

Installation Guidelines

Luxury Vinyl Tile (LVT)

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References

Note: This document refers to the following standards. Please use current version available at time of installation:

- ACI 302.1R Guide for Concrete Floor and Slab Construction
- ACI 302.2R Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
- APA Engineered Wood Construction Guide
- ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- ASTM F1869 Standard Test Method for Measuring Moisture Evaporation Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
- ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
- ASTM F1482 Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
- ASTM F2419 Standard Practice for Installation of Thick Poured Gypsum Concrete Underlayments and Preparation of the Surface to Receive Resilient Flooring
- ASTM F2678 Standard Practice for Preparing Panel Underlayments, Thick Poured Gypsum Concrete Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compound
- ASTM F2873 Standard Practice for the Installation of Self-Leveling Underlayment and the Preparation of Surface to Receive Resilient Flooring
- ASTM F3010 Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings
- Recommended Work Practices for Removal of Resilient Floor Coverings of Resilient Floor Covering Institute (RFCI)

Storage and Handling

Store boxes on clean, flat, and solid surfaces in a controlled environment. Do not store outside. Handle all materials carefully and safely. Do not toss or drop LVT as this may damage the corners. Do not stand boxes on end. Care must be taken to avoid damage to edges and corners. Do not install damaged tiles.

Acclimation

- Under normal conditions, the LVT must be taken out of their boxes 16-24 hours prior to the installation. In cases where the flooring may have spent a long period of time in colder conditions, more time will be required for acclimation.
- Areas to receive LVT must be fully enclosed with the permanent HVAC system operational and set to a minimum of 65°F or a maximum of 85°F for a minimum of 48 hours prior to, during, and then maintained after the installation.

Subfloor Preparation

- The General Contractor will supply a smooth, flat concrete finish ready to receive the new flooring in accordance with ACI 302.1R Guide for Concrete Floor and Slab Construction and ACI 302.2R Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
- The concrete subfloor must be cured for a minimum of forty-five (45) days.
- The slab will have a tolerance of 3/16" in a 10' radius.
- Prepare substrate as per ASTM F710 "Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring."
- The concrete slab, new or old, must be tested for moisture. We recommend having the tests performed by a recognized engineering firm. The International Concrete Repair Institute (ICRI) website has a list of certified technicians for the USA: https://www.icri.org/page/ccsmtt_list
- The moisture tests must be performed as per ASTM F1869 "Standard Test Method for Measuring Moisture Evaporation Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" and/or ASTM F2170 "Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes."
- Substrate moisture levels shall not exceed:

	Concrete slab with an effective moisture vapor barrier	Concrete slab with radiant heating system
Gerfix LVT & Plank Spray Adhesive	8-lbs / 95% RH, 11 pH	8-lbs / 95% RH, 11 pH
Gerfix TPS+ Adhesive	10-lbs / 95% RH, 11 pH	8-lbs / 90% RH, 11 pH
Bentley Healthbond 2399	10-lbs / 95% RH, 12 pH	8-lbs / 95% RH, 12 pH

- Wood subfloor Construction and Wood Underlayment conditions. Please contact Bentley Mills Technical Services for further information.

Bentley's Position on Moisture Testing

Bentley requires concrete slab moisture testing and recognizes 2 test methods to measure the moisture in a concrete slab:

ASTM F2170 RH test

ASTM F1869 Calcium Chloride test

The best choice is to do both tests side by side. This way, all the information needed to properly assess the moisture condition of the concrete slab will be available.

When performing the tests, both tests need to pass the moisture requirements.

Should there be a decision to perform only one type of test, Bentley requires the ASTM F2170 RH test, as this is the most accurate test available at this time.

Gypsum Base Substrate

- Prohibit circulation of other trades in the installation area.
- The General Contractor shall patch and repair all cracks, voids and other imperfections of the gypsum base subfloor with high strength gypsum base patching compounds compatible with the gypsum base product.
- After completion of patching and leveling, vacuum or sweep entire surface of the gypsum base subfloor to remove loose dust and dirt.

