

ENGINEERED HARDWOOD FLOORING

THINGS TO KNOW BEFORE INSTALLATION:

PLEASE READ!

Wood and Bamboo are natural products, containing variations in color, decoration, and grain. Before our flooring products leave the plant, they go through numerous inspections; however, as the installer of the flooring, YOU are the final inspector.

NOTE: MANUFACTURER ACCEPTS NO RESPONSIBILITY OR LIABILITY FOR ANY MATERIAL ONCE IT HAS BEEN INSTALLED. IF THERE IS ANY QUESTION REGARDING FIT, FINISH, OR ANY OBVIOUS DEFECTS, DO NOT INSTALL! INSTALLATION ACKNOWLEDGES ACCEPTANCE OF THE MATERIAL.

Allow 5% minimum (we recommend allowing 5% - 10% on Acacia) for culling out (removing) undesirable pieces during the layout process. Some overwood/underwood and gaps are a natural occurrence in factory finished wood flooring. Appropriate color match filler can be used to fill small gaps.

All wood floor installations must follow NWFA (National Wood Flooring Association) guidelines.

Flooring requires acclimation time BEFORE it is installed. Check the moisture content (MC) of the flooring when it is delivered to the job site, and do not install until it reaches the desired MC for the climate and environment in which it is going to be used. The moisture meter should be adjusted to the species of wood being installed. For more information about the MC required in your area for the species of wood you are using, contact the National Wood Flooring Association. Cartons and plastic packaging should be opened and cross stacked on the job site. Do not install the flooring until it is at the correct MC. Moisture readings should be documented and retained. In the event you need to file a claim on your flooring, documentation of the moisture readings will be required.

WOOD DUST CAN BE AN IRRITANT TO BOTH SKIN AND LUNGS! BE SURE TO WEAR THE PROPER PROTECTIVE GEAR WHEN CUTTING OR SANDING WOOD.

Caution:

Wood Dust! Cutting, sanding, or machining wood products produces wood dust. While wood products are not hazardous under the OSHA Hazard Communication Standard (29 CFR 1910.1200), the International Agency for Research on Cancer (IARC) and the State of California have classified wood dust as a human carcinogen.

Proposition 65 Warning:

This product produces wood dust when cut, sanded, or machined. Wood dust is considered a carcinogen by the State of California. Precautionary Measures: Airborne wood dust can

cause respiratory, skin, and eye irritation. Power tools should be equipped with a dust collector. Use an appropriate NIOSH-designated dust mask. Avoid dust contact with skin and eyes. First Aid measures in case of irritations: In case of irritation, flush eyes with water. If needed, seek medical attention. If dermatitis occurs, seek medical attention.

Warning!

DO NOT MECHANICALLY CHIP OR PULVERIZE EXISTING RESILIENT FLOORING, BACKING, LINING FELT, ASPHALTIC "CUTBACK" ADHESIVES, OR OTHER ADHESIVES. Previously installed resilient floor covering products and the asphaltic or cutback adhesives used to install them may contain asbestos fibers and/or crystalline silica. The products in this carton DO NOT contain asbestos or crystalline silica. Avoid creating dust. Inhalation of asbestos or crystalline dust is a cancer and respiratory tract hazard. Smoking by individuals exposed to asbestos fibers greatly increases the risk of serious bodily harm. Unless positively certain that the product is a non-asbestos containing material, you must presume it contains asbestos. Regulations may require that the material be tested to determine asbestos content and may govern the removal and disposal of material. See current edition of the Resilient Floor Covering Institute (RFCI) publication "Recommended Work Practices for Removal of Resilient Floor Coverings" for detailed information and instructions on removing all resilient covering structures.

INSTALLER/OWNER RESPONSIBILITY

The following information is aimed at the wood floor installer, whose focus is producing the finest finished product possible. The installer may in some cases be the person who sold the job, the homeowner, or in many instances, the job was sold by someone else. Good communication between the salesperson and the installer is important. Customer expectations should always be considered when selling and installing both pre-finished and job site finished wood floors. If a factory finished floor is "oversold" and things such as over-wood, under-wood, or small gaps are not discussed, the job becomes an accident waiting to happen. The same is true of job site finished wood floors if color change over time and differences in color between different finish systems is not discussed and understood. When selling wood or Bamboo flooring, take into consideration the lifestyle of the customer; do they have pets or small children? Do they entertain frequently? If so, do not recommend flooring that is prone to dent or mar, such as American Cherry, American Walnut, Bamboo (especially carbonized), Pine, or Genuine Teak. Recommend woods on the high end of the Janka Hardness scale in these situations. The bottom line is good communication between all parties.

It is the responsibility of the installer and owner to ensure that job site environmental, sub-floor, and subsurface conditions involved meet or exceed all requirements as outlined in installation instructions prior to installation. Manufacturer declines all responsibility for product performance or installation

failure due to sub-floor, substrate, or environmental deficiencies or job site conditions.

Manufacturer requires Engineered Hardwood products to acclimate for a minimum of 72 hours prior to installation. Additional time may be required for 5" wide or wider products as determined by moisture content. Acacia flooring may require 7 to 14 days of acclimation before it reaches equilibrium with its surroundings. Acclimation allows flooring to achieve equilibrium moisture content (EMC) with the installation environment. True acclimation is reached only when the flooring is within 2% of the subfloor (4% for widths less than 3"). All wood continually expands and contracts until it reaches moisture equilibrium with the environment in which it's installed. As with all wood flooring, expansion and contraction will be minimized if climate control is consistently maintained year round. This is especially important with tropical species, because denser woods experience more significant shrinkage in low moisture/low humidity environments. All work involving water or moisture (plumbing, masonry, painting, plastering) must be completed prior to flooring being delivered. Building envelope must be complete and exterior doors and windows installed. Exterior grading and gutter downspouts should be completed, and permanent HVAC systems should be in operation for 14 days prior to flooring being delivered to job site. Measures should be taken to protect floors from other trade work.

Do not cover floors with plastic, red rosin, felt or wax paper or previously used cardboard. Instead use a breathable material such as clean, dry, plain uncoated cardboard or Kraft paper. Inks from printed cardboard could damage the hardwood floor. The floor should be thoroughly cleaned before covering to remove grit and debris that would damage the finish. The floor must be completely covered to eliminate uneven ambering from exposure to UV light.

Because of the potential for damage to the surface finish due to the adhesives on tape, we do not recommend or approve the use of any tape, including painter's tape, 3M, etc., to be placed on the surface of the flooring. Any damage to the finish caused by the use of tape will be covered under the warranty provided by the tape manufacturer. Flooring manufacturer accepts no responsibility for this type of finish damage.

Room temperature should be 65 - 75° F, with relative humidity between 35 – 55%. These environmental conditions are specified as pre-installation requirements and must be maintained for the life of the product. The HVAC system should be in operation for a minimum of 14 days prior to installation. If HVAC is not possible at the time of installation, the job site conditions must be at or near normal living conditions between 60° and 80° Fahrenheit, and at the average yearly relative humidity for the area.

Building interiors are affected by two distinct humidity seasons

– Heating and Non-Heating. Care should be taken to maintain humidity levels between 35-55%. Manufacturer warranties do not cover natural expansion and contraction which results in separation between planks or damage caused by excessively low or high humidity. Seasonal gapping is not considered a manufacturing defect.

Heating season – Low Humidity, Dry. All heating methods create dry, low humidity conditions. Humidifiers are recommended to prevent excessive shrinkage or gapping in wood floors due to seasonal periods of low humidity.

Non Heating season and Coastal or Waterfront Areas – High Humidity. During the non-heating season, proper humidity levels should be maintained by using an air conditioner or dehumidifier or by turning on your heating system periodically during the summer months.

Do not install in full bathrooms or powder rooms. Do not install over radiant heat.

Examine flooring for color, finish and quality prior to installation. If material is unacceptable, contact the seller immediately. Wood is a natural product and contains characteristics such as variation in color, tone, and graining. Flooring is manufactured in accordance with industry standards, which allows manufacturing and natural tolerances up to 5% of the total installation. We recommend allowing up to 10% on all Acacia installations. Installer should work from several cartons at the same time to ensure good color and shade blend. Installer should not install undesirable pieces. Installation is considered acceptance.

Flooring warranties DO NOT cover materials with visible defects once they are installed. Installer and Owner are responsible for final inspection of flooring manufacture, grade, and finish. Purchase an additional 5% of flooring to allow for cuts (10% for Acacia) and an additional 10% if installing diagonally.

Flooring warranties DO NOT cover materials that do not match samples. Wood flooring is made from natural woods. Because they are a natural product, the colors can vary substantially between lots in natural and in stained flooring. Installer and Owner are responsible for final inspection of flooring for color and appearance BEFORE installation.

WARRANTY NOTE

Installer should provide owner with one carton end label from product installed for warranty purposes. Owner should retain carton end label and copy of their original sales invoice with product style name and style number for their records. Excess flooring should be retained and stored in a climate controlled area for future repairs in the event planks are ever damaged.

The use of stain, filler, or putty for correction is considered a normal practice and a routine part of installation. Installer is responsible for identifying issues that may require excessive

use of any of the above. In these instances, installation should immediately stop and the seller should be contacted.

PLEASE READ ALL INSTRUCTIONS CAREFULLY BEFORE YOU BEGIN INSTALLATION. IMPROPER INSTALLATION WILL VOID WARRANTY. STOP: WOOD IS A NATURAL PRODUCT AND COLORS CAN VARY FROM CARTON TO CARTON, SO ALWAYS WORK FROM A MINIMUM OF 3 TO 5 CARTONS.

