



# Greenwood Flooring International Engineered Hardwood Flooring Installation Instructions

**READ ALL OF THESE 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 (WWW.NWFA.ORG). WHERE THESE INSTRUCTIONS DIFFER FROM NWFA GUIDELINES, THIS DOCUMENT TAKES PRECEDENCE.**

## PRIOR TO INSTALLATION

It is the installer's responsibility to ensure that all of these General Conditions are met prior to installation, and that all specific installation instructions below for the installation method you have chosen (Glue Down, Nail Down, or Floating Floor, plus, when applicable, Radiant Heat Systems) are followed carefully. When installed according to these instructions, Greenwood Flooring International Engineered Hardwood Flooring is approved for use above, on or below grade. When installing below grade, use the Floating Floor installation method.

It is the installer's responsibility to inspect the flooring for proper color, grade, gloss, visible manufacturing defects, damage, or otherwise unsatisfactory appearance. ***Do not install damaged or visibly unsatisfactory material. Installing a plank constitutes acceptance of its appearance.*** If necessary, contact your local retailer, distributor, or Greenwood Flooring International regarding any unsatisfactory material PRIOR TO INSTALLATION.

If installing over radiant heat, read the 'Radiant Heat Systems' section below before finalizing product selection or beginning installation. Careful adherence to these guidelines is required for a successful and fully warranted installation. Certain wood species are not warranted for installation over any type of radiant heat. Greenwood Flooring International does not offer a warranty on ANY flooring installed over electric radiant heat systems. Only hydronic (water) systems may be approved.

***When nailing down planks wider than 7", it is strongly recommended to use a full spread adhesive in addition to nails in order to prevent movement and squeaking.*** Claims will not be accepted for movement or squeaking in floors wider than 7" that



were nailed down without a full spread adhesive. See below under 'Nail + Glue Installation Instructions' for further details.



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## GENERAL CONDITIONS – ALL INSTALLATION METHODS ENVIRONMENTAL CONDITIONS

When wood absorbs moisture it expands and when it expels moisture it contracts. To help minimize moisture-related expansion and contraction, verify the following conditions prior to installation:

- All exterior walls, windows, and doors must be in place and the building envelope closed during acclimation and installation.
- All wet work such as painting, drywall, and masonry must be completed and dry.
- Basements and crawl spaces must be dry and well ventilated. Crawl spaces must be a minimum of 18" high from the ground to the bottom of the joist. Dirt floors in crawl spaces should be covered with a 6-10 mil black plastic to reduce moisture migration. Seams should overlap and be sealed with waterproof tape. Perimeter crawl space cross ventilation should equal 1.5% of the square footage. Crawlspace vents must remain open year round.
- Exterior grading should be complete and drainage should move away from the building structure with a minimum drop of 3" in 10'.

### Acclimation

Ensure that the flooring has been properly acclimated to the site conditions prior to installation. Permanent HVAC should be on and operational and maintained between 60-75°F with relative humidity of 30%-50% for a minimum of 7 days prior to delivery, as well as during and after installation of the flooring. Humidity levels below 30% may cause movement in the flooring, including gapping between pieces and possible cupping and cracking in the face. Use of a humidification/dehumidification system may be required to maintain proper humidity levels, particularly over radiant heat.

***The flooring must be delivered to the jobsite and the packages unopened a minimum of 48 hours prior to the start of the installation. Additional special requirements apply when installing over radiant heat. See below under 'Radiant Heat Systems' for details.***

### Subfloor Conditions

Subfloors must be:



