

Installation Instruction

Engineered Hardwood Flooring

Congratulations on the purchase of your new floor. We thank you for your excellent selection of a Twelve Oaks product that is designed to offer you years of use and enjoyment.

Twelve Oaks Engineered Hardwood floors can be installed above, on, or below grade.

IMPORTANT

- To ensure that your floor is installed properly, Twelve Oaks requires that you **CAREFULLY READ AND FOLLOW** the installation instructions **BEFORE** you or a hired authorized professional install Twelve Oaks products. **FAILURE TO DO SO WILL VOID YOUR PRODUCT WARRANTY.**
- It is the **INSTALLER/OWNERS' RESPONSIBILITY** to inspect all material carefully **BEFORE** installation, and ensure the product match what has been ordered/chosen. If you have any doubts or concerns in regards to the quality of Twelve Oaks flooring products, report to your retailer **BEFORE** installation. **INSTALLATION IMPLIES ACCEPTANCE. NO CLAIM AGAINST MATERIAL OR LABOR WILL BE ACCEPTED BY TWELVE OAKS ONCE THE MATERIAL IS LAID OR INSTALLED.**
- It is the **INSTALLER/OWNERS' RESPONSIBILITY** to ensure the job-site, the ambience, and the sub-surfaces conditions **MEET** all of Twelve Oaks' requirements.
- Wood is a natural product containing natural variations in color and grain configurations. Twelve Oaks hardwood floors meet the industry standards, which permits up to 5% of grading deficiencies. A 10% material waste allowance should be included within your total square footage (10% for diagonal installation is suggested)
- The selection of mechanical fasteners, such as nailer/stapler, varies by manufacturers. It is the **INSTALLER'S LIABILITY** to ensure that tools are properly set. Dimpling of the wood face, as a result of improper setting is **NOT** considered a manufacturing defect. It is recommended to test on a couple of pieces before a full install. Particularly in installations of 90 degrees to outside walls, dimpling could be very apparent under direct sunlight.
- Do **NOT** use a rubber mallet to engage the tongue and groove. Instead, use a tapping block as rubber mallets will leave abrasive marks (dull spots) and chipped edges on the floor.
- Crawlspace or basement areas have to be cross-ventilated, and covered entirely with proper vapor barriers (minimum 6 mil black polyethylene), in accordance with NWFA Installation Guidelines.
- End-joint separation can result from uneven subfloors. Ensure the subfloor is level within **3/16" in 10' radius** (5mm in 3m).
- The floor should be installed with the centre line running towards the strongest feature of the room, (e.g. this could be a fireplace or doorway). Although the floor is fully bonded to the subfloor, an expansion gap should still be provided between the wall and the floor. It must be at least 1.5 mm for each metre of floor width including any fixed objects (walls, door frames, pillars, stairs etc.). Example: If your room is 10 m in width, the expansion gap should be at least 15 mm ($10 \times 1.5 = 15$) all around the floor. Rooms up to 12 m in width and 36 m in length can be installed in one mass. Floors should be divided between rooms. Cover the expansion gap with a T moulding. - All skirting boards or other mouldings must be at least 50 % thicker than the expansion joint. Example: If you have calculated that you need an expansion gap of 10 mm you will need a skirting of at least 15 mm this will ensure that any shrinkage in the floor will not leave a gap between the floor and the skirting board.

TOOLS

Basic tools and accessories:

Broom/vacuum, chalk line, tapping block, wood flooring surface cleaner, hand or electric jam saw, miter saw, wood/concrete moisture meter, NIOSH designated dust mask, safety wear, straight edge, mitre saw/table saw, tape measure, square, utility knife, pry bar.

Additional tools & material needed:

Moisture-cured urethane hardwood floor adhesive as warranted by professional installer. Clean White Rags, Mineral Spirits/ Urethane Adhesive Remover Adhesive Trowel Straight Edge

SAFETY - EXISTING FLOOR

Do not mechanically chip or pulverize existing resilient flooring, backing, lining felt, asphaltic "cutback" adhesives or other adhesives. These products may contain either asbestos fiber and/or crystalline silica. Inhaling such dust is a cancer and respiratory tract hazard. Always follow local health and safety regulations

STORAGE AND HANDLING

It is important to not transport flooring products under raining and/or damp conditions. Handle and unload flooring products with care, and store in a dry and well ventilated place, being sure to provide at least a 4" (10 cm) air space under cartons. Flooring shall not be delivered until the building has been enclosed with windows, doors are in place, and cement work, plastering and all other "wet" work are completed and dry. HVAC systems must be in place and in operation at least 14 days prior, during, and after installation of the flooring.