Always check panels for defects such as chips and color/sheen differences under good light conditions. Also check that the channel is clean and free of debris. For best color match when using panels from three or more packages, check to be sure all the patterns are the same. Be sure to use flooring out of more than one box.

Flooring MUST be allowed to acclimate to the environment of the installation area. Flooring will not properly acclimate in wrappers, cartons, etc. Remove the flooring from its packaging and cross stack it on the job site. You must allow a minimum of 5 days of acclimation. Acacia flooring must not be installed until the Moisture Content (MC) is within 2% of the subfloor. Moisture readings of the subfloor and the flooring must be taken prior to installation and documentation must be retained. The temperature should be approximately 62-73° F (17-23° C) with a relative humidity of 35-55 percent. Humidity should never be allowed to drop below 35 percent as this may cause gapping, face checking, etc.

If existing baseboard moldings are difficult to remove, they may be left in place. Quarter round molding is all that is needed to cover the expansion space between flooring and baseboard.

BASIC TOOLS & ACCESSORIES

Broom
Terry Cloth Towels
Coordinating transition strips or molding
Coordinating stain, filler, or putty
Chalk line
Thick felt or rubber pads
Safety Glasses
Straight Edge
Tape Measure
Pry Bar or Trim Puller
Pencil
15 Lb. Saturated Felt
Tapping Block
Urethane Adhesive
Adhesive-Sealer
Putty Knife
Mineral Spirits
Hand or Electric Jam Saw
Power Circular saw or Miter Saw
Wood/Concrete Moisture Meter or Both
1/2 Inch Wood Spacers

Table Saw
Carpenter's Square
Utility Knife
Pull Bar
Floor Glue
Plastic Scraper
Moisture Membrane

Floating Installation:

We recommend products specifically designed and tested for use with Engineered Hardwood Flooring.

For Direct Glue Installation:

When installing on concrete subfloors, trowels should be replaced every 3000 ft. Never use a water based adhesive to install Engineered Hardwood Flooring.

Engineered Tongue and Groove Hardwood Flooring can be installed over most properly prepared subfloors and are engineered to be dimensionally stable, making them suitable for installation on all grade levels where moisture conditions do not exist.

STORAGE & HANDLING

Flooring should be delivered and stored at the job site for a minimum of 72 hours prior to installation to allow the product to acclimate from prior transport or storage conditions. Flooring should be stored with at least a four inch air space under cartons. Cartons should be opened. This is especially important if you live in a very humid or dry climate.

PRE-INSTALLATION & JOB SITE CONDITIONS

Subfloor Requirements:

The following subfloor recommendations are intended to complement the installation of hardwood flooring as an interior finish. Hardwood flooring is not a structural component. These recommendations are not intended to supersede federal, state, or local building codes, but as with many other interior finish products, may require modifying existing structural components for a successful installation. NOTE: When joist spacing exceeds the traditional 16 on center, it is recommended that a thin bead of glue be applied to the bottom side of the groove to lock the tongue and groove profile in place. This will reduce the potential for movement of the tongue and groove, which may contribute to squeaking or crackle. When using this method of installation, you may to staple/nail down the flooring. Using glue with the staple or cleat reduces movement as the subfloor deflects.

Subfloor Preparation Recommendations for All Installations:

Engineered Hardwood Floors may be installed over any structurally sound subfloor that is flat, clean, and dry on all grade levels. Do not install in full bathrooms or powder rooms.

All subfloors should be:

- CLEAN** – Subfloor must be clean and free of dirt, curing compounds, drywall mud, wax, paint, oil, sealers, adhesives, and other debris. These may be removed mechanically.
- FLAT** – Within 3/16" in 10' radius (5 mm in 3 m) and/or 1/8" in 6' radius (3 mm in 2 m). Sand high areas or joints. Fill low areas with a high compressive strength (min. 3,000 psi) Portland base compound.
- DRY** – Select the appropriate moisture indicator test specifically designed for use with wood or concrete subfloors. Test and record moisture content results.
- STRUCTURALLY SOUND** – Nail or screw any areas that are loose or squeak. Wood panels should exhibit an adequate fastening pattern, glued/screwed or nailed as that system requires, using an acceptable nailing pattern. Typical: 6" (15 cm) along bearing edges and 12" (31 cm) along intermediate supports. Flatten edge swell as necessary. Replace any water-damaged, swollen, or delaminated subflooring or underlayment.

Building codes establish requirements for structural support components of flooring systems which may not provide adequate rigidity and support for proper installation and performance of a hardwood floor. Whenever possible, install flooring perpendicular to the floor joists for maximum stability.

NOTE: Avoid subfloors with excessive vertical movement or deflection because subfloor movement will telegraph through to the finished installation. Indications of excessive deflection are uneven finish wear, fastener release, squeaking, compromised or damaged locking systems, sectional contours such as bowing or dipping in floors, and uneven flooring material. Nail or screw subfloor panels to secure boards with excessive vertical movement or deflection. If the subfloor has excessive vertical movement (deflection) before installation of the flooring, it is likely it will do so after installation of the flooring is complete. Our warranties **DO NOT** cover any problems caused by inadequate substructures or improper installation of said substructures.

Subfloor Moisture Check:

Note: To increase reliability, moisture testing should be performed after the HVAC system has been in operation for a minimum of 14 days. Excess moisture on any flooring substrate, if not identified and corrected prior to installation, will cause floor covering failure. Warranties **DO NOT** cover products installed over improperly prepared subfloors, substrates, or environmental related deficiencies.

Acceptable conditions for above, on, and below grade applications are:

Concrete Subfloor Moisture Content:

On and below grade applications are susceptible to moisture and should be tested for moisture prior to installation in several locations within the installation area. Installer should record moisture test results on the form provided in this document and leave with the owner as part of their records. Acceptable

conditions for above, on, and below grade applications on concrete are:

- Less than 3 lbs./1000 sq. ft./24 hrs. Calcium Chloride Test (ASTM F1869) or
- Less than 75% RH Levels in Concrete Using In-situ Probes (ASTM F 2170-02) or
- No greater than 5% on a Tramex Concrete Moisture Encounter meter or equivalent concrete moisture meter.

DO NOT INSTALL FLOORING IF MOISTURE TESTS RESULTS EXCEED RECOMMENDED LIMITS.

NOTE: New concrete slabs require a minimum of 60 days drying time before covering them with a wood floor. (Must be fully cured) Although initial moisture tests may indicate a dry slab, the moisture content of slabs may increase due to seasonal fluctuation or weather patterns. New construction should have a minimum 10 mil poly membrane between the ground and concrete.

Wood Subfloor Moisture Content:

Test both wood subfloor and wood flooring for moisture content using a reliable pin type moisture meter. The subfloor material must not exceed 12% moisture content. The difference between the moisture content of the wood subfloor and the hardwood flooring must not exceed 4%. For hardwood products greater than 3" wide, the moisture content of the wood subfloor and hardwood floor should not differ more than 2%. If subfloor moisture readings exceed recommended levels for concrete or wood, steps **MUST** be taken to reduce subfloor moisture. Steps could include waiting for subfloors to dry to acceptable.

NOTE: Basements and crawl spaces must be dry. Use of a 6 mil black polyethylene membrane is required to cover 100% of the crawl space earth. Crawl space clearance from ground to underside of joist should be no less than 18" and perimeter vent spacing should be equal to 1.5% of the total square footage of the crawl space area to provide cross ventilation.

To correct any subfloor conditions concerning moisture, either wait until the subfloor dries to meet specifications or use an appropriate moisture barrier.

Concrete Subfloor

Lightweight Concrete:

To test for lightweight or acoustical concrete, scrape a coin or key across the surface of the subfloor. If the surface powders easily or has a dry density of 100 pounds or less per cubic foot, Engineered Hardwood flooring should be installed as floating only. Only engineered flooring 4 plies or thicker may be installed as floating.

Wood Subfloors:

NOTE: As with many other interior finish products, modification of existing structural components may be required for a

successful installation.

Solid Wood Subfloors - Direct Glue or Floating Installations:

- Minimum 3/4" (19 mm) thick with a maximum width of 6" (15 cm) installed at a 45° angle to the floor joists.
- Group 1 dense softwood (Pine, Larch, Douglas fir, etc.) No. 2 common, kiln dried with all board ends bearing on joists.
- For direct glue-down applications add 3/8" (9.5 mm) approved floor panel underlayment.

Existing Wood Flooring - Direct Glue or Floating Installations:

- Existing engineered flooring must be well bonded/fastened. When gluing over existing wood flooring, the surface finish must be abraded or removed to allow adequate adhesive bond.
- Existing solid hardwood flooring that exceeds 6" (15 mm) in width must be covered with 3/8" (9.5 mm) approved underlayment and fastened as required. Do not install over solid or engineered flooring attached directly to concrete.

Wood subfloors should be well nailed or secured with screws. Nails should be ring shank and screws need to be counter sunk. The wood subfloor needs to be structurally sound (meaning subfloors without loose boards, vinyl or tile). If sub-floor panels are a single layer, less than 3/4" thick, add another single cross layer for strength and stability (minimum 3/8" thick for a total 1 1/8" thickness). Underlayment floor panels must be installed sealed side down. When used as a subfloor, allow 1/8" (3 mm) expansion space between each panel. If spacing is inadequate, cut in with a circular saw. Do not cut in expansion space on tongue and groove panels. When installing parallel to the floor joists it may be necessary to increase rigidity of the structural subfloor system by installing an additional minimum of 3/8" (9.5 mm) approved underlayment floor panel.