- Apply Taylor 2025 Universal Primer per Taylor's instructions.
- Once the Primer has set, install the flooring following the installation instructions.

Subfloors with Radiant Heating Systems

Bentley LVT can be installed over subfloors with radiant heating systems.

To ensure proper installation and enable proper adhesion, respect the following conditions:

- In all cases, it is necessary to respect the curing time of the concrete slab.
- Before the installation, the radiant heating system must have been turned on for at least 4 weeks to stabilize the moisture content of the concrete slab and to avoid any moisture peak when the system will be in service after the installation of the flooring.
- A certified technician should turn on the system as per the manufacturer recommendation.
- The room temperature must be kept at its maximum 85°F for 8 days prior to the installation of the floor covering.
- The maximum temperature will not exceed 85°F at any time.
- To install on a subfloor with a radiant heating system, the system has to be turned off 48 hours before, during, and 72 hours after the installation. Always verify that the room temperature is not less than 65°F during that period of time.
- The heating system should be turned on gradually starting 72 hours after the installation. Temperature should remain in normal operating parameters post installation.
- Turning on the heat gradually will allow the substrate and the flooring to adapt to the temperature change together.
- A sudden temperature change could result in adhesion problems.
- During the drying period of the concrete slab, moisture tests shall be performed per the conditions stated in ASTM F1869, ASTM F2170 standards and substrate conditions will meet ASTM F710 standard.
- When using Gerfix TPS+, moisture tests for subfloors with Radiant Heating Systems shall not exceed 8-lbs./ 1000 sq. ft./24hrs. per ASTM F1869 and 90% RH per ASTM F2170.
- When using Gerfix Spray or Healthbond 2399, moisture tests for subfloors with Radiant Heating Systems shall not exceed 8-lbs./ 1000 sq. ft./24hrs. per ASTM F1869 and 95% RH per ASTM F2170.
- When using Mapei G19, moisture tests for subfloors with Radiant Heating Systems shall not exceed 3-lbs./ 1000 sq. ft./24hrs. per ASTM F1869 and 75% RH per ASTM F2170.

WARNING: NEVER COVER THE FLOORING WITH RUGS, MATS, RUNNERS, ETC. THESE WILL AFFECT THE HEAT TRANSFER OF THE RADIANT SYSTEM AND COULD DAMAGE THE FLOORING.

Wood Substrates

Wood Subfloor Constructions

Suspended wood subfloor shall be 1" (25mm) thick or heavier, conforming to the current CSA or FHA standards, double-layered, strongly constructed, free from vertical movement and have a minimum of 18" (460mm) of well-ventilated air space clearance above the ground. In an area of high humidity due to ground moisture such as a crawl space or basement, a vapor barrier (minimum 4 mil polyethylene sheeting) should be installed over the ground with overlapped widths and lengths, to serve as a moisture barrier to help assure dryness. The truss shall be spaced not more than 16-inch (406mm) on centers. If truss are warped or twisted, or otherwise do not present a flat, true base for plywood installation, these conditions must be corrected prior to the installation of the plywood by routing the truss or by firmly nailing blocks to the sides of the truss whichever is required. All subfloor panels must be fastened to the truss in accordance with their manufactures recommendations to preserve their warranties.

Single Layer Wood Floors: Single layer plywood subfloors are not recommended in areas requiring resilient flooring; they are the major cause of nails popping and squeaking. These subfloors must be covered with a minimum of 1/4" (6mm) or heavier approved underlayment grade plywood.

Stripwood Subfloors: Single and/or double tongue-and-groove stripwood floors should be covered with a 3/8" (9.53mm) or heavier underlayment to eliminate telegraphing of the stripwood floor board joints.