JOBSITE CONDITION & PRE-INSTALLATION REQUIREMENT

Exterior grading must be completed with surface drainage offering a minimum drop of 3" in 10' (7.6cm in 3m) to direct flow of water away from the building. All gutters and drainage spouts must be in place. The soil around the house must be treated or graded to provide sufficient drainage.

Do NOT install hardwood floors in areas exposed to excessive moisture. Acclimatize the hardwood flooring products on the jobsite. Material is acclimated once it has reached moisture equilibrium consistent with the ambient temperature and relative humidity of the job site conditions listed below.

It is required to maintain the relative humidity where the flooring is installed at a level between **35% and 55%**, and room temperature be consistently kept at **65-80°F (18-27 °C)**. These ambient conditions are specified as pre-installation requirements and must be maintained for the life of the hardwood floor.

SUBFLOOR CONDITIONS AND INSPECTION

Twelve Oaks hardwood engineered products are designed to perform on concrete, plywood, or O.S.B. subfloors. IMPORTANT

- Installer/owner is responsible for determining if the jobsite, subfloor, and/or other conditions are environmentally and structurally acceptable for wood floor installation. Twelve Oaks is not responsible for any wood product failure resulting from or connected with subfloors, subsurface, jobsite damage or deficiencies after floors have been installed.
- Wall to wall carpeting must be removed before installing your new hardwood floor

1) STRUCTURALLY SOUND

Nail or screw down the subfloor (plywood or OSB) if there are any loose areas; otherwise, hardwood that are glued or nailed to the subfloor may squeak. It is recommended to install hardwood floor over plywood, CDX, and/or concrete. Replace any water- damaged, swollen, or delaminated subfloor/underlayment.

2) LEVEL & FLAT

Avoid subfloors with excessive vertical movement. Using a straight edge or level, check to ensure the subfloors is within **3/16" in 10' radius** (5mm in 3m) or 1/8" in 6' radius (3mm in 2m). Use a cement-leveling compound that has strength no lower than 3000 p.s.i. to patch/fill any low areas. Follow the cement-leveling compound manufacturer's instructions to avoid overfill in deep voids.

3) CLEAN

Inspect to ensure the subfloor is free of any imperfections. Sweep or vacuum thoroughly to make sure there is no wax, paint spills, oil, debris, or anything that could impede adhesion to the subfloor.

4) DRY

Conduct appropriate moisture tests from several different areas of the subfloors and record readings. Subfloor moisture content must not exceed 4% for concrete or 12% for plywood/OSB. It is the responsibility of the installer/owner to verify and ensure the moisture contents are within the requirements prior to installation.

Subfloors

PLYWOOD:

3/4" (19mm) CDX plywood subfloor is preferred, but minimum thickness of 5/8" is required.

O.S.B.:

3/4" OR 23/32" stamped exterior grade is approved. Install hardwood at a 90 degree angle to joists only.

CONCRETE:

Allow a minimum of 60 days for new concrete to cure before installation. If moisture reading exceeds 4% from the concrete moisture test, a calcium chloride test must be conducted to verify if moisture level exceeds 3 lbs /1000 sf. /24 hrs.

The following tests are required for commercial application. Both tests should be performed prior to installation.

- Calcium Chloride Test (ASTM F1869): Moisture less than 3 lbs/1000 sf./24 hrs.
- Relative Humidity Level in concrete using In-situ Probes (ASTM F2170-02): Must not exceed 75%

OTHER:

Glue-down installation allows hardwood to be installed over ceramic, Terrazzo, and other hard surfaces. It is the installer/owner's responsibility to ensure the surfaces are dry, clean, structurally sound, and level, as described in the subfloor requirements.

RADIANT HEAT

When installing over radiant heat, precautions must be taken to ensure a gradual temperature change so that the hardwood flooring doesn't dry out too quickly. Prior to attempting installation over radiant heat, ambient and subfloor requirements must all be met. The heating system must be inspected by a qualified heating installer.