Approved underlayment floor panels should meet or exceed the following:

- Plywood: Must be minimum CDX grade (exposure 1) and meet US Voluntary Product Standard PS1 performance standard or Canadian performance standard CAN/CSA 0325-0-92. The preferred thickness is 3/4" (19 mm) as a subfloor [minimum 5/8" (16 mm)] or 3/8" (9.5 mm) as floor panel underlayment.
- Oriented Strand Board (OSB): Conforming to US Voluntary Product Standard PS2 or Canadian performance standard CAN/CSA 0325-0-92 construction sheathing. Check underside of panel for codes. When used as a subfloor, the panels must be tongue and groove and installed sealed side down. Minimum thickness to be 23/32" (18 mm) thick when used as a subfloor or 3/8" (9.5 mm) as floor panel underlayment.
- Wafer board and Chipboard: Conforming to US Voluntary Product Standard PS2 or Canadian performance standard CAN/CSA 0325-0-92. Must be 3/4" (19 mm) thick when used as a subfloor and 3/8" (9.5 mm) thick when used as floor panel underlayment.
- Particleboard: Must be a minimum 40-lb. density, stamped

underlayment grade and 3/4" (19 mm) thick. (Floating installation only)

Subfloors Other Than Wood or Concrete:

Note: Perimeter glued resilient vinyl and rubber tiles are unacceptable underlayments and must be removed.

Terrazzo, Vinyl, Resilient Tile, Cork and Linoleum or hard surfaces that are dry, structurally sound and level are suitable as a sub-floor. As above, the surface must be sound, tight and free of paint, oil, existing adhesives, wax, grease and dirt. Terrazzo and ceramic tile must be scuffed to assure adhesion.

Warning!

Do not sand existing resilient tile, sheet flooring, backing, or felt linings. These products may contain asbestos fibers that are not readily identifiable. Inhalation of asbestos dust can cause asbestosis or other serious bodily harm. Check with local, state and federal laws for handling hazardous material before attempting the removal of these floors.

Direct Glue Installation:

Make sure the floor covering materials are well bonded to the subfloor/underlayment with full spread adhesive and no more than two layers thick, not to exceed 3/16" (5 mm). With approved wood/wood composite subfloors, if vinyl or tiles are loose, broken, or in poor condition, install a 3/8" (9.5 mm) approved subfloor panel directly over the flooring materials. Clean the flooring materials as necessary to remove waxes, sealers or cleaning residues to allow a good adhesive bond. Cork floor sealers and surface treatments must be removed. Always check for adequate adhesive bond prior to beginning direct glue installation.

Radiant Heat Subfloors:

It is important to follow these guidelines strictly. Failure to follow these guidelines may produce unsatisfactory results.

Only floating installations are approved for radiant heat systems. Direct glue down and Nail Down are NOT RECOMMENDED.

Before installing hardwood over radiant heat subfloors, determine if the radiant heat system is rated to be compatible with hardwood flooring. It is highly recommended the radiant heat system be designed specifically to accept hardwood flooring. Radiant heat systems designed for floor coverings with a higher resistance to heat transfer such as carpet will damage wood flooring. Single heat circuit systems designed for use with multiple floor covering products must be adjusted to work at temperatures suitable for hardwood flooring. Use of an in floor temperature sensor as well as a separate thermostat for the individual room is required. An outdoor temperature sensor should be used to adjust water temperature according to anticipated heat loss.

Note: When radiant heat is installed in concrete, mortar beds, or gypsum cement, it is very important to operate the radiant heat system until these are completely dry before you install your hardwood flooring on top. This may take several weeks. Also operate the HVAC system to allow humidity levels in the area to stabilize (35-55% RH) for the area in which the hardwood floor will be installed. Allow hardwood to acclimate to this humidity level before installation. This will minimize dimensional changes due to moisture.

Before installing over a radiant heat floor turn off heat and wait until the floor has reached room temperature (70°-75°F). After installing the floor, gradually return the heat in 5 degree increments. CAUTION: The floor surface must never exceed 85°F.

Multi Width Installation:

Installing planks of multiple widths requires special consideration. Multi Width products arrive in the same carton so measure material needs as you normally would. Always start installation with the widest plank width and install in descending widths (example 5" -3", 5"-3"). Do not try to "mix" widths within a row.

BEFORE YOU START

- Plan your layout and determine the direction of the installation in the room. Planks installed parallel to windows accent the hardwood best.
- Blending of Cartons: To achieve a uniform installation appearance, preselect and set aside hardwood planks that blend best with all trims and moldings. Install these planks next to best blended moldings.
- Remove all wall mounted moldings such as base and quarter round.
- Floor should be installed blending planks from several cartons at the same time to ensure good color and shade mixture throughout the installation.
- Be attentive to staggering the ends of the boards at least 4"-6" (10-15 cm) when possible, in adjacent rows.
- The floating floor underlayment already has double-sided tape for ease of taping the precut overlapping seams. If a non-adhesive underlayment is used, tape all seams.
- Do not install in areas of high moisture such as bathrooms and powder rooms.

PREPARATION:

Undercut Door Casings: Undercut all door casings 1/16" higher than the thickness of the flooring materials being installed. To do this, use a scrap piece of flooring as a guide. Lay it on the substrate and cut the casing with a handsaw or use a power jamb saw set at the correct height. Remove all moldings and wall-base, and undercut all door casings.

FLOATING INSTALLATION

NOTE: Only Engineered Hardwood Flooring with 4 plies or more are approved for floating installations.

Underlayment:

Underlayment requirements are very critical to a floating installation. Excessive pad compression or compaction is a common cause of seam failure.

Lay the underlayment on the floor with the moisture barrier facing up. The direction of the underlayment should be parallel to the direction of the floor. For the first row of flooring the underlayment should be placed so that approximately 1 inch overlaps onto all perpendicular walls. Place the following row next to the first row on top of the lower moisture barrier overlap. Remove the adhesive strip and fold back the upper overlap on the second row. Make sure the underlayment fits together tightly (don't leave gaps). On the last row, place the underlayment 1 inch up the wall. To join rolls on the short side of the underlayment, use a moisture resistant tape to connect the 2 pieces so water cannot penetrate the underlayment.

Expansion Space:

An expansion space of at least ½ inch must be maintained around the perimeter of the room, all pipes, counters, cabinets, fireplace hearths, doorframes and any other fixed vertical objects in the room. Doorway or archways 4 feet or less and rooms larger than a 26 X 33 are required to have a T-Molding.

Glue and Glue Placement:

The glue must be placed along the topside of the groove the full length of the grooved side and end. This can be accomplished by inverting the plank and applying a bead of glue (3/32") to the topside of the groove (side of the groove nearest the face of the plank), when the plank is turned back over the glue will flow down the back of the groove allowing total coverage. Apply only a 3/32-inch bead of glue; if the groove is filled with glue it will be difficult to close the seam not allowing a tight fit.

Getting Started:

The installation begins with three rows of flooring glued together and held in place with 3M blue painters tape (#2080) with the groove side facing the wall. Spacers must be used to establish the minimum ½" expansion space from the walls. These three rows must be straight, square and in rack because they establish the alignment of the rest of the floor. After putting these three rows together allow the glue to set (15 to 45 minutes) before proceeding with the installation. With the tongue facing out the planks can be tapped together with a tapping block on the tongue to make a snug fit. After installing 8 or 10 rows of flooring, stand back and check for crowning or heaving due to tension strapping or any damage caused by improper taping.

Clean As You Go:

If any glue squeezes out of the seam between the planks allow

it to dry for 10 to 15 minutes and then lightly scrape it away with a plastic scraper or putty knife, any glue left may be cleaned with a damp cloth. Do not allow the glue to dry on the face of the flooring; it will be very difficult to clean off.

Starting Off - The First Three Rows

Row One: Plank 1 should begin in the left hand corner of the room. Spacing around the wall perimeter of 1/2" can be maintained by using wood wedges. The planks are laid with the groove side facing the wall. The first row starts with a full length board; working from left to right will be required when installing engineered hardwood flooring. Slide the end groove of the board being installed into the end tongue of the board you previously installed. Place each plank firmly against the wood wedges. After setting the first row and making sure you are against a firm starting point, lay out three to four rows before starting to install. Plank 2 end tongue is connected to the end groove of Plank 1. Lay the rest, plank after plank, in this manner until you have completed the first row. Cut the last plank accordingly. Please ensure that this first row is straight using the wedges to maintain proper 1/2" expansion space from the wall.

Row Two: When possible use leftover plank from the first row to begin the second row. The leftover piece from the first row should be considered for this starter piece to minimize waste. Initial layout of material will allow you to check your end seams to ensure they are not too close. End joints on adjoining rows should be offset by no less than 6". Align this plank and lock the side into place against the first plank in row 1. The next plank is aligned with the end joint first into the previously plank in row 2. The side of plank is then tapped lightly against the previously laid row. Continue laying in this way across the entire row. Remove the fitting wedge and press in the row of planks with a light pressure on the long side. The planks lock into each other. The square edge tapping block is needed to aid in the connection of the locking system on the long side. The planks are now laid row after row in this sequence.

Row Three and Remaining Rows: Move rows if necessary to ensure that you are not showing any undesirable joint patterns. The rest of the row's end joints should be random throughout the floor. Your first three rows are staggered ensuring that offset of previous row with end joints are no closer than 6" from one another. When the planks are being tapped in place, a non-random pyramid or stair step pattern is used to ensure the planks remain engaged through the force of the tapping.