Wood Underlayment

Underlayment grade panels are used to resurface an existing wood subfloor. The finished appearance of any resilient flooring installation will be determined in part by the underlayment over which it is installed. Underlayment grade panels for commercial resilient floors must be 3/8" (9mm) or heavier with fully sanded face meeting CSA or FHA standards. The following descriptions of types of underlayment panels and Bentley Mills resilient flooring's recommendations for their use are intended only as a guide. The underlayment selected is subject to the discretion of the installer based upon subfloor conditions. Bentley Mills strongly suggests that whoever is buying the underlayment material obtain a warranty from the supplier. **The responsibility for warranties, guarantees and performance rests with the manufacturer of the underlayment and not with Bentley Mills.**

CAUTION: Some plywood underlayment manufacturers use plastic or resin filler to patch surface cracks. Some filler can cause discoloration in vinyl flooring. Specify plywood underlayment with wood plugs and fills.

APA-Engineered Wood Construction Guide:

- 3/8" (6mm) or heavier APA Underlayment Exposure 1 (with fully sanded face)
- 3/8" (6mm) or heavier APA Underlayment C-C Plugged Exterior (with fully sanded face)

Sturd-I-Floor Construction Plywood Floor System

Conventional veneered plywood Sturd-I-Floor system with sanded face is a suitable subfloor for installation of Bentley Mills resilient flooring when constructed for resilient flooring per APA.

The identification provides information on thickness and the corresponding allowable maximum joist spacing. Tables in the APA Engineered Wood Construction Guide provide maximum joist spans for each joist size, wood specie and grade. Glued tongue and groove edges are recommended to assure snug joints. Only fully sanded panels are acceptable and must be thoroughly dry before applying floor covering. The long dimension of the panel must be installed across supports and with panel continuous over two or more spans. To minimize squeaks, buckling and nail-pop, follow the APA recommendations for site applied glue on both joists and tongue-and-groove joints.

Note: 3/8" (9 mm) minimum APA Underlayment grade plywood must be applied over the Sturd-I-Floor System with staggered and off-set joints.

Caution: Certain industrial grade adhesives used in the construction trade to adhere subfloor panels have been known to discolor resilient flooring products even if covered over with board or trowelable underlayments. Any construction adhesives used in subfloor construction must be guaranteed by its manufacturer, not Bentley Mills, to be non-staining for resilient flooring materials.

Note: Installing a resilient flooring over approved plywood will not diminish the telegraphing of the sheets of plywood through the resilient flooring.

Installation of Squares, 18 in x 36 in, and Planks

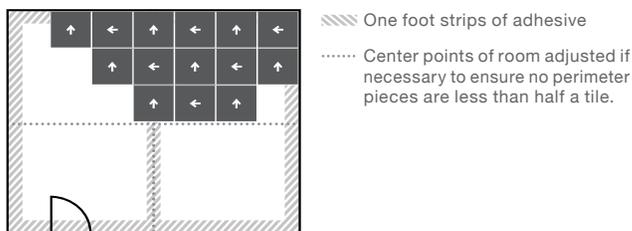
Flooring Material Inspection

- Boxes are clearly marked with batch numbers and the product should be checked for match before installing.
- Inspect all materials carefully to verify that correct colors, lot number, patterns, quality and quantities have been shipped as ordered. Do not install, cut, or fit any material that has visible defects.
- A contractor that installs material that has visible defects or damage without prior consent of Bentley deems the product acceptable for installation and therefore accepts full responsibility for said material.

Note: Most tiles have directional arrows and should be installed by alternating the arrows 90° forming a “checkerboard” pattern. Should the tiles be installed in the same direction, the seams will then be more visible, this is an observable fact inherent to the product.

Square Tile Layout

- Chalk the center lines of the work area in both directions so that one line is parallel to the length of the room and that the second line is on a 90° angle to the first line.