Though not recommended, Twelve Oaks hardwood floors can be installed over hydronic radiant heating systems provided that the subfloor surface does not exceed **85°F** (or 29°C) at any point. Installation over electric radiant heating system will not be covered by Twelve Oaks warranty. The initial floor temperature must not exceed 70°F (or 21°C) for 24 hours prior to and 48 hours post installation. Thereafter, the temperature should be gradually increased by no more than 5°F (or 2.8°C) per day to the desired setting, never exceeding 85°F or (29°C). A relative humidity level between 35% and 55% must be maintained before, during, and after the installation.

NOTE: Seasonal gapping and face checking of your hardwood floor should be expected with radiant heat installation. Warranty will be voided if an improper installation over radiant heat system is demonstrated.

PREPARATION

Remove existing carpet, baseboards, moldings (if applicable), wall-base, and thres holds. Undercut all door castings with a hand or power jam saw using a scrap piece of floor plank as a guide. Ensure doors can still open and close after installing the floor (leave a minimum of 3/8" or 1cm clearance).

When installing wood floor with natural variations, be sure to blend the planks from several cartons to ensure a good mixture of grain and shading throughout the install.

Sufficient expansion gaps must be always respected between flooring and any vertical rise. Do not allow foot traffic or heavy furniture on newly installed floor for at least 24 hours.

GLUE DOWN INSTALLATION

IMPORTANT

REFER TO THE ADHESIVE LABEL FOR PROPER TROWEL REQUIRED, SPREAD RATES AND INSTALLATION APPLICATION INFORMATION!

- Use only moisture-cured urethane adhesive, trowel size, and spread rate specified for hardwood floors. Temperature and humidity can affect the flash and working time of the adhesive. Follow the adhesive manufacture's instruction carefully, and spread out a small amount on subfloor to test for adhesion bonding. Warranty may be voided when there is improper use of adhesive or trowels.
- Always hold the trowel 45° angle, pressing firmly. Replace trowel when teeth are worn for an even and permanent bond
- Clean off any adhesive on floor surface before it cures, using only products specified by the adhesive manufacturer
- Always allow for adequate cross ventilation when working with flooring adhesives

The most important part of installing a herringbone pattern is the set out of the room. With herringbone the set out of the floor is the most critical and this is dealt with in the detailed drawings and instructions below.

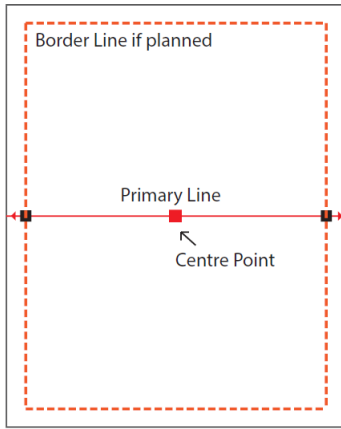


Figure 1. Establish the Primary Line

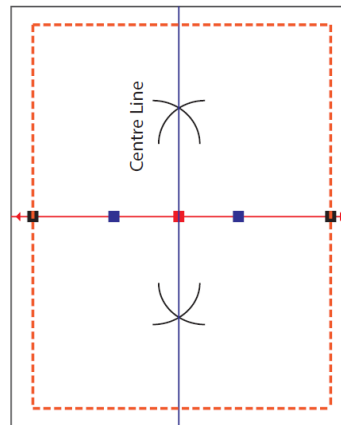


Figure 2. Establish the Centre Line

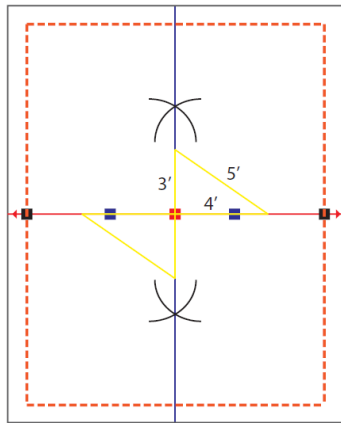


Figure 3. Check the Primary Line is square to the Centre Line

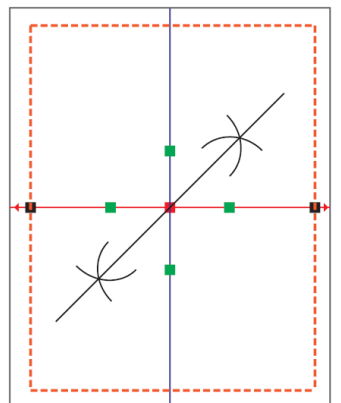


Figure 4. First 45° Diagonal Line

Step 1: In general, the pattern would ideally be set running up the longest dimension of the room, but if there is a particularly strong feature (such as an ornate fireplace or window) the pattern might be better installed in that direction. We would strongly advise that the end user be responsible for making the final decision as to which direction herringbone should be installed.