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- 1) **Clean** - Subfloors must be scraped clean and free of debris. Sweep and /or vacuum all debris from the subfloor. Debris on the subfloor may cause over-wood and uneven surfaces in the finished floor, poor fit between planks, and poor adhesive bond in glue-down installations.
- 2) **Flat** - Subfloors must be flat to within 3/16" over any 10' radius and 1/8" over any 6' radius. Check the flatness using a straight edge, laser line or string line. Grind, scrape, sand or shim all high or low spots. On concrete subfloors, grind all high areas and fill low areas using a quality cementitious leveling compound. Ensure that all fasteners securing the subfloor are set flush.
- 3) **Dry** - Check and record all moisture and temperature conditions prior to installation. Visually check the jobsite for potential moisture problems. Look for signs of water intrusion around window and doors. Check for mold or fungus on walls and all other areas. Water intrusion may necessitate structural repairs and/or create conditions unsuitable for flooring installation.
  - Plywood and composite subfloors should be checked using a calibrated moisture meter. Be sure to use the correct moisture meter setting for the species being checked. Carefully follow the moisture meter manufacturer's operation instructions. Moisture readings should not exceed 10% in any location and the moisture variation between the subfloor and the flooring should not exceed 2% at time of installation.
  - Concrete subfloors must be fully cured, at least 60 days old, and should have minimum 6-mil polyfilm between the concrete and ground. Lightweight concrete can hold more moisture and may take longer to dry out to an acceptable moisture content.
  - Installations over concrete require the use of a Calcium Chloride test per ASTM F 1869, or an in-situ Relative Humidity test using probes inserted into holes drilled into the concrete. Test all areas where wood will be installed. The results of the Calcium Chloride tests should not exceed 3 lbs per 24 hours per 1000 square feet, and in-situ test results should not exceed 75% RH. Carefully record all results.
  - NOTE: These tests give a snapshot of moisture conditions at the time of the test, but do not reflect the permanent year-round condition of the substrate. If Gluing Down on concrete that is on or below grade, even if you believe the concrete is dry, **it is highly recommended that you use a moisture barrier such as Bostik MVP4 or Franklin 531**. Check with the manufacturers of the adhesive and moisture barrier you plan to use to make sure they are compatible. A concrete slab on or below grade that measures dry today may become moist in



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the future and cause floor failure. Greenwood Flooring International is not responsible for site related moisture issues.

- More stringent requirements regarding the dryness of the subfloor apply when installing over radiant heat. See below under 'Radiant Heat Systems' for details.
- 4) **Structurally Sound** - Wood subfloors must be well fastened. Use screws every 6" and replace subfloor panels/boards as necessary to eliminate all movement and squeaking. Acceptable subfloor types:
- CDX plywood - at least 5/8" thick for joist spacing up to 16" on center, minimum 3/4" thick for joist spacing greater than 16" on center (19.2" maximum). Plywood subfloors installed over concrete must be installed in accordance with the guidelines set forth by the National Wood Flooring Association ([www.nwfa.org](http://www.nwfa.org)).
  - OSB - at least 3/4" thick, PS 2-92 rated or PS 1-95 rated.- Existing hardwood flooring over a suitable subfloor as outlined above. Existing floor must be well-fastened, smooth, and for Glue Down installations, unfinished.
  - Underlayment grade particleboard (minimum 40 lb. density) - Glue Down/Floating Floors only.
  - Concrete slab - Glue Down/Floating Floors only. Concrete must be at least 3000 lbs. density for Glue Down installations.
  - Lightweight concrete (gypcrete) – Gluing to concrete that is less than 3000 lbs. density is NOT WARRANTED. Greenwood Flooring International provides no guarantee that lightweight concrete or gypcrete will remain structurally sound during the life of the floor. Separation of the flooring from the subfloor caused by deterioration or fracturing of the substrate will not be considered a product failure.
  - Ceramic tile – Floating Floor only. Tile must be well-adhered and flat to 3/16" over any 10' radius.
  - Resilient tile & sheet vinyl - Glue Down/Floating Floors only; for glue-down, tile/vinyl must be new and non-urethane-coated.

## Preparing the Perimeter

1. Undercut door trim, jambs and casings to the thickness of the flooring plus any adhesives or underlayments you plan to use.
2. All wood flooring expands and contracts with changes in humidity. It is essential to install the floor leaving adequate expansion space between ALL sides of the flooring and ALL vertical obstructions, including door trim, jambs, studs, plumbing, cabinets, etc. This space will be covered with base molding. ***Failure to provide adequate***



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***expansion space in any single location can cause damage to the entire floor.***

- ***Minimum expansion space for 9/16" – 3/4" thick flooring is 5/8"***
- ***Minimum expansion space for 5/16" – 1/2" thick flooring is 1/2"***

## Layout

On wood subfloors, if the subfloor is fastened to joists or trusses, the flooring should be installed perpendicular or at a 45° angle to the joists/trusses.