Most often walls are not structurally square. Planks in the first row may need to be scribed and cut to contour the first row with the wall and to allow for 1/2" expansion. Allow 1/2" expansion space at all vertical obstructions. Use 1/2" wood wedges or short cut 1/2" pieces of the floor against the wall to hold planks true to spacing. It is important that the planks follow the wall. Scribing is used if the wall is not straight. First, mark the plank with a scribing tool or other tool that will allow you to follow the shape

of the wall and then cut it lengthwise to follow the line. **NOTE:** Another way to achieve a firm starting point is to screw down a straight length of 1"x3" lumber, or another straight, firm material along the full length of the starter wall. This is set to the outside edge the distance of the width of your end planks plus the 1/2" expansion. You will be removing this after the rest of the floor is installed and the space filled and ripped to size the flooring.

Tapping the planks together: When tapping the planks together the following process works best: 1) Using the Tapping Block, lightly tap each piece for the first 3-4 rows. After the first 3-4 rows, you should only need the Tapping Block every third row. Start tapping in the plank at the opposite end along the length working from left to right, making sure the plank fully engages as you progress down the length. 2) When end joint is slid into place on the preceding plank, raise the plank now being installed to an approximate 45° angle while setting the side joint into place. 3) When you have the plank in place, lower the plank while pushing in until plank locks in place. The planks should lock into place at this point. Your initial rows, if you are not against a firm starting structure, it may seem more difficult to engage than the preceding rows. The square edge tapping block is needed to distribute equal force across the tongue without any damage. For best results, slide the tapping block along the sub floor and row, tapping lightly with a hammer, using tapping strokes to engage the locking system. If the planks are not going together, check to see if the planks are moving against the wall with the strikes. If so, adjust shims to firm up or use the screw down starter row method.

WARRANTY: Warranty for separation of planks is the responsibility of the installer.

STAPLE OR NAIL DOWN INSTALLATIONS

Note: Engineered wood flooring products that are 5/16" thick are not approved for staple or nail down installation. The recommended method of installation is direct glue down only.

Engineered hardwood floors may be installed over wood sub-floors using staples or flooring cleats. When installing engineered wood planks or strips by nailing or stapling it is necessary to use the proper type of flooring stapler or nailer made for the thickness of the engineered wood flooring that is being installed. **Note:** In addition to the ground cover in the crawlspace, a 6-mil polyethylene layer or a 15lb felt or rosin paper must be installed over the subfloor prior to the installation of the engineered wood flooring in order to reduce squeaks and noises created by the opposing floors. **Installing 6-mil Polyethylene:** Install the polyethylene parallel to the direction of the flooring and allow a 3" overhang at the perimeter. Make sure each run of polyethylene overlaps the previous run by 6" or more.

Layout the job:

Measure out from the ends of your starting wall 3 1/2" and mark

both ends. Where possible lay the flooring at 90° angles to the floor joists. Make a chalk line along the starting wall using the marks you made. Beginning installation Note: Expansion space is required along the perimeter of room(s) of intended installation; expansion space is dictated by the thickness of the product, for example, 3/8" thick floor requires 3/8" expansion space, 1/2" thick floor requires 1/2" expansion space; 3/4" thick floors require 3/4" expansion space.

Place the planks with the tongue facing away from the wall and along your chalk line. Use brads or small finishing nails to secure the first starter row along the wall edge 1" to 2" from the ends and every 4" to 6" along the side. Counter sink the nails and fill with the wood filler that blends with the flooring installed. Place the nails in a dark grain spot in the board. The base or shoe molding will cover the nails when installed after completion of the installation.

Blind nail at a 45 degree angle through the tongues. It will be easier IF YOU PREDRILL THE HOLES IN THE TONGUES. Nail 1" to 2" from the ends and every 4" to 6" along the sides. It will be necessary to blind nail the next 2 rows. A brad nailer with 1" to 1 3/8" brads can also be used to blind nail and no pre-drilling is needed. Continue the installation using an engineered wood-flooring stapler, using recommended staples or nails. Nail or staple the flooring 1" to 2" from the ends and every 4" to 6" along the edge tongues.

Recommended Pneumatic Floor Stapler: When stapling, use a 20 gauge, 1" staple or 18 gauge, 1" or longer staple on products up to 3" wide and 1/2" thick. When installing a 5" wide product or wider, use an 18 gauge 1-1/4" staple or longer. (Note: you must use an appropriate adapter for the thickness of the wood on some flooring staplers). Also note: 3/4" thick engineered planks should be nailed or stapled using a 3/4" solid wood flooring nailer or stapler of any brand using the recommended size staple or cleat for 3/4" solid wood installations and the nailing schedule which is 1" to 3" from the ends and 8" to 10" in the field. You must staple or nail 1" to 2" from the ends and every 4" to 6" along the tongue side of the engineered wood product. This will help insure a satisfactory installation. It is recommended to initially set the compressor at 80 to 85 PSI and adjust the pressure as needed in order to properly set the fastener and keep the staples from going through or breaking the tongues. Improper stapling techniques can cause squeaks in the floor.

Adjustments may be necessary to provide adequate penetration of the nail or staple into the nail bed. You want it flush in the nail pocket. Use a scrap piece of flooring material to set tools properly before installation.

Final Touches:

Install the proper trim molding at the doorways to achieve the transition and along the walls to cover the edges of any gaps along the wall due to irregularity. Complete the job by using the

wood filler that coordinates with the installed engineered flooring to fill any gapping along the joints or areas where brad nails were used in the trim or the flooring. Clean the finished floor.

GLUE DOWN INSTALLATION GUIDELINES

If subfloor moisture is below recommended levels, simply follow direct glue installation instructions below. Installing membrane: ProTech M901 Urethane Moisture Membrane: A trowel-applied membrane that improves the long-term performance of direct glue-down wood-flooring installations over concrete substrates.

*Typical trowel and approximate coverage**

5/32" x 3/16" 40 to 45 sq. ft./U.S. gal.

*Coverage may vary depending on substrate conditions.

Uses:

- For protection from concrete moisture (up to 25 lbs. MVER)
- For reducing sound transfer in multi-story buildings
- For improving flexibility and increasing bond strength of installations

Note: Do not apply over self-stick tile, sheet vinyl, old adhesives, metal, linoleum, laminate, particleboard or strip wood subfloors. Air temperature must be between 50°F and 100°F for applying ProTech M901 Urethane Moisture Membrane.

Application:

1. Regulate temperature and humidity 72 hours before, during and after installation. 2. Complete undercuts before applying ProTech M901. Include the additional 1/16" height of ProTech M901 when calculating undercuts. 3. Pour ProTech M901 onto substrate (no mixing necessary). 4. Using the notched side of a 5/32" x 3/16" V-notched trowel, spread ProTech M901 evenly. Product will flatten out naturally. 5. Allow to dry completely (12 to 16 hours). 6. Correct any missed spots and voids with trowel's flat side. 7. Allow repair areas to dry completely. 8. While membrane is fresh, clean tools using a urethane adhesive cleaner or mineral spirits. ProTech M901 is extremely difficult to remove when cured. 9. Install Engineered Hardwood flooring using either Mohawk's ProTack M908 or Columbia's Urethane Adhesives.

NOTES: Product must be used in its entirety when opened. Lid cannot be re-sealed. Temperature and humidity will affect the curing time. The higher the temperature and humidity, the faster the cure.

Getting Started Direct Glue:

There are two ways to install when using a moisture cured urethane wood flooring adhesive (wet lay meaning to lay directly into wet adhesive and dry-lay method meaning to allow the adhesive to flash or to tack up.)

Caution: Whether you choose to install using the dry or wet method follow all guidelines set by the adhesive manufacturer

as well as the flooring manufacturer. By not adhering to the guidelines you can void your flooring warranties.

General Information for Glue-Down Installations:

1. Use cement-based patch, skim coat leveling products to correct substrate imperfections.
2. Regulate temperature and humidity 72 hours before, during and after installation.
3. At least 48 hours before installation, place cartons of wood flooring in area to be installed.
4. Install and secure starter row.
5. Spread adhesive using recommended trowel, ensuring 95 to 100% adhesive contact.
6. Wet Lay method: press flooring firmly into adhesive immediately after troweling.
7. Inspect the installation and remove any adhesive smudges or drops immediately.

Note: Urethane adhesive is very difficult to remove once dry and cured. Make every effort to prevent adhesive from getting on the flooring surface. For best results, keep a urethane adhesive cleaner nearby to remove any adhesive smudges or drops during installation.

8. Clean tools while adhesive is fresh using a urethane adhesive cleaner or mineral spirits.
9. Avoid light/regular traffic for at least 12 hours. Avoid heavy traffic for at least 24 hours.
10. See adhesive manufacture guidelines for OPEN TIME on the adhesive container.
11. Proper ventilation within the room must be provided. An electric fan is helpful.

Installation:

Step 1 - (Wet Lay Method) Select a starter wall. It is recommended to start the installation along an exterior wall. It's more likely to be straight and square with the room. Measure out from the wall the width of two planks and mark each end of the room and snap your chalk line.

Step 2 - Spread adhesive from the chalk line to the starter wall using the recommended trowel size. It is important to use the correct trowel at a 45° to get the proper spread of adhesive applied to the subfloor, which will produce a proper and permanent bond. Improper bonding can cause loose or hollow spots.

Note: Change the trowel every 2000 to 3000 square feet due to wear down of the notches. This assures you always get the proper spread of adhesive.

Step 3 - Install the first row of starter planks with the tongue facing the starter wall and secure into position. Alignment is critical and can be achieved by securing a straight edge along the chalk line (2x4's work well), or by top nailing the first row with finishing nails (wood sub-floor), or adjustable spacers (concrete sub-floor). This prevents slippage of the planks that can cause misalignment.