Establish a Primary Line perpendicular to the length of the room and find the room's centre point.

Step 2: Measure equal distance from the centre point, then use an Arc Trammel to draw 2 points of intersection. Connect the points to establish a Centre Line perpendicular to the primary line, extending from the centre point.

Step 3: To check that the Primary Line is square to the Centre Line, use the Pythagorean Theorem to ensure the triangle is of the correct ratio - 3:4:5. Check square on both sides per picture shown below. Adjust when necessary.

Step 4: When the centre line has been selected (taking into account the squareness of the room and the decided direction of installation) working lines including the 45° diagonal reference lines and glue lines should be marked on the floor using a chalk line. This aspect of the installation is very important as once the installation has been started the orientation of the pattern is fixed and cannot be changed. Please refer to the illustrations for help.

Marking 45° diagonal reference lines. Measure equal distance from the centre point, along both the Primary and Centre Lines. Use an Arc Trammel to draw 2 points of intersection. Connect the points to form a Diagonal Reference Line that is 45° from either the Primary and Centre Lines.

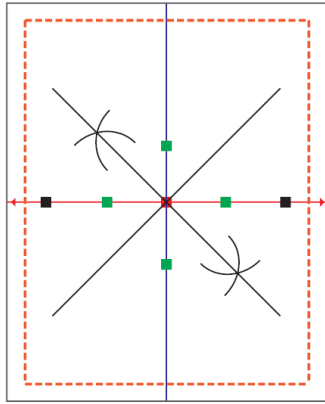


Figure 5. Second 45° Diagonal Line

Step 5: Repeat Step 4 to create a second Diagonal Reference Line on the opposite side. This finishes the basic framework for herringbone installation pattern, with 4 quadrants.

Step 6: Dry-fit the pattern first. The first plank should be placed at a 45° angle to the Centre Line, align with the 45° diagonal reference line, with the short end close to the centre point of the room. After you have determined a direction to install the pattern, lay out 4 more planks and establish a Secondary Line to keep the pattern from running off. The Secondary Line is parallel to the Primary Line.

Continue to dry-fit the pattern in this quadrant until you have reached the far wall. Use a framing square to check for alignment periodically. Once you have reached the farthest wall, check to ensure that the pattern is visually balanced with minimum cuts need to fill in the last row. Make necessary adjustment by shifting the Diagonal Reference Lines.