No contiguous area of installed flooring should exceed 30' across the widths of the planks or 50' along the lengths of the planks. For spaces wider or longer than these dimensions, add expansion space midway through the span and cover with a T-molding or other transition piece.

Once all of these General Conditions are met, continue the installation using the instructions for the type(s) of installation you have chosen (Glue Down, Nail Down, Floating Floor, and Radiant Heat Systems).

## TYPICAL INSTALLATION TOOLS NEEDED:

### FOR ALL INSTALLATION METHODS:

- Pencil
- Tape Measure
- Safety Glasses
- Utility Knife
- Moisture Meter
- Shim
- Wedges
- Tapping Block
- Rubber Mallet
- Carpenter square
- Pry-bar or pull-bar
- Wood Filler
- Scraper
- Dust Mask
- Rags



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- Chalk Box & Chalk

**Recommended Saws:** power miter saw, table saw, jamb saw

***If tape is needed (we recommend avoiding its use if possible), use ONLY 3M Advanced Delicate Surfaces 2080EL Tape, and be sure to remove any tape within 20 minutes of application. Leaving tape on for more than 20 minutes or using the wrong type of tape will damage the finish. Never tape protective covering directly to the floor – only tape it to itself.***

## NAIL DOWN INSTALLATION INSTRUCTIONS

*For planks up to 7" wide. (For planks wider than 7", see below under 'Nail + Glue Installation Instructions')*

Greenwood Flooring International Engineered Wood Flooring can be nailed to plywood, OSB and existing wood flooring meeting the requirements outlined above under 'Subfloor Conditions.'

For Nail Down Installations, you will need the General Tools and Accessories, plus:

- Nail set
- Tack Stapler or 1" Roofing nails (for felt)
- 6-d Finish Nails or Pneumatic Finish Nailer with 1-1/4" to 1-1/2" fastener
- Edge or Blind Stapler/Nailer (Manual or Pneumatic) with 1-1/2" - 2" fasteners for flooring 5/8" to 3/4" thick, or 1-1/4" to 1-1/2" fasteners for flooring 5/16" to 9/16" thick (always do a test plank to verify that fasteners are seating properly and not causing dimpling in the face of the flooring before proceeding with the installation)
- Compressor with hose (if pneumatic tools are used)
- 15 lb. roofing felt, #15 hardwood floor underlayment felt, or Aqua Bar paper

## Nailing Down the Floor

1. If possible, use an outside wall as the starting point. Measure out from the starting wall the width of one flooring plank plus the appropriate expansion space for that thickness of flooring. Mark two points toward each end of the starting wall and snap a chalk line along the full length of the wall through the marks.
2. Lay the tongue side of the first row of flooring along the chalk line. Face nail (top nail) the first row of flooring in place. Place the fasteners approximately 3/4" from the wall side (groove side) of the flooring board every 4" to 6". Continue the first row installation



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blind/edge nailing every 4" to 6" along the tongue and every 2" to 3" from every end joint. Note: Blind/edge nailing of the first row may require the installer to use 6-d finish nails or the pneumatic finish nailer along the tongue.

3. Continue the installation across the room, blind/edge nailing every 4" to 6" and 2" to 3" from each end joint. Stagger end joints by at least 8". Avoid creating "H" patterns (where an end joint is adjacent to another end joint in the second to last row installed).
4. Trim the last row of flooring to maintain the minimum expansion space at the far wall. Use the trimmed piece to start a subsequent row. Discard any trimmed ends shorter than 8".
5. Face-nail the last two or three rows at the far (finish) wall. The last row or two of flooring may need to be pulled together using a pulling bar.
6. Complete the installation by reinstalling or installing new base moldings.