Note: The planks along the wall may have to be scribed and cut to fit in order to maintain a consistent expansion space since most walls are not straight. Try to maintain at least 2" on the scribed plank.

Step 4 - Once the starter rows are secure spread 2 ½ to 3 feet of adhesive the length of the room. (Never lay more adhesive than can be covered in approximately 2 hrs.) Place tongue into groove of plank or strips and press firmly into adhesive. Never slide planks or strips through adhesive. Use tapping block to fit planks snug together at side and butt ends. Clean any adhesive off the surface before it cures using clean terry cloth towels and mineral spirits.

Note: Never work on top of the flooring when installing. If you must work on top of the newly laid flooring use a kneeling board.

Secure your starter rows with a straight edge (2x4's). Once the remainder of the floor has been installed go back to the beginning and remove the straight edges and spread adhesive on the remainder of the open subfloor. Remember planks closest to the wall may have to be scribed and cut to fit due to irregularities along the wall.

Clean Up:

Use clean white terry cloth towels to clean as you go along with mineral spirits. It is easy and convenient to use. Adhesive that has cured on the surface of the flooring can be difficult to remove. Light foot traffic is allowed after 12 hours but wait 24 hours after installation to remove the 3M blue masking tape. Once the tape is removed clean any adhesive residue left from the tape using mineral spirits on a clean white terry towel. Measures should be taken to protect floors from other trade work. If the floor is to be covered, the floor should be thoroughly cleaned prior to covering to prevent grit damage to the finish. Do not cover with plastic, red rosin, felt or wax paper or previously used cardboard. Instead use a breathable material such as clean, dry, plain uncoated cardboard or Kraft paper. Inks from printed cardboard could damage the hardwood floor. A common reinforced builder's paper is a good choice. 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. The floor must be completely covered to eliminate uneven ambering from exposure to UV light.

Final Touches:

Install the proper trim molding at the doorways to achieve the transition and along the walls to cover the edges of any gaps along the wall due to irregularity.

Complete the job by using the wood filler that coordinates with the installed engineered flooring for minor corrections or areas where brad nails were used in the trim or the flooring. Clean the finished floor.

Trim excess underlayment (floating installation only) and install

or re-install any transition pieces, reducer strips, T-moldings, thresholds, bases and/or quarter round moldings. Trims and moldings should be nailed into the wall, not the floor.

To prevent surface damage, avoid rolling heavy furniture and appliances on the floor. Use plywood, hardboard or appliance lifts if necessary. Use protective castors/castor cups or felt pads on the legs of furniture to prevent damage to the flooring.

MAINTENANCE

Engineered Hardwood Floors are very easily maintained.

STEP ONE: Sweep your floor to remove any particles that could scratch your floor. Warning: Vacuums with a beater bar or power rotary brush head can damage a wood floor and should never be used.

STEP TWO: Apply cleaner directly to the terry cloth flooring mop, not to the floor!

STEP THREE: Use a back and forth motion with the mop. When the terry cloth cover becomes soiled, simply replace it with a clean one. Cleaning the floor with a soiled cover could cause streaking. The covers are re-usable so simply throw the cover in the wash and dry it as you would any towel. **DO NOT USE FABRIC SOFTENER** when washing terry cloth covers.

Tips & Warnings:

- Sweep regularly, with a soft bristle broom.
- Remove spills promptly and use cleaners and a clean white cloth.
- Use felt protectors under heavy pieces of furniture and chairs.
- Use protective mats at all exterior entrances. Do not use mats or area rug cushions constructed of rubber or PVC. Instead use urethane backed products.
- Spiked heels or shoes in need of repair can severely damage your floor.
- Replace hard plastic, metal casters or wheels on furniture with soft rubber casters or by using a protective mat under the casters.
- Never wet or damp mop your wood floors. Water can cause damage to wood flooring.
- Never use oil soaps, wax, liquid or other household products to clean your floor.
- The sun's UV rays can change the color of your floor.
- Keep animal nails trimmed.
- Protect your floor when using a dolly for moving furniture or appliances. Never slide or roll heavy furniture or appliances across the floor.
- Never use steam cleaners on your wood floors. This will force moisture into the wood and cause damage to your flooring.
- Use protective window coverings to protect hardwood floors from excessive heat during periods of direct sunlight.

Exterior and interior walk off mats should be used at all exterior entrance to avoid exposure to moisture from tracking during periods of inclement weather. Walk off mats should be routinely maintained to avoid becoming a soil source. Do not use mats or

under mat cushions constructed of rubber or PVC. Instead use urethane backed products.

Hardwood contains certain types of acids in their cellular structure. With exposure to sunlight these acids begin to amber. The color change is referred to as patina. The wood will reach its own natural warmth and patina level and stop ambering. The amount of patina is directly related to the species, amount of acids and the level of sunlight. The entire floor will reach the same patina level over time. This is often noticed after a rug is removed and the floor is noticeably different in color underneath. If you remove the rug and expose the entire floor to the same amount of light, it will even out over time and become uniform in color.

Hardwood flooring will scratch and dent:

With today's active lifestyles it is important to note that hardwood flooring can, and will, scratch and dent. See Tips & Warnings for protecting your hardwood floor. In order to prevent excessive abuse the use of strategically placed mats and area rugs as well as floor protectors on chair and table legs are a must.

CONCRETE SUB-FLOOR MOISTURE TEST

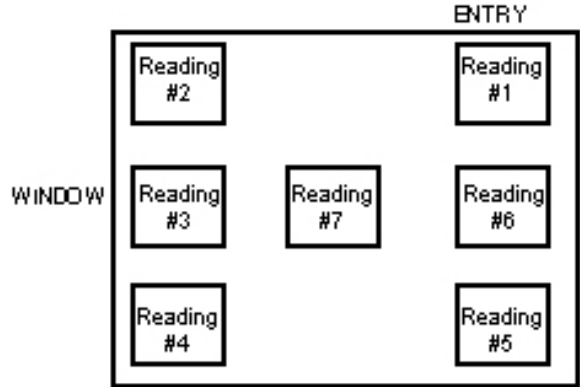
MUST BE PERFORMED AND RECORDED ONTO THE CONCRETE PRIOR TO THE ACTUAL INSTALLATION OF FLOORING. FAILURE TO DO SO WILL VOID THE WARRANTY.

SUB-FLOOR MOISTURE TEST RECORD

In each room of the locations specified as diagram at right, please take pencil and draw box around the concrete moisture meter. Write Meter Reading and Date inside each box onto the concrete slab prior to actual installation. (4 corners; Middle of Room; In front of doors & windows; plus at least one additional reading are required)

*Calcium Chloride test is recommended if area is susceptible to moisture. (Example: outside flower planter next to wall or grade with improper slope.)

In the event that there is a moisture-related claim filed with us, we will exam the meter readings on the slabs. **Prior to installation please complete the information below. A copy should be left with the homeowner.**



Customer Name: _____ Installer's Name/Company: _____

Address: _____ Address: _____

City: _____ St.: _____ Zip: _____ City: _____ St.: _____ Zip: _____

Phone #: _____ Fax #: _____ Phone #: _____ Fax #: _____

Product Purchased: _____ Inv. #: _____ Inv. Date: _____

Date of Test: _____ Installation Date: _____ Tested By: _____

Type of Test Performed: _____ Square Footage of Installation: _____

Was any type of sealer used on the sub-floor before installation? Yes No

If so, what type of sealer was used?: _____

Was a moisture barrier installed?: Yes No

If so, what type and thickness was used?: _____

SUB-FLOOR MOISTURE TEST RECORD

Record Moisture Test Results for each room below (make additional copies if necessary):

ROOM #		
Subfloor		
Moisture Content:	_____ % Moisture Content of Subfloor	
	_____ % Moisture Content of Hardwood	
	_____ % Difference between subfloor and flooring	
Concrete Subfloor Testing		
Test Method Used:	_____ Calcium Chloride (ASTM F1869)	
	_____ RH (ASTM F2170-02)1869	
	_____ Electronic Meter (Tramex or Equivalent)	
Type of Moisture Meter used (wood subfloor): _____		
Hardwood Flooring Moisture Readings (40 Bds Per 1,000 SF)		
1)	11)	21)
2)	12)	22)
3)	13)	23)
4)	14)	24)
5)	15)	25)
6)	16)	26)
7)	17)	27)
8)	18)	28)
9)	19)	29)
10)	20)	30)

ROOM #		
Subfloor		
Moisture Content:	_____ % Moisture Content of Subfloor	
	_____ % Moisture Content of Hardwood	
	_____ % Difference between subfloor and flooring	
Concrete Subfloor Testing		
Test Method Used:	_____ Calcium Chloride (ASTM F1869)	
	_____ RH (ASTM F2170-02)1869	
	_____ Electronic Meter (Tramex or Equivalent)	
Type of Moisture Meter used (wood subfloor): _____		
Hardwood Flooring Moisture Readings (40 Bds Per 1,000 SF)		
1)	11)	21)
2)	12)	22)
3)	13)	23)
4)	14)	24)
5)	15)	25)
6)	16)	26)
7)	17)	27)
8)	18)	28)
9)	19)	29)
10)	20)	30)

3/4" SOLID HARDWOOD FLOORING

THINGS TO KNOW BEFORE INSTALLATION:

PLEASE READ!

Wood and Bamboo are natural products, containing variations in color, decoration, and grain. Before our flooring products leave the plant, they go through numerous inspections; however, as the installer of the flooring, YOU are the final inspector.

