupied RH range at the time of installation, spacers may be needed to allow future expansion. For example, if the flooring in the example above is installed in an interior with RH range 40% – 60% (EMC 7.7 – 11), then the potential dimensional change will be up to 3-1/2" (3/64" per board).

You may consider installing a spacer every a few rows.

Appendix D — Sound Control

In North America, there are two primary ratings used for sound control. They are Impact Insulation Class (IIC) and Sound Transmission Class (STC). It is important to understand what these ratings mean as they relate to flooring selection and the installation method. A number of factors contribute to a room's sound insulating ability.

Impact Insulation Class (IIC)
IIC, which stands for Impact Insulation Class, is a statistical measurement of the transmission of impact sound energy through a floor/ceiling assembly system (such as footsteps, dropped articles, or furniture moving across the floor). The larger the number, the more sound attenuation you have. The scale, like the decibel scale for sound, is logarithmic. IIC is measured and stated in accordance with ASTM E989 & C634, and is tested via ASTM E492.

- Delta (Δ) IIC is derived by subtracting the IIC of the nominal 6'' bare concrete from the IIC of the various tested assemblies. The higher the Delta IIC, the higher the performance level. Delta IIC is derived from ASTM E2179, the Standard Test Method for laboratory measurement of the effectiveness of floor coverings in reducing impact sound transmission through concrete floors.
- FIIC, Field Impact Insulation Class, refers to testing procedures conducted in the field following ASTM E1007 and E989. The FIIC test is conducted by setting up testing equipment in the field where sound is not as controllable.
- AIIC, Apparent Impact Insulation Class, refers to testing procedures conducted in the field following ASTM E1007. For these metrics, sound power from associated support structures are attributed to the floor-ceiling assembly. Because these are measures of the apparent performance of the nominally separating floor-ceiling, the receiving room shall be the space directly under the tapping machine.

Sound Transmission Class (STC)
STC, which stands for Sound Transmission Class, is a rating of how well a building partition attenuates airborne sound (such as voices, radio, or television) in the context of multi-family facilities. STC is measured and stated in accordance with ASTM C634, and tested via ASTM E90, E336, and E596. STC values are influenced by the solid mass of the structure, but are also dependent on isolation and resilience within the structure.

- FSTC, Field Sound Transmission Class, refers to testing procedures conducted in the field following ASTM E1007 and E989. The FSTC test is conducted by setting up testing equipment in the field where sound is not as controllable.

For more information on Sound Ratings, selecting a sound device and installation method that meets the needs of your installation, please refer to the NWFA Installation Guide.

Appendix E — Moisture Testing & Vapor Retarders

Moisture Testing
Flooring installers must know the MC of the wood flooring, as well as the subfloor. Refer to NWFA Installation Guidelines for Moisture Testing for Wood Flooring, Wood Subfloors and Concrete Slabs. Never use a vapor retarder over subfloor to remedy a known moisture condition, and never install a wood floor over a known moisture condition.

Acceptable Vapor Retarders
The 2012 IBC defines three classes of vapor retarders:
Class I 0.1 perm or less
Class II 0.1 – 1.0 perm
Class III 1.0 – 10 perm

Over Wood Subfloors
When installing wood flooring over a wood subfloor, identify if the space directly below the flooring is a conditioned space or an unconditioned space:

Conditioned Space
Conditioned space is an area or room within the building that is intentionally heated or cooled, and humidified or dehumidified, to be maintained at the same conditions as the living/interior space either for the comfort of occupants, or for preserving temperature and humidity-sensitive goods.

- No vapor retarder is necessary over the wood subfloor and under the wood floor when the flooring is being installed over a conditioned space that is maintained at the same temperature and humidity as the living space directly above.
- No vapor retarder should be installed over the wood subfloor and under the wood floor, where a Class I or Class II vapor retarder has been installed on the underside of the joists.

Unconditioned Space
Unconditioned space refers to exterior space or spaces within the shell of a building that is neither directly nor indirectly heated, cooled, humidified, nor dehumidified.

- A Class II vapor retarder (sheet-good or liquid-applied) may be used on wood subfloors over unconditioned spaces to slow the rate at which potential moisture-laden air moves through the assembly and into the wood flooring, unless otherwise directed by the flooring manufacturer.

Over Concrete Subfloors
Every concrete slab on- and below-grade should have a Class I vapor retarder installed directly beneath it, prohibiting the passage of ground moisture through the slab. If the vapor retarder below the slab has been compromised or left out, moisture will be able to move freely through the slab and into the flooring system. Unfortunately, there is no way of knowing whether there is an intact vapor retarder in place below the entire slab.

- Moisture test the concrete substrate in accordance with the most current ASTM standards, to align the moisture control system and installation method with the condition of the slab.
- Install a Class I impermeable vapor retarder when calcium chloride readings are greater than 3 pounds, relative humidity readings are greater than 80%, or calcium carbide readings are greater than 2.5%.
- In on- and below-grade applications, due to the ever-changing moisture variability with a concrete slab, and the likelihood of sub-slab moisture barrier degradation over time, a Class I impermeable vapor retarder is always recommended.

Depending upon your installation method, the type of vapor retarder will vary. Refer to the NWFA Installation Guidelines for more information.

References

This Allwood Installation Instruction Manual is created based on the National Wood Flooring Association (NWFA) Installation Guidelines. These guidelines by NWFA are regularly reviewed by a committee of industry experts, offering industry-accepted standards for hardwood flooring techniques. Follow the most current NWFA Installation Guidelines if any of the instructions in this manual differ or conflict from the former. Contact your local distributor if you need a copy of the guidelines.