## GLUE DOWN INSTALLATION INSTRUCTIONS

Greenwood Flooring International Engineered Flooring can be glued down to concrete, plywood, OSB, underlayment grade particleboard, and existing wood floors meeting the requirements outlined above under General Conditions/Subfloor Conditions. Greenwood Flooring International Engineered Flooring can also be glued to other surfaces such as well-adhered sheet vinyl, vinyl tile, ceramic, etc., but the performance of the adhesive is the responsibility of the adhesive manufacturer and careful adherence to the adhesive manufacturer's installation instructions for that particular subfloor surface is crucial.

Greenwood Flooring International does not warrant the adhesive bond between the subfloor and the Greenwood Flooring International Engineered Wood Flooring.

For Glue Down Installations, you will need the General Tools and Accessories, plus:

- Wood Flooring Adhesive - Recommended Adhesives: Bostik Best or Franklin 811
- Wood flooring Adhesive Remover recommended by the manufacturer of the adhesive selected
- If tape is needed (we recommend avoiding its use if possible), **use ONLY 3M Advanced Delicate Surfaces 2080EL Tape, and be sure to remove any tape within 20 minutes of application. Leaving tape on for more than 20 minutes or using the wrong type of tape may damage the finish.**

## Gluing Down the Floor





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1. If possible, use an outside wall as the starting point. Measure out from the starting wall the width of the flooring plus the appropriate expansion space for that thickness of flooring. Mark two points toward each end of the starting wall and snap a chalk line along the full length of the wall through the marks.
2. Install backer boards as guides along the wall side of the chalk line. Anchor the backer boards in place with screws or finish nails. Over concrete subfloors, anchor the backer boards with concrete screws or concrete nails. These boards will be removed later.
3. Lay the first row of flooring, but do not glue into place. Align the tongue side of the flooring boards against the backer board. Dry lay the next two rows of flooring in place, sliding the tongue into the groove. End joints should be staggered at least 8". Pull the rows of flooring boards out away from the backer board approximately 24" to allow the glue to be spread.
4. Trowel spread the adhesive on the subfloor along the backer board wide enough to allow the first three rows of flooring to be installed. Follow the adhesive manufacturer's recommendations for wet lay times before proceeding to the next step.
5. Install the first row of flooring, pressing the tongue to the backer board. Slide the tongue of the next row of flooring into the groove of the first row and continue until the first three rows are done. If tape is needed to keep joints tight until the glue sets, be sure to remove it within 20 minutes of application.
6. Trowel spread adhesive and continue the installation across the room. Trim the last row of flooring to maintain the minimum expansion space at the far wall. Be careful not to move the installed flooring out of position. Some boards may need to be tapped or pulled into place with a tapping block or pull bar.
7. Most adhesives require that the installer clean the adhesive off the flooring boards during the installation. Follow the adhesive manufacturer's recommendations for this procedure.
8. Once the room is finished, remove the backer boards at the starter row.
9. Dry lay the first row of flooring to replace the backer board. Trowel spread the adhesive on the back of the flooring boards (not on the subfloor) and install the flooring, sliding the groove onto the tongue of the already installed starter row. Doorways and other openings may require installation of the flooring the same way. Slide the flooring boards under the previously cut door trims and casings.
10. Complete the installation by reinstalling or installing new base moldings.
11. Do not allow foot traffic on the floor for 24 hours after installation is complete.

## NAIL + GLUE INSTALLATION INSTRUCTIONS

*Strongly recommended when nailing down planks over 7" wide.*



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Greenwood Flooring International Engineered Wood Flooring can be nailed + glued to plywood, OSB and existing wood flooring meeting the requirements outlined above under ‘Subfloor Conditions.’