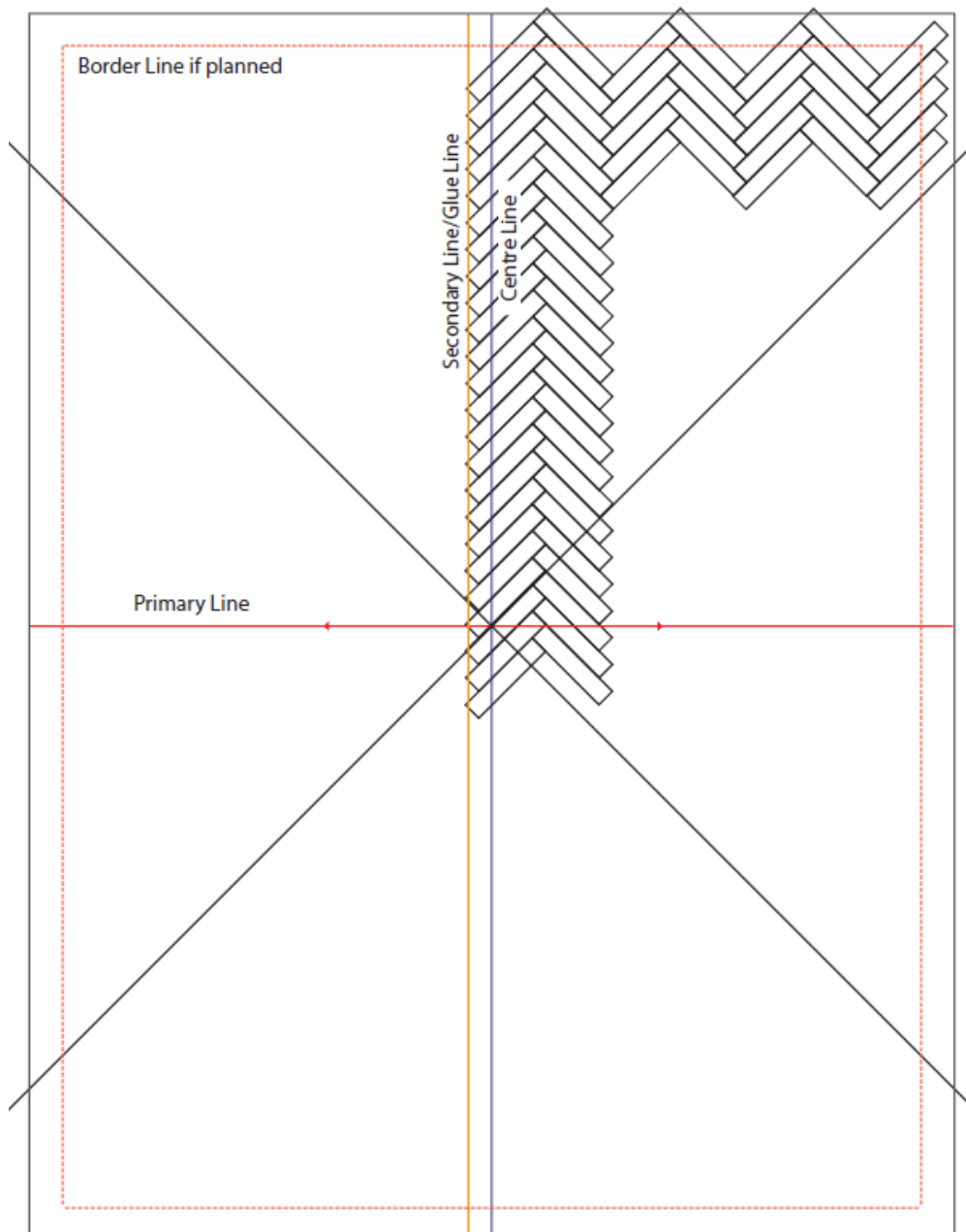


Figure 6. Dry Fit for Layout

Step 7: Evenly apply a full-spread of adhesive with proper trowel. Be mindful of the specified flash time. Once set, place the first plank into adhesive at a 45° angle to the Centre Line, making sure the first plank exactly align with the 45° diagonal reference line. Lay out more planks to form the secondary line and glue reference line. The glue reference line is to help guiding the boundary of area that the adhesive to be applied, one row at a time.

We would recommend installing the first six pieces taking great care to ensure that the pattern is lined up perfectly, before leaving them for the adhesive to fully dry. This provides a strong fixed point in the floor and ensures that pressure applied to individual elements during installation does not result in movement of the pattern.

For installation over plywood/OSB subfloor, after the planks are fixed over the adhesive, we strongly recommend also fastening the floor planks using flooring staples or cleats, to help hold the planks in place. Please be noted that:

- The selection of nailers/staplers varies by manufacturers. Therefore, it is the installer's liability to ensure depth gauge is appropriate for the thickness of the flooring. Dimpling as a result of improper setup is NOT considered a manufacturing defect. It is recommended to test a couple of pieces beforehand.
- We recommend use 16 gauge 1-1/2" length, 1/4" crown u-shape staples for this particular herringbone flooring, at 4" - 6" interval.