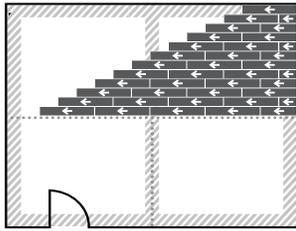


- Position center lines to allow the perimeter tiles to be \geq to $\frac{1}{2}$ tile.
- Before spreading adhesive it is recommended to lay one or two rows of tiles along both center lines to check for proper alignment.
- Mix tiles from different boxes to obtain a consistent layout.
- Be certain this tile is installed on the lines to fit the 90° angle.
- After the first tile is in place, begin laying tiles outward along both guide lines.
- Press tiles firmly against adjoining tiles and press into the adhesive.
- Begin stair-stepping the tiles into the field area.
- It is recommended to install the tiles in a checkerboard pattern (90°).

Plank and 18 in x 36 in Tile Layout

- Chalk the center lines of the work area so that the line is parallel to the length of the room.
- Before spreading adhesive it is recommended to lay one or two rows of planks or tiles along center line to check for proper alignment.
- Mix planks or tiles from different boxes to obtain a consistent layout.
- Be certain the planks or tiles are installed right on the center lines.
- After the first row is in place, begin laying planks or tiles outward.
- Press planks or tiles firmly against adjoining planks and press into the adhesive.

- Begin stair-stepping the planks or tiles into the field area.



 One foot strips of adhesive
 Center points of room adjusted if necessary to ensure no perimeter pieces are less than half a tile.

* Please reference the recommended installation method for your specific product.

Gerfix Spray LVT & Plank Adhesive Installation Method

- Use only Gerfix LVT & Plank Spray adhesive.
- Always refer to the Gerfix Spray LVT & Plank Adhesive Technical Data Sheet.
- Follow the guidelines indicated on the container of adhesive.

Recommended spray pattern:



- Coverage up to 185 sq. ft. per can.
- Ensure substrate, flooring and surrounding areas are clean and dust free.
- Damp-mop substrate if dust is present.
- Only use cement-based patching and leveling compounds.
- Wipe hand across surface to verify for dust.
- If dust transfers, substrate is not clean.
- Protect from overspray with a spray shield, drop cloths or paper with masking tape.
- Shake aerosol can well. Remove cap.
- Starting from the center lines and working outward, apply the adhesive to the subfloor.
- To ensure uniform adhesion of the entire surface, spray a workable amount of adhesive at one time.
- Stand straight up to spray. Hold can upside down, approximately 20-30 inches horizontally from the substrate, aim at floor and press tip with finger.
- Walk right to left slowly to achieve results.
- Adhesive should spray out in a wide mist.

Note:

- Spraying in a sweeping motion may result in an inconsistent spray pattern.
- Excess buildup or inconsistent spray pattern on substrate may cause telegraphing.
- Avoid extremely heavy application.
- To ensure optimal spray pattern, remove any adhesive build up that may occur during the application process.
- If overspray occurs, it may be removed with a damp cloth while the adhesive is still wet.
- Allow adhesive to dry until there is no adhesive transfer when lightly touched. (10-20 min).
- High humidity and/or low temperature increases tack time.
- Open time after application is 3 hours. While open, ensure that adhesive is not contaminated by dust.
- Roll flooring with a 3 section 100-lb roller within 1 hour after installation to complete the bonding process.
- Floor is open to all traffic immediately after installation.

Gerfix TPS+ or Bentley Healthbond 2399 Adhesive Installation Method for Tiles and Planks

- Always refer to the Gerfix TPS+ or Bentley Healthbond 2399 Technical Data Sheet.
- Follow the guidelines indicated on the pail of adhesive.