For Nail + Glue Installations, you will need the General Tools and Accessories, plus:

- Adhesive: Franklin 741, 811, or Bostik Best urethane wood flooring adhesive or equivalent
- Adhesive Remover recommended by the manufacturer of the adhesive selected
- Adhesive Trowel recommended by the manufacturer of the adhesive selected
- Nail set
- Tack Stapler or 1" roofing nails (for felt)
- 6-d Finish Nails or Pneumatic Finish Nailer with 1 1/4" to 1 1/2" fastener
- Edge or Blind Stapler/Nailer (Manual or Pneumatic) with 1 1/2" - 2" Fasteners for flooring 5/8"
- 3/4" thick, or 1-1/4" to 1-1/2" fasteners for flooring 5/16" – 9/16" thick (always do a test plank to verify that fasteners are seating properly and not causing dimpling on the surface)

## Nailing + Gluing the Floor

1. Measure out from the starting wall the width of one flooring plank plus the appropriate expansion space for that thickness of flooring. Mark two points toward each end of the starting wall and snap a chalk line along the full length of the wall through the marks.
2. Trowel spread the adhesive on the subfloor along the chalk line wide enough to allow the first row of flooring to be installed, being careful not to cover the line. Follow the adhesive manufacturer’s recommendations for wet lay times before proceeding to the next step.
3. Lay the tongue side of the first row of flooring along the chalk line. Face nail (top nail) the first row of flooring in place. Place the fasteners approximately 3/4" from the wall side (groove side) of the board every 4" to 6". Once the face nails are set, use 6-d finish nails or the pneumatic finish nailer to blind/edge nail along the tongue of the first row, every 4" to 6" and every 2" to 3" from every end joint. Check to make sure the first row is still straight along the chalk line before proceeding.
4. Trowel spread enough adhesive to install 2-3 more rows.
5. Install the second row by sliding the groove side on to the tongue of the first row. Blind/edge nail it in to place, with fasteners every 4" to 6" and 2" to 3" from each end joint. Stagger end joints by at least 8".



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6. Continue nailing and gluing 2-3 rows at a time in this manner across the room. Avoid creating “H” patterns (where an end joint is adjacent to another end joint in the second to last row installed). Use cut ends to start the subsequent row, discarding any pieces shorter than 8”.
7. Most adhesives require that the installer clean the adhesive off the flooring boards during the installation. Follow the adhesive manufacturer’s recommendations for this procedure.
8. Trim the last row of flooring to maintain the minimum expansion space at the far wall.
9. At the far (finish) wall, it may be necessary to face-nail the last 2-3 rows due to the angle of the stapler/nailer. The last row or two of flooring may need to be pulled together using a pulling bar.
10. Complete the installation by reinstalling or installing new base moldings.
11. Do not allow foot traffic on the floor for 24 hours after installation is complete.

## FLOATING FLOOR INSTALLATION INSTRUCTIONS

Greenwood Flooring International Engineered Wood Flooring can be installed as a floating floor system over almost all types of subfloors including Plywood, OSB, Existing Wood Floor, Vinyl, Vinyl Tile, and Ceramic Tile provided they are clean, flat, dry and structurally sound, meeting the requirements outlined above under ‘Subfloor Conditions.’ **Note: Greenwood Flooring International Engineered Wood Flooring boards must be at least 3” wide to be installed as a floating floor system.**

For Floating Floors, you will need the General Tools and Accessories, plus:

- Tongue and Groove Glue: Franklin Titebond III or Equivalent PVA adhesive
- Underlayment: ~1/8" thick Two-in-One pad (pad plus vapor barrier) or ~1/8" or 1/4" cork underlayment
- Waterproof packing tape (for use on underlayment only)
- If tape is needed to hold installed boards together while the glue sets (we recommend avoiding its use if possible), **use ONLY 3M Advanced Delicate Surfaces 2080EL Tape, and be sure to remove any tape within 20 minutes of application. Leaving tape on for more than 20 minutes or using the wrong type of tape may damage the finish.**

### Floating the Floor

1. If possible, use an outside wall as the starting point. Roll out the first run of underlayment from wall to wall parallel to the starter wall. If installing over



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underlayment plus a separate layer of polyfilm, install the 6 mil polyfilm first. Tape all seams with waterproof tape.