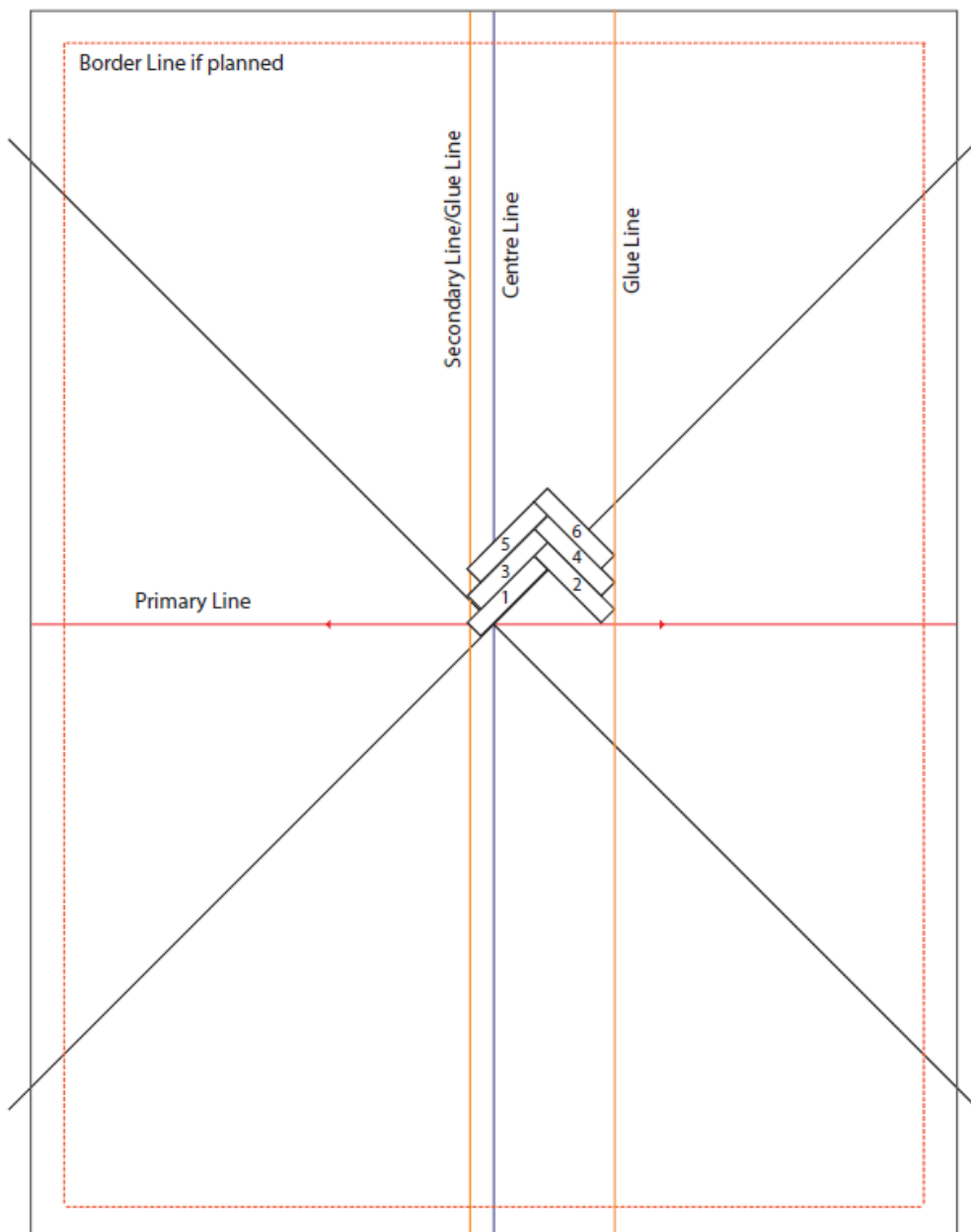


Figure 7. Start Installation

Step 8: Continue to install the pattern until you reach the far wall. Alignment is critical – if needed use a framing square to check alignment periodically. Once you have reached the farthest wall work the pattern to the right, one row at a time and repeat to fill the quadrant.

