

INTERNATIONAL



CERTIFIED FLOORING INSTALLERS

LVP LAMINATE HARDWOOD INSTALLATION TRAINING

Presented by the CFI Team of Trainers

and

Sponsored by Flooring Manufacturers

Disclaimer: The International Certified Flooring Installers Association® assumes no liability for the application of the principles or techniques contained in this manual. The information in its entirety was prepared for professionals in the industry to use as guidelines when addressing installation and difficulties that arise concerning the installation of laminate and wood flooring. **The primary source of direction is the individual product manufacturers who reserve the right to provide specific installation instructions, which are to be strictly adhered to by installation professionals.**

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INTRODUCTION AND PREPARATION for CFI Training

A. The CFI Training Partnership

Flooring installation is serious business! CFI is built on creating an environment in which the customers receive what is expected at the time of the sale; quality work provided by professional CFI Certified Installers with the ultimate in customer service skills. The sales associates and flooring installers make this happen by sharing skills and knowledge. Working together to create this scenario, the customers return again to purchase flooring that result in a “hassle-free” experience to beautify the surroundings of their homes and offices.

B. CFI Team of Trainers

The CFI Team is composed of over 75 trainers who complete extensive skills and knowledge testing to present the most up-to-date installation knowledge. It is presented in a format that provides installers and sales associates with information that will enhance their customer service skills. Professional installation is the answer to the customer’s search for an installation that not only beautifies their surroundings, but is performed in a manner in which the customer feels safe, secure and satisfied during and after the flooring purchase.

C. Recognition of the Program Sponsors

This training is made possible through the generosity of the flooring industry that furnishes the wood and laminate products and the training supplies. Manufacturers listed on the back cover of the CFI Resource Guide.

D. Review of the Program

1. The program includes information about the various types of LVP, laminate, and wood flooring, tools, planning and layout, substrates, the installation process, people skills and customer service.
2. Installers participate in “hands-on” skills sessions. Sales Associates are also encouraged to attend the seminar presentations and to view the installation requirements to strengthen the partnership with the installation team.
3. Special attention is to be paid to the PowerPoint presentation and the subject matter presented by the CFI Team Leader. This information is critical to the success of a laminate and wood flooring installation. Installation includes knowledge and the ability to understand the technical information, as well as provide the installation of the flooring. A total of 16 installers participate in the hands-on, skills training.

E. Requirements of the Flooring Installer to achieve CFI Certification

- Attend both full-day sessions
- Complete all required paperwork (Application, Proof, Release, Agreement)
- Successful completion of the written test
- Demonstrate required skills and knowledge as requested
- Minimum of 2 years experience in course-specific flooring type

F. The Flooring Sales Installation Partnership

The best installation begins at the time of the sale! The salesperson's relationship with the customer transforms into a contract for sale when he or she “promises” retailers reputation when they “sell” the flooring. Once the flooring arrives, the continuing relationship is placed in the hands of the installer. It is extremely important not to “promise” something that the installation team cannot accomplish. It is the installer’s obligation to preserve the customer’s confidence throughout the installation period. The installers complete the sale and can “sell” or “unsell” everything based on the quality of their work and attitude. In a very short time, unprofessional installers destroy future sales. Quality workmanship is not everything! Equally important is the observance of good common-sense rules of conduct on the customer’s premises during the installation process. A well-qualified installer is a business-like worker, and skill and neatness generally go hand-in-hand. Good conduct is as important as neatness and skill. In the field of flooring installation, the customer is not likely to overlook questionable conduct or bad manners no matter how expert the job turns out. The installer may create such a disruptive atmosphere that the job will never be completed to achieve customer satisfaction.

WHAT IS CFI?

CFI, the International Certified Flooring Installers Association was founded in 1993. In 2009, the organization represented over 60,000 installers worldwide who regard customer satisfaction as the ultimate goal. The customer has the opportunity to select the best-qualified installer in their area by visiting www.CFIinstallers.org and entering a zip code in the search box. Skills and written and oral testing determine the awarding of the certificate or certification.

Through attendance at the CFI Training Sessions, the installers are not only provided with the skills and knowledge to enhance their value but the opportunity to earn the designation of a CFI Certified LVP1, Laminate-I, or Wood-I Installer. By demonstrating the skills and knowledge required to earn the certification, the installers participate in two days of “hands-on” training conducted by the CFI Team, recognized by the industry as among the most qualified in the nation.

CFI training builds effective relationships, provides updated information and new technologies, improves customer satisfaction and performance and strengthens the industry as a whole. There is real value in joining a group of others who proudly display their skills daily. ***Earning a CFI Certification is just the beginning. Delivering customer satisfaction on a daily basis is the journey.***

The technical staff at CFI is always prepared to assist with answers to situations that arise and offer solutions to rectifying problems if they occur. By calling (816) 231.4646, installers can discuss the work prior to the commencement of the job or seek advice as the job progresses. This is a service that is available to CFI Installers and a benefit of membership.

Your questions are always welcome during the training. This time is provided for you to gain knowledge. The CFI Team of Trainers is available to assist you during the course. There are NO foolish questions!