2. Measure out from the starting wall the width of the flooring plus the appropriate expansion space for that thickness of flooring. On the installed underlayment mark two points toward each end of the starting wall and chalk a line the full length of the wall through the marks. This is the starter line.
3. Lay the first row of flooring using only long boards. The first board and the last board in this row should be a minimum of 12" long and cut to provide the appropriate expansion space on each end. Apply a 1/8" continuous bead of T&G glue on the bottom side of the groove of each end joint. Align the tongue side of the starter row along the chalk line and engage the end joints together. Use shim wedges along the long wall and at both ends of the row to keep the floor in position and maintain the appropriate expansion space.
4. Lay the second and third row of boards. End joints should be separated by a minimum of 8" from the adjacent row. Spread a 1/8" bead of T&G glue along the bottom side of the long groove and each end joint groove on the second row of flooring. Engage the groove side of the second row with the tongue of the starter row. Engage the end joints at the same time, aligning them and cutting at the end of each row to allow for appropriate expansion space. Continue this procedure for the third row. These three rows must be aligned straight to ensure that the rest of the installation remains straight. If flooring boards do not easily engage together, use a tapping block or pull-bar. Tape the first three rows together using the recommended masking tape to keep rows straight and joints tight until the glue has set.
5. Remove all masking tape within 20 minutes of application.
6. Continue using the same procedure. Use masking tape as needed to keep the boards together and rows straight, being careful to remove it within 20 minutes of application. Avoid working on the installed flooring as much as possible to prevent breakage of the glue joint.
7. Complete the installation by reinstalling or installing new base moldings.
8. Do not allow foot traffic on the floor for 24 hours after installation is complete.

## RADIANT HEAT SYSTEMS

The following species are **NOT WARRANTED** in installations over radiant heat: Acacia, Australian Cypress, Brazilian Cherry, Caribbean Cherry, Caribbean Rosewood, Hickory, Madrone, Pecan Maple, Southern Chestnut.

The following species **ARE WARRANTED** for installation over hydronic radiant heat systems: American Cherry, Caribbean Walnut, European Oak, Maple, Orchard Walnut, Pepperwood, Red Oak, Royal Mahogany, Santos Mahogany, Walnut, and White Oak. If your species is not listed



here, please contact Greenwood Flooring International Flooring for clarification before finalizing product selection.

In all installations over radiant heat, the warranty will be void if any of the following requirements and instructions are not adhered to:

- The radiant heat system must be hydronic (using warm water). Greenwood Flooring International Engineered Flooring is not warranted over electric radiant floor heat systems.
- The heat system must be designed for wood flooring and have an outside temperature sensor and in-floor direct contact temperature sensors.
- The system controller must be designed for wood flooring and have a temperature control mechanism that will not allow the surface temperature of the subfloor to exceed 82°F.
- The system must be kept on and within 15°F of normal operating temperature AT ALL TIMES.
- For concrete subfloors, conduct and document Calcium Chloride Tests per ASTM F1869. Test results must not exceed 2.0 lbs. per 1000 square feet per 24 hours.
- For wood subfloors, use a pin type meter to document the moisture content of the subfloor. Moisture readings should not exceed 8% in any location and readings for the subfloor must be within 2% of the flooring at the time of installation.
- Relative humidity at the jobsite must be maintained between 30% and 50% at all times. Failure to maintain proper humidity levels will void all warranties.
- The radiant heat system must be on and operating at normal output a minimum of 14 days prior to the start of the installation.
- Wood flooring must be delivered to the jobsite and acclimated to the installation environment with cartons unopened for a minimum of 3 days prior to the start of the installation.
- Temperature in the installation area must be controlled between 60°F and 80°F at all times.
- Maximum surface temperature of the wood flooring can never exceed 82°F.
- Excessive heat, rapid heating, and/or failure to maintain humidity levels between 30% and 50% may cause cracking, cupping and other forms of failure and will void the warranty.

**NOTE:** in wood flooring installations over radiant heat, surface checking, cracking (especially at the ends of boards and around knots), shrinkage, gapping between planks, and slight cupping are all to be expected and do not constitute a product defect.



Once these instructions and requirements are met, continue the installation by following the instructions for your specific installation method as outlined above.

***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

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