NOTE: MANUFACTURER ACCEPTS NO RESPONSIBILITY OR LIABILITY FOR ANY MATERIAL ONCE IT HAS BEEN INSTALLED. IF THERE IS ANY QUESTION REGARDING FIT, FINISH, OR ANY OBVIOUS DEFECTS, DO NOT INSTALL! INSTALLATION ACKNOWLEDGES ACCEPTANCE OF THE MATERIAL.

Allow 5% minimum (we recommend allowing 5% - 10% on Acacia) for culling out (removing) undesirable pieces during the layout process. Some overwood/underwood and gaps are a natural occurrence in factory finished wood flooring. Appropriate color match filler can be used to fill small gaps.

All wood floor installations must follow NWFA (National Wood Flooring Association) guidelines. **DO NOT GLUE DOWN SOLID WOOD FLOORING – FIXED LENGTH OR RANDOM LENGTH. SOLID WOOD FLOORING MUST BE NAILED OR STAPLED DOWN OVER AN APPROPRIATE WOOD SUB-FLOOR AS PER NWFA GUIDELINES.** Any other installation method will void the warranty. Solid wood shorts and/or parquets may be glued down using a waterless adhesive (urethane, polymer or solvent base).

All solid wood flooring requires acclimation time **BEFORE** it is installed. Check the moisture content (MC) of the flooring when it is delivered to the job site, and do not install until it reaches the desired MC for the climate and environment in which it is going to be used. The moisture meter should be adjusted to the species of wood being installed. For more information about the MC required in your area for the species of wood you are using call our technical department or contact the National Wood Flooring Association. **NOTE: solid wood will not properly acclimate in wrappers/cartons, etc. Cartons and plastic packaging should be opened and cross stacked on the job site. Do not install the flooring until it is at the correct MC. Moisture readings should be documented and retained. In the event you need to file a claim on your flooring, documentation of the moisture readings will be required.**

WOOD DUST CAN BE AN IRRITANT TO BOTH SKIN AND LUNGS! BE SURE TO WEAR THE PROPER PROTECTIVE GEAR WHEN CUTTING OR SANDING WOOD.

INSTALLER/OWNER RESPONSIBILITY

The following information is aimed at the wood floor installer, whose focus is producing the finest finished product possible.

The installer may in some cases be the person who sold the job, the homeowner or in many instances the job was sold by someone else. Good communication between the sales person and the installer is important. Customer expectations should always be considered when selling and installing both pre-finished and job site finished wood floors. If a factory finished floor is "oversold" and things such as over-wood, under-wood, or small gaps are not discussed, the job becomes an accident waiting for a place to happen. The same is true of jobsite finished wood floors if color change over time and differences in color between different finish systems is not discussed and understood. When selling wood or Bamboo flooring take into consideration the lifestyle of the customer; do they have pets, small children, do they entertain frequently? If so do not recommend flooring that is prone to dent or mar such as American Cherry, American Walnut, Bamboo (especially carbonized) Pine or Genuine Teak. Recommend woods on the high end of the Janka Hardness scale in these situations. The bottom line is good communication between all parties.

It is the responsibility of the installer and owner to ensure that job site environmental, sub-floor and subsurface conditions involved meet or exceed all requirements as outlined in installation instructions prior to installation. Manufacturer declines all responsibility for product performance or installation failure due to sub-floor, substrate or environmental deficiencies or jobsite conditions.

Manufacturer requires Solid Hardwood products acclimate for a minimum of 72 hours prior to installation. Additional time may be required for 5" wide or wider products as determined by moisture content. Acacia flooring may require 7 to 14 days of acclimation before it reaches equilibrium with its surroundings. Acclimation allows flooring to achieve equilibrium moisture content (EMC) with the installation environment. True acclimation is reached only when the flooring is within 2% of the subfloor (4% for widths less than 3"). All wood continually expands and contracts until it reaches moisture equilibrium with the environment in which it's installed. As with all wood flooring, expansion and contraction will be minimized if climate control is consistently maintained year round. This is especially important with tropical species, because denser woods experience more significant shrinkage in low moisture/low humidity environments.

All work involving water or moisture (plumbing, masonry, painting, plastering) must be completed prior to flooring being delivered. Building envelope must be complete and exterior doors and windows installed. Exterior grading and gutter downspouts should be completed and permanent HVAC systems in operation for 14 days prior to flooring being delivered to job site. Measures should be taken to protect floors from other trade work.

Do not cover floors with plastic, red rosin, felt or wax paper or previously used cardboard. Instead use a breathable material

such as clean, dry, plain uncoated cardboard or Kraft paper. Inks from printed cardboard could damage the hardwood floor. The floor should be thoroughly cleaned before covering to remove grit and debris that would damage the finish. The floor must be completely covered to eliminate uneven ambering from exposure to UV light.

Because of the potential for damage to the surface finish due to the adhesives on tape, we do not recommend or approve the use of any tape, including painter's tape, 3M, etc., to be placed on the surface of the flooring. Any damage to the finish caused by the use of tape will be covered under the warranty provided by the tape manufacturer. Floor Source accepts no responsibility for this type of finish damage.

Room temperature should be 65 - 75° F, with relative humidity between 35 – 55%. These environmental conditions are specified as pre-installation requirements and must be maintained for the life of the product. The HVAC system should be in operation for a minimum of 14 days prior to installation. If HVAC is not possible at the time of installation, the job site conditions must be at or near normal living conditions between 60° and 80° Fahrenheit, and at the average yearly relative humidity for the area.

Building interiors are affected by two distinct humidity season – Heating and Non-Heating. Care should be taken to maintain humidity levels between 35-55%. Manufacturer warranties do not cover natural expansion and contraction which results in separation between planks or damage caused by excessively low or high humidity. Seasonal gapping is not considered a manufacturing defect.

Heating season – Low Humidity, Dry. All heating methods create dry, low humidity conditions. Humidifiers are recommended to prevent excessive shrinkage or gapping in wood floors due to seasonal periods of low humidity.

Non Heating season and Coastal or Waterfront Areas – High Humidity. During the non-heating season, proper humidity levels should be maintained by using an air conditioner, dehumidifier or by turning on your heating system periodically during the summer months.

Do not install in full bathrooms or powder rooms. Do not install over radiant heat.

Examine flooring for color, finish and quality prior to installation. If material is unacceptable, contact the seller immediately. Wood is a natural product and contains characteristics such as variation in color, tone and graining. Flooring is manufactured in accordance with industry standards, which allows manufacturing and natural tolerances up to 5% of the total installation. We recommend allowing up to 10% on all Acacia installations. Installer should work from several cartons at the same time to

ensure good color and shade blend. Installer should not install undesirable pieces. Installation is considered acceptance.

Flooring warranties DO NOT cover materials with visible defects once they are installed. Installer and Owner are responsible for final inspection of flooring manufacture, grade and finish. Purchase an additional 5% of flooring to allow for cuts (10% for Acacia) and an additional 10% if installing diagonally.

Flooring warranties DO NOT cover materials that do not match samples. Wood flooring is made from natural woods. Because they are a natural product, the colors can vary substantially between lots in natural and in stained flooring. Installer and Owner are responsible for final inspection of flooring for color and appearance BEFORE installation.

WARRANTY NOTE. Installer should provide owner with one carton end label from product installed for warranty purposes. Owner should retain carton end label and copy of their original sales invoice with product style name and style number for their records. Excess flooring should be retained and stored in a climate controlled area for future repairs in the event planks are ever damaged.

The use of stain, filler or putty for correction is considered a normal practice and a routine part of installation. Installer is responsible for identifying issues that may require excessive use of any of the above. In these instances, installation should immediately stop and the seller be contacted.

BASIC TOOLS & ACCESSORIES:

- 10D Nails
- 15# Felt Paper or Rosin Paper
- Broom
- Chalk Line & String
- Drill and drill bits
- Hand or Electric Jam Saw
- Mechanical Fastener
- Miter Saw
- Moisture Meter
- Pencil
- Pry Bar or trim puller
- Straight Edge
- Table Saw
- Tape Measure
- Utility Knife

STORAGE & HANDLING

Flooring material should be delivered to the job site and stored in the room(s) where it is to be installed for a minimum of 72 hours before being installed to allow the material to acclimate. Open the cartons but do not remove the product from the cartons. The cartons should be cross stacked to allow air circulation. Make sure the room temperature is set at a normal living temperature as described above. The flooring

is acclimated and ready for installation when it has reached a moisture level consistent with the job site and normal living conditions.

The subfloor and flooring should be tested with an appropriate moisture meter set for the density of the flooring being tested. A representative sample is typically 40 boards for every 1,000 square feet of flooring. The subfloor moisture level must not exceed 12%. The difference between the moisture content of the subfloor and the hardwood flooring must not exceed 4%. For hardwood products greater than 3" wide, the moisture content of the wood subfloor and hardwood floor should not differ more than 2%.

WARRANTY NOTE. Installer should record and provide the owner with moisture test results of subfloor and hardwood flooring for warranty purposes. Owner should retain moisture readings for their records.

PRE-INSTALLATION & JOB SITE CONDITIONS

Subfloor Requirements:

The following subfloor recommendations are intended to complement the installation of hardwood flooring as an interior finish. Hardwood flooring is not a structural component. These recommendations are not intended to supersede federal, state or local building codes, but as with many other interior finish products, may require modifying existing structural components for a successful installation.

Building codes establish requirements for structural support components of flooring systems which may not provide adequate rigidity and support for proper installation and performance of a hardwood floor. Whenever possible, install flooring perpendicular to the floor joists for maximum stability.