- Recommended trowel size is 1/16" x 1/32" x 1/32" U notch, covering up to 245 sq. ft. per U.S. gallon.
- Starting from the center lines and working outward, apply the adhesive to the subfloor.
- To ensure uniform adhesion of the entire surface, apply a workable amount of adhesive at one time.
- Maintain a uniform spread rate. Replace trowel (or trowel blade) with every pail used.
- Immediately after troweling the adhesive onto the concrete use a medium napped paint roller saturated with adhesive to flatten out visible trowel marks and even out the adhesive. **A double arm roller frame is recommended to ensure an even coat of adhesive.**
- **Open time is the combination of flash time and working time.**
- "Open time" of the adhesive is dependent upon porosity of the substrate, temperature, and humidity. It is important that the installers familiarize themselves with the adhesive before starting the installations. Insufficient open time will cause bubbling and result in poor adhesion.

Application Characteristics over Porous Substrates

	Flash Time*	Working Time**
Tiles and Planks	20 to 40 minutes (to reach a tacky state)	40 to 90 minutes

* *Flash Time is the waiting time required before installing flooring.*

** *Working time is the window of time for the adhesive to accept flooring.*

Note: Flash time and working time may vary based on temperature, humidity, substrate porosity, trowel size and jobsite conditions.

- Once flooring is placed into the adhesive, immediately roll thoroughly with a 3 sectional 100-lb roller in both directions.
- Use a 14" to 16" cork board or a piece of 2" x 4" wrapped with a piece of carpet to remove air bubbles.
- Continue laying tiles by butting the edges together without too much pressure.
- During the installation, always double check the flooring for bubbles with the lights on and off.
- Avoid adhesive displacement by prohibiting traffic for a period of 48 hours and 72 hours for rolling loads.
- The use of walking boards is mandatory to protect from adhesive displacement during installation.

Once The Installation is Completed

- Perform a visual inspection of the project.
- Repair every imperfection before leaving the project.
- Make sure that all vertical obstacles, such as door frames, are well trimmed and sealed with a silicone sealer or an equivalent product.

Free Lay Installation (5 mm Only)

- It is important to balance the layout of the plank or 18 in x 36 in tile format. Proper planning and layout will prevent narrow widths or lengths at wall junctures. Identify which direction the planks or tiles will run in the room. Typically, the planks or 18 in x 36 in tiles will run lengthwise in the longest dimension of the room.
- Accurately measure the room and identify the center point. Next, determine if that center point will result in planks or tiles less than half width or very short in length being on either side of the room against the wall. If this will be the case, adjust the center line accordingly to a point where you have at least half width or medium length plank or tile on the edges against the wall.
- Apply Healthbond 2399 adhesive using only a 1/16" x 1/32" x 1/32" U notch trowel in one foot widths on both sides of the center line and all the way around the perimeter of the room. Allow adhesive to set up. This provides for multiple anchor points to hold the Free Lay installation firmly in place.
- For areas larger than 25 feet wide, you will need to utilize a grid system and add one foot trowel widths of adhesive accordingly. Large open areas should be a 20 foot grid and smaller areas can go as low as 10 feet.

- Start by laying a full plank or tile around the center line. You can start it right at the center line or overlap the center line. Work outward from the center point toward the perimeter in both directions installing them end to end. If you have multiple installers, have one move in one direction and the other the opposite, so as to maximize efficiency. As you progress to the next row overlap the seams by at least $\frac{1}{4}$ of the length of the one before it. Keep in mind you are creating a random looking installation that will mimic a natural look. As you proceed, overlap the prior rows by differing amounts ensuring that seams do not line up.
- Finish by cutting in the fill pieces on the side allowing an expansion area of $\frac{1}{4}$ " around the perimeter. This is necessary to allow for some expansion or contraction of the product.
- Protect your installed flooring from exposure to extreme or direct sunlight. Prolonged, direct sunlight will heat your floor, causing it to expand. When the floor temperature drops after the sun passes, your floor will shrink, causing the floor to separate. This is especially true in areas where the flooring is pinned or where heavy objects are on the floor. In areas where large windows or sliding glass doors are present, shades and window treatments are needed to protect your floor from sunlight during all seasons.

For additional information, please contact Bentley Technical Services at 800.423.4709.

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