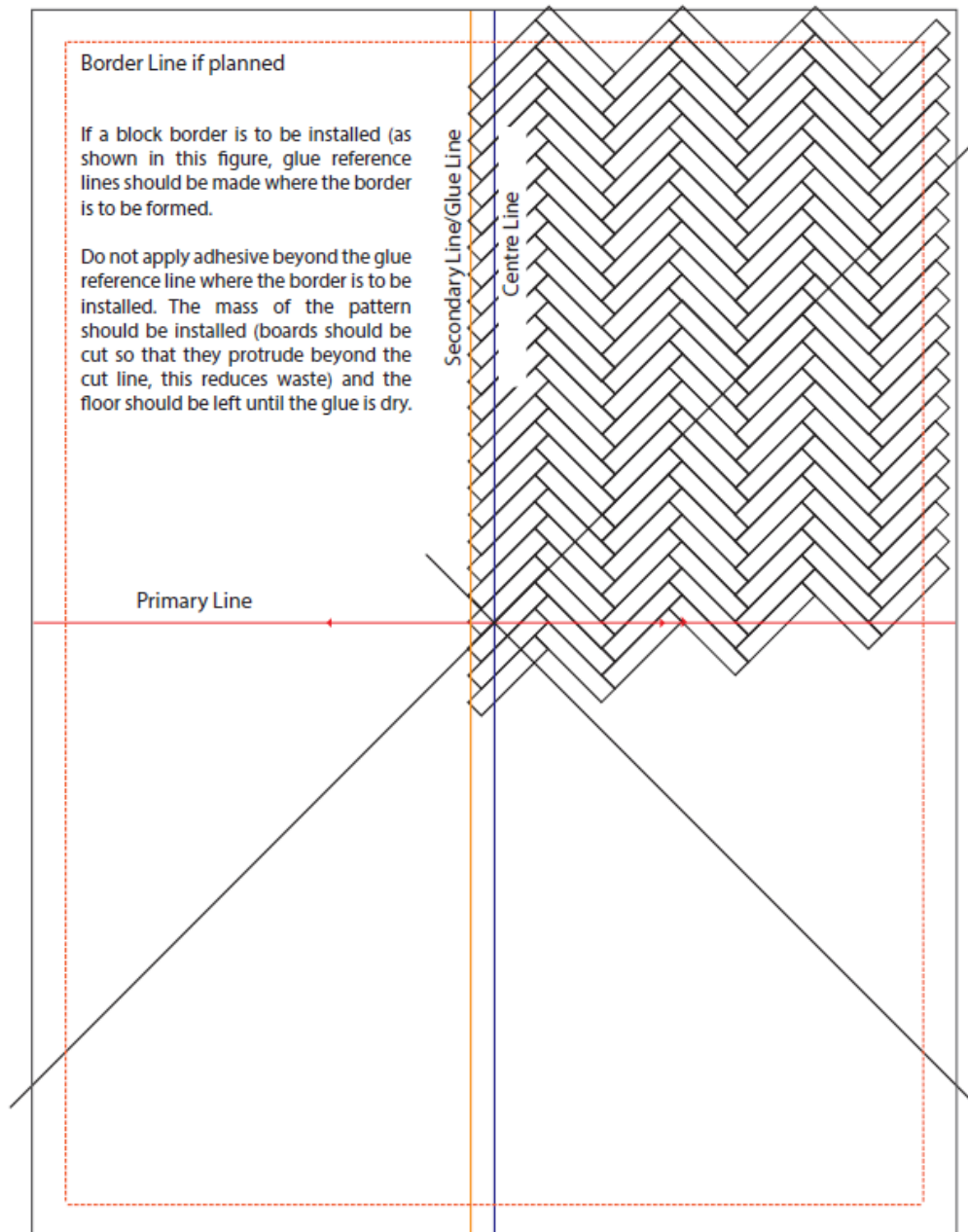


Figure 8. Installation Quadrant

Step 9: Repeat Step 8 and work clockwise to finish installing in all quadrants. As you approach the end wall, it may be necessary to make cuts to fill in the last row. Remember to always leave the appropriate expansion gap around any vertical rise.

If a border is planned to be installed around the perimeter of the room, it is important that additional glue reference lines are marked on the floor. These should be marked parallel to the primary and centre lines and care must be taken to ensure that no adhesive is spread beyond these reference lines. Once the main field of the floor has been installed, the waste from the herringbone pattern can be removed by using a guide rail and a plunge saw (such as a Festo TS55). When the border cuts have been completed a groove should be cut into the edge of the floor using a router equipped with our cutting bit (or equivalent). Adhesive can then be spread, and the border finally installed.