NOTE: Avoid subfloors with excessive vertical movement or deflection because subfloor movement will telegraph through to the finished installation. Indications of excessive deflection are uneven finish wear, fastener release, squeaking, compromised or damaged locking systems, sectional contours such as bowing or dipping in floors uneven flooring material. Nail or screw subfloor panels to secure boards with excessive vertical movement or deflection. If the subfloor has excessive vertical movement (deflection) before installation of the flooring, it is likely it will do so after installation of the flooring is complete. Our warranties **DO NOT** cover any problems caused by inadequate substructures or improper installation of said substructures.

Do not install Solid Hardwood Flooring over particleboard, fiberboard, or pressed wood panel.

Solid Hardwood Flooring is not recommended for below grade installations or over radiant heat.

Do not glue Solid Hardwood Flooring directly to any subfloor

surface.

Subfloor Preparation Recommendations for On or Above Grade Only:

We recommend three (3) types of subfloors: plywood/OSB, solid wood planks (1 x 6 or larger, or sleepers (2 x 4 inch. Each subfloor has separate installation guidelines.

Solid hardwood flooring may be installed on or above grade provided the subfloor is:

CLEAN – all construction debris, soil, mud and any other objects on or adhering to the floor are scraped and swept away before installation.

FLAT – within ¼" in a 10' radius.

DRY – always test the subfloor with the appropriate moisture meter. Installation cannot continue until the subfloor moisture does not exceed 12% and the subfloor and flooring moisture should not differ more than 4%. On 3" or wider, the subfloor and the flooring being installed should not differ more than 2%.

SOUND – all damaged or swollen subflooring should be replaced. Check the floor for squeaks/loose components, repair areas by adding fasteners or adhesive.

Wood Subfloor:

NOTE: As with many other interior finish products, modification of existing structural components may be required for a successful installation.

Wood subfloors should be well nailed or secured with screws. Nails should be ring shank and screws need to be counter sunk. The wood subfloor needs to be structurally sound (meaning subfloors without loose boards, vinyl or tile). If subfloor panels are a single layer, less than ¾" thick, add another single cross layer for strength and stability (minimum ½" thick). Underlayment floor panels must be installed sealed side down. When used as a subfloor, allow 1/8" (3mm) expansion space between each panel. If spacing is inadequate, cut in with a circular saw. Do not cut in expansion space on tongue and groove panels.

When installing parallel to the floor joists, it may be necessary to increase rigidity of the structural subfloor system by installing an additional minimum of ½" (13mm) approved underlayment floor panel.

Approved underlayment floor panels should meet or exceed the following:

Plywood: Must be a minimum CDX grade (exposure 1) and meet US Voluntary Product Standard PS1 performance standard. The preferred thickness is ¾" (19mm) as a subfloor (minimum 5/8" (16mm) or ½" (13mm)) as a floor panel underlayment.
Oriented Strand Board (OSB): Conforming to US Voluntary Product Standard PS2 construction sheathing. Check the underside of panel for codes. When used as a subfloor, the panels must be tongue and groove and installed sealed side

down. Minimum thickness to be 23/32" (18mm) thick when used as a subfloor or 1/2" (13mm) as the floor panel underlayment. Wafer board and Chipboard: Not Recommended. Conforming to US Voluntary Product Standard PS2. It must be 3/4" (19mm) thick when used as a subfloor and 1/2" (12.7mm) thick when used as a floor panel underlayment.

Subfloor Moisture Check:

NOTE: To increase reliability, moisture testing should be performed after the HVAC system has been in operation for a minimum of 14 days. Excess moisture on any flooring substrate, if not identified and corrected prior to installation, will cause floor covering failure. Warranties DO NOT cover products installed over improperly prepared subfloors, substrates or environmental related deficiencies.

DO NOT INSTALL FLOORING IF MOISTURE TEST RESULTS EXCEED RECOMMENDED LIMITS.

Wood Subfloor Moisture Content:

Test both wood subfloor and wood flooring for moisture content using a reliable pin type moisture meter. The subfloor material must not exceed 12% moisture content. The difference between the moisture content of the wood subfloor and the hardwood flooring must not exceed 4%. For hardwood products greater than 3" wide, the moisture content of the wood subfloor and hardwood floor should not differ more than 2%.

IMPORTANT: Installer should record moisture test results in the space provided at the end of this document and leave with the owner as part of their records. This information will be required in the event the owner needs to file a claim.

NOTE: Basements and crawl spaces must be dry. Use of a 6 mil polyethylene membrane is required to cover 100% of the crawl space earth and run approximately 6" up the foundation walls. The seams of the 6-mil poly should overlap 4" to 6" and should be taped to the foundation walls using an aggressive tape such as duct tape. This will help retard moisture from below that is emitted from the soil. Crawl space clearance from ground to underside of joist should be no less than 18" and perimeter vent spacing should be equal to 1.5% of the total square footage of the crawl space area to provide cross ventilation.

To correct any subfloor conditions concerning moisture, either wait until the subfloor dries to meet specifications or use an appropriate moisture barrier.

BEFORE YOU START

Perform a pre-installation check of the flooring. Verify that the product and color are correct and meet the approval of the owner. The installer is the final inspector of quality. The manufacturer accepts no responsibility once the material has been installed. If there is any question regarding, fit, finish or any obvious defects, do not install. Installation acknowledges

acceptance of the material. Labor for products installed with obvious manufacturing defects is not covered under the manufacturer's warranty. As the final inspector, the installer could be responsible for material and labor if the installer proceeds with installing wood with obvious defects.

Plan your layout and determine the direction of the installation in the room. Planks installed parallel to windows accent the hardwood best.

Remove existing base, show molding or threshold carefully. They can be used to cover the 3/4" expansion gap left around the perimeter of the room.

Undercut doors and casings using a handsaw laid flat on a piece of scrap flooring. This will eliminate difficult scribe cuts.

Subfloors should be clean prior to the floor installation. Sweep the area to remove all dust and debris.

Make sure the subfloor is dry to 12% moisture content or less.

Install 15 lb. felt paper to help reduce squeaks.

Blend cartons: To achieve a uniform installation appearance, preselect and set aside hardwood planks that blend best with all trims and moldings. Install these planks next to best blended moldings.

Install planks from several cartons at the same time to ensure good color and shade mixture throughout the installation.

Be attentive to staggering the ends of the boards at least 4"-6" (10-15cm) when possible in adjacent rows.

MULTI-WIDTH INSTALLATION

Installing planks of multiple widths requires special consideration. Multi Width products arrive in the same carton, so measure material needs as you normally would.

Always start installation with the widest plank and install in descending widths (example 5", 3", 5", 3").

Do not try to "mix" widths within a row.

INSTALLATION

"Racking the Floor":

Start by using random length planks from the carton or by cutting four to five plans in random lengths, differing by at least 6". As you continue working across the floor, be sure to maintain the 6" minimum stagger between end joints on all adjacent rows.

NEVER WASTE MATERIAL: USE THE LEFT OVER PIECES FROM THE FILL CUTS TO START THE NEXT ROW OR TO COMPLETE A ROW.

Note: When installing a pre-finished wood floor, be sure to blend the wood from several cartons to ensure a good grain and shading mixture throughout the installation.

Step 1 - LAYOUT:

Measure and mark 3" from the wall at two spots near each end of the room. Drive a nail at each spot. Stretch string and tie each spot. Stretch string and tie each end of the string around the nails so the nails become posts. Use the string as your flooring guide.

Note: This dimension should be 4" when installing 3 1/4" wide flooring. When a room is greater than 20ft. in width, the direction of the installation should start near the center of the room and work out towards the walls placing a loose spline where the two grooves come together.

Step 2 - INSTALL FIRST ROW:

Using the string as a straight edge lay the first row of flooring in place with the tongue facing the center of the room. Leaving a 3/4" gap at the wall, pre-drill and face nail using 10D nails. Continue nailing the entire length of the room.

Leave a 3/4" expansion space at each end. Set nails and fill holes with matching putty. Remove string and nails.

Step 3 - INSTALL REMAINING ROWS:

Continue the laying process using a mechanical fastener until the room is complete. (See section –Recommended Pneumatic Floor Stapler or Nailer).

Helpful Hint: Use flooring lengths that offset or stagger the end joints at least 6" or more for a professional look.

Carefully cut the last row to leave a 3/4" expansion space. Replace/install trim moldings.

STAPLE OR NAIL DOWN INSTALLATIONS

3/4" Solid Hardwood Flooring may be installed over wood subfloors using staples or flooring cleats. When installing 3/4" solid wood planks or strips by nailing or stapling, it is necessary to use the proper type of flooring stapler or nailer made for the thickness of the hardwood flooring that is being installed.

Step 1:

You must staple or nail 1" to 2" from the ends and every 4" to 6" along the edges. This will help insure a satisfactory installation. It is recommended to set the compressor PSI at 80 to 85lbs. initially and adjust as necessary to keep the staples from going through or breaking the tongues. Improper stapling techniques can cause squeaks in the floor. Adjustments may be necessary to provide adequate penetration of the nail or staple into the nail bed. It should be flush in the nail pocket. Use a scrap piece of flooring material to set tools properly before installation. Staples are not recommended for Solid Hardwood Floors 3" and wider.

Note: An expansion space of 3/4" is required along the perimeter walls and at all vertical structures to allow the flooring to expand.

Place the planks with the tongue facing away from the wall and along your chalk line. Use 10D nails to secure the starter row along the wall edge 1" to 2" from the ends and every 4" to 6" along the side. Counter sink the nails and fill with appropriate filler that blends with the flooring. Place the nails in a dark grain spot in the board when possible. The base or quarter round will cover the nails when installed after completion of the installation.

Blind nail at a 45° angle through the tongues. It will be easier IF YOU PRE-DRILL THE HOLES IN THE TONGUES. Nail 1" to 2" from the ends and every 4" to 6" along the sides. It will be necessary to blind nail the next 2 rows. A brad nailer with 1" to 1 3/8" brads can also be used to blind nail and no pre-drilling is needed.

INSTALLING 3/4" SOLID HARDWOOD OVER CONCRETE
Solid Hardwood Flooring can be installed on concrete slabs (minimum 3,000 psi) that are on or above grade.

Solid Hardwood Flooring is not recommended for below grade installations or over radiant heat.

Do not glue Solid Hardwood Flooring directly to any subfloor surface. Installation of the Solid Hardwood Flooring by the glue-down method voids the manufacturer's warranty.

The moisture content of the slab should be tested with a Calcium Chloride Test and emit less than 3 pounds per 1000 square feet per 24 hours, then the appropriate subfloor (nailing surface) can be installed. Installer should record moisture test results in the space provided on the last page of this document and leave with the owner as part of their records. This information will be required in the event a claim is filed by the owner.

There are several methods by which this can be accomplished:

• 3/4" or thicker Exterior Grade Plywood laid over a vapor retarder of 6 mil poly or two layers of 15% felt and power nailed in the concrete slab. The ends of the plywood panels should be staggered 1/2 panel in alternating rows and an expansion space of 1/2" should be left around the perimeter of the room. An expansion gap of 1/2" must be left between the panels. The flooring may then be nailed to the plywood surface using 1 1/2" fastener.

• 3/4" or thicker Exterior Grade Plywood may also be glued to the vapor retarder that has been glued to the concrete floor. The vapor retarder and plywood should be glued using cutback adhesive or other approved adhesive, applied according to the manufacturer's directions. The plywood panels should be cut down to 4' x 4' or 16" x 8" and the panel joints should be

staggered by 2'. Score the backs of the panels 3/8" deep on a 12" grid, laying the scored side into the adhesive observing a 1/8" gap between the panels and a 1/2" space around the perimeter.

- As an alternative, a floating plywood base can be installed. In this method a 6 mil poly vapor retarder is laid on the floor lapping the seams at least 6". Loose lay 3/8" exterior grade plywood panels on the floor, allowing 1/8" between panels and 1/2" between the panels and walls or other vertical surfaces and offsetting the ends by one-half panel. Lay a second layer of plywood at 90° angles to the first layer allowing 1/8" between the panels and 1/2" between the panels and walls or other vertical surfaces and offsetting the ends 1/2 panel. Staple the panels together with staples that have crowns at least 1/4" and that do not penetrate the bottom layer in a pattern not exceeding 6" x 6". Lay an additional vapor retardant barrier over the plywood panels and begin installation of the flooring.

- Flat, dry screeds or 2" x 4" boards of Group 1 softwood in random lengths from 18" to 48" may be used as a nailing base. The boards must be preservative treated (suitable for interior use) and dried to no more than 12% moisture. The screeds should be adhered to the floor using suitable mastic adhesive at 12" on center. A 6 mil poly vapor retarder is draped over the screeds and the flooring is nailed directly to the screeds, provided the flooring is less than 4" wide. For flooring 4" wide and over a wood subfloor must be applied over the screeds to provide adequate nailing surface. 5/8" CDS plywood or 3/4" OSB are recommended for this application. In high moisture conditions such as coastal areas, an additional vapor retarder should be glued directly to the slab before the screeds are installed in addition to the vapor retarder over the screed.

COMPLETING THE JOB - FINISHING TOUCHES

Install the proper trim molding at the doorways to achieve the transition and along the walls to cover expansion gap and the edges of any gaps along the wall due to irregularity. Complete the job by using wood filler that coordinates with the installed hardwood flooring to fill any gapping along the joints or areas where bard nails were used in the trim or the flooring.

Sweep your floor to remove any particles that could scratch your floor.

HELPFUL HINTS

- Do not install 3/4" Solid Hardwood Flooring below grade level. Use only on or above ground level.
- Make sure mechanical fastener is approved for use in OSB if plywood is not used as a substrate.
- Do not install without checking for color compatibility.
- Lay out several cartons to check quality and grading and "rack" or stagger the end joints in random lengths.
- Leave 3/4" at all perimeter walls and vertical structures to allow

for expansion.

- The mechanical fastener cannot be used on the first and last few rows. Pre-drill, nail with 10D nails, countersink nails and use matching putty to hide nail heads.
- Rows to be hand nailed may be drilled at an angle through the top of the tongue to hide nail heads.
- Lay flooring perpendicular to the direction of the floor joists.
- Occasionally, a plank may be slightly bowed. Nail one end first and then use the pry bar to push the other end in place.
- Using shorter pieces at undercut door jams will help when fitting flooring in place.

CARE AND MAINTENANCE

- Sweep regularly with a soft bristle broom or dry dust mop.
- Vacuums with beater bar or power rotary brush head can damage a wood floor and should not be used. Instead use a suction only type of vacuum.
- Wipe up spills promptly. Remember that liquids and your floors are not compatible.
- Use felt protectors under heavy pieces of furniture and chairs.
- Use protective mats at all exterior entrances.
- Spiked heels or shoes in need of repair can severely damage flooring.
- Replace hard plastic metal casters, or wheels on furniture with soft rubber casters or by using a protective mat under the casters.
- Never wet mop your wood floors. Excess moisture or liquids can cause damage to wood flooring.
- Never use oil soaps, wax or other household products to clean your floor.
- Keep pet nails trimmed.
- Protect your floor when using a dolly for moving furniture or appliances.
- Use protective window coverings to protect hardwood floors from excessive heat during periods of direct sunlight.
- Never use rubber backed rugs or pads as they may damage hardwood floors. Area rugs should be soft, non-abrasive, and urethane backed.

Hardwood flooring will scratch and dent:

With today's active lifestyles it is important to note that hardwood flooring can, and will, scratch and dent. In order to prevent excessive abuse the use of strategically placed mats and area rugs as well as floor protectors on chair and table legs are a must.

Walk Off Mats:

Exterior and interior walk off mats should be used at all exterior entrances to avoid exposure to moisture from tracking during periods of inclement weather. Walk off mats should be routinely maintained to avoid becoming a soil source. Do not use mats or under mat cushions constructed of rubber or PVC. Instead use urethane backed products.

TRENDS

Installation Instructions

in WOOD

Hardwoods React to Sunlight:

Hardwood contains certain types of acids in their cellular structure. With exposure to sunlight these acids begin to amber. The color change is referred to as patina. The wood will reach its own natural warmth and patina level and stop ambering. The amount of patina is directly related to the species, amount of acids and the level of sunlight. The entire floor will reach the same patina over time, This is often noticed after a rug is removed and the floor is noticeably different in color underneath. If you remove the rug and expose the entire floor to the same amount of light, it will even out over time and become uniform in color. Periodically rearranging furniture will expose different areas of your flooring to sunlight and avoid excessive localized ambering.

WARRANTY

A copy of the warranty should have been furnished with these installation instructions. If you did not receive a copy of the warranty, please contact your flooring dealer for a copy.

MOISTURE TEST RESULTS

The subfloor and flooring should be tested with an appropriate moisture meter set for the density of the flooring being tested. A representative sample is typically 40 boards for every 1,000 square feet of flooring. The subfloor moisture level must not exceed 12%. The difference between the moisture content of the subfloor and the hardwood flooring must not exceed 4%. For hardwood products greater than 3" wide, the moisture content of the wood subfloor and hardwood floor should not differ more than 2%.

WARRANTY NOTE

Installer should record and provide the owner with moisture test results of subfloor and hardwood flooring for warranty purposes. Owner should retain moisture readings for their records. These readings will be REQUIRED in the event a claim is filed with the manufacturer.

SUB-FLOOR MOISTURE TEST RECORD

Record Moisture Test Results for each room below (make additional copies if necessary):

ROOM #		
Subfloor		
Moisture Content:	_____ % Moisture Content of Subfloor	
	_____ % Moisture Content of Hardwood	
	_____ % Difference between subfloor and flooring	
Concrete Subfloor Testing		
Test Method Used:	_____ Calcium Chloride (ASTM F1869)	
	_____ RH (ASTM F2170-02)1869	
	_____ Electronic Meter (Tramex or Equivalent)	
Type of Moisture Meter used (wood subfloor): _____		
Hardwood Flooring Moisture Readings (40 Bds Per 1,000 SF)		
1)	11)	21)
2)	12)	22)
3)	13)	23)
4)	14)	24)
5)	15)	25)
6)	16)	26)
7)	17)	27)
8)	18)	28)
9)	19)	29)
10)	20)	30)

ROOM #		
Subfloor		
Moisture Content:	_____ % Moisture Content of Subfloor	
	_____ % Moisture Content of Hardwood	
	_____ % Difference between subfloor and flooring	
Concrete Subfloor Testing		
Test Method Used:	_____ Calcium Chloride (ASTM F1869)	
	_____ RH (ASTM F2170-02)1869	
	_____ Electronic Meter (Tramex or Equivalent)	
Type of Moisture Meter used (wood subfloor): _____		
Hardwood Flooring Moisture Readings (40 Bds Per 1,000 SF)		
1)	11)	21)
2)	12)	22)
3)	13)	23)
4)	14)	24)
5)	15)	25)
6)	16)	26)
7)	17)	27)
8)	18)	28)
9)	19)	29)
10)	20)	30)