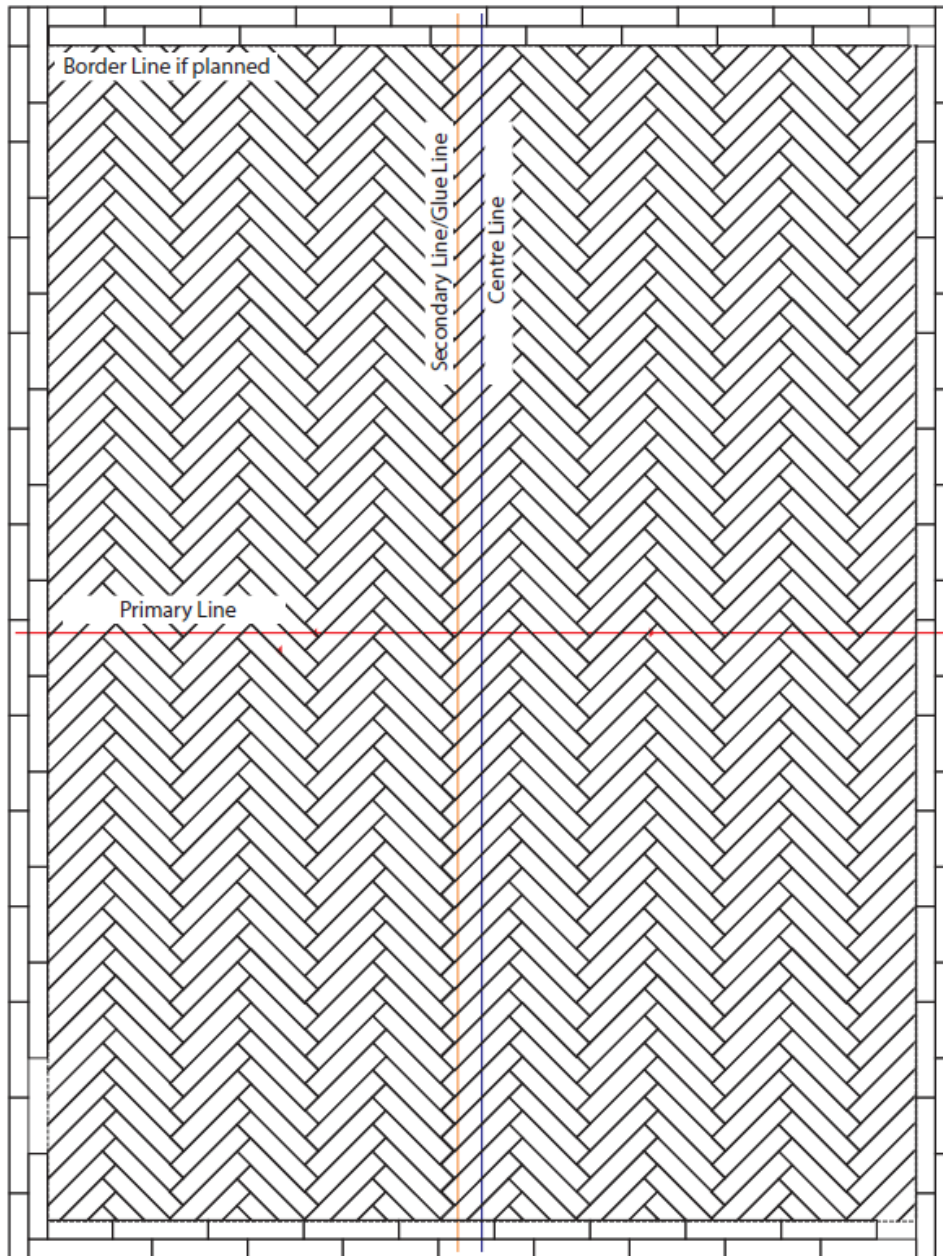


Figure 9. Finish Installation

Step 10: Visually inspect the floor and clean up any adhesive residue before it sets. Follow adhesive manufacturer's recommendation.

Working with adhesive. Last but not least, always ensure that good working practices are observed care should be taken that there is adequate ventilation. Read and assess the risks involved with the use of the chosen adhesive, many adhesives are hazardous to health and breathing apparatus may be required. For detailed information refer to the safety data sheet from the adhesive manufacturer. When installing the floor avoid adhesive being pushed into the open grooves as this will make the individual boards difficult to install. Wherever possible press tongue into groove and when this is not possible angle the short end in before lowering into the adhesive bed.

Floor Protection During Construction: After installation, if you choose to protectively cover the floor, cover the floor completely, since some species are lightsensitive and uncovered areas may change color. Use a covering material with a vapor permeance (perm rating) of 1 perm or more (tested I accordance with ASTM E96) to avoid trapping moisture/vapor on or within the floor. Any covering should be taped, using a low-adhesion tape, to base or shoe moldings. Avoid taping to finished flooring. When taping paper or sheets together, tape them to each other, not to the floor.

* Twelve Oaks carries color-coordinated mouldings for each of our engineered hardwood SKUs.