A. CFI Laminate-I and / or CFI Wood-I Certification

1. CFI Laminate I Hardwood I Installer receives:
 - The CFI Photo Identification Badge - CFI Installation Certificate
 - CFI Decal for display on truck or toolbox
 - Listing on www.CFIinstallers.org website and in the CFI Directory
 - CFI eNews communications
 - Opportunity to attend all educational events and CFI Convention at member fees
 - Opportunity to add advanced levels to the achieved certification at CFI events
 - Renewal notice to maintain listing by the payment of annual dues to continue recognition as a CFI flooring professional in the industry and to continue receiving the benefits of membership.
2. **The CFI Technical Certification** is awarded to Industry Associates who participate in the training program and successfully complete the written test. Time does not allow for individual training for Industry Associates. Still, through observation of skills techniques, demonstrations and presented information, an abundance of information is available that adds significant value through increased knowledge when servicing the customer.

B. DESCRIPTION OF COURSE

The CFI Wood and Laminate Course is 20% Classroom/Discussion and 80% hands-on training involving: CFI Incorporates training that follows guidelines of the National Wood Flooring Association, North American Laminate Flooring Association and the product manufacturers.

Demonstrations and lectures – 20%

- Business skills / Professionalism/ Tips to make you “shine”
- OSHA and EPA guidelines / Being compliant / Safety and environmental issues

IMPORTANT! CFI recommends that professional, quality-minded laminate and wood installers **ALWAYS** follow the individual manufacturer's recommendations and installation techniques when using their products. Adhering to these guidelines and recommendations sets the stage for a successful installation. To further your wood knowledge, numerous manufacturers also provide in-depth product specific training and certification. **NWFA**, the National Wood Flooring Association (800) 422.4556 or www.nwfa.org offers continuing education and certification programs. **NALFA**, the North American Laminate Flooring Association (423) 305-5513 or www.nalfa.org provides the opportunity to become NALFA Certified by passing all the CFI-NALFA skills and written requirements. The fee is paid directly to NALFA. Upon receipt, the certification is sent by **NALFA**. A separate **NALFA** certification program gives the attendees the skills necessary to perform installations to high standards and craftsmanship in the field.

CFI acknowledges the use of industry organizations' and manufacturer's guidelines for preparing the CFI Laminate and Wood Installation Resource Guide and including materials taken from the original program sponsored by the World Floor Covering Association.

How to Lose a Customer in Five Easy Steps

- Be late. We're not talking 5-minutes late; be an hour and a half late or even more and just don't bother to call. Arrive whenever!
- When you finally get there, do not apologize or offer any sort of an explanation. People like a little bit of mystery and unpredictability in their lives.
- Take one look at the flooring and wonder aloud if this is the cheapest product the store has to offer. Don't worry if the customer hears you. **Hey, you're the expert — go ahead and act like it! OKAY?**
- Rush your customer! You don't have time to talk about this job; you've got work to do.
- When you are finished, don't tell the customer to call with any questions and don't offer to come back if problems should arise. Just get out of there!

If you follow these steps exactly, you should never hear from that customer again! Though there are businesses out there that do provide this terrible service on a regular basis — **CFI Certified Flooring Installers** were not on that job!

The Importance of Our Customer

CFI Certified Flooring Installers sign an agreement when achieving certification that states, “**Customer Satisfaction is the Ultimate Goal!**” We understand the importance of return business based on the performance we deliver. CFI installers have discovered that now, more than ever, the sales community is taking notice that CFI delivers value far beyond what is considered a normal business relationship.

“The ladder of success is never crowded at the top”

“If you think you are beaten, you are, if you think you dare not, you don’t.

If you like to win, but you think you can’t, it is almost certain you won’t.

If you think you’ll lose, you’re lost, for out of the world we find,

Success begins with a fellow’s will---- It’s all in the state of mind.

If you think you are outclassed, you are, you’ve got to think high to rise,

You’ve got to be sure of yourself, before you can ever win the prize.

Life’s battles don’t always go to the stronger or faster man,

But soon or late, the man who wins; is the man **WHO THINKS HE CAN!**

Setting the Stage with the Customer

Customers make an investment in their lifestyle when they purchase new flooring. They expect a professional and enjoyable experience that a professional, quality-minded and skilled installer can deliver. Let’s look at this from the customer’s side. Customers desire workers in their homes or offices that possess positive factors that include their appearance, prompt arrival time, communication skills, respect for their furniture and fixtures, honesty and quality of service and ability to leave the jobsite in a manner that enhances the beauty of their surroundings.

Professional installation professionals seek to achieve the status of top-quality installer and receive the edge and confidence to perform the finest installations. They are searching for recognition as one of the “BEST;” skilled installers display the pride and professionalism that only come from a sense of achievement and recognition of a “job well done!”

“People skills” are described as the ability to satisfy the customer, communicate and present oneself as a professional. CFI installers DO NOT display attitudes that in any way create a negative perception of the installer or the industry associate. They avoid becoming the “salesperson” for the job – installers do not know what was said at the time of the sale. Best answer for the customer, “Contact your salesperson.”

Working on your professional skills makes you more marketable and more in demand. It has been determined that over 85% of our success in life is directly related to your ability to deal with people – **PEOPLE SKILLS!** Learning to deal effectively with customers also enhances the customer’s perception of our technical skills. Many examples exist of adequate installations that run into problems because of the over zealous scrutiny of difficult customers. There are also cases of mediocre jobs that pass with flying colors because the flooring contractor used great communication skills.

Customers don’t just want the job done right; they want to feel good about their purchase. Never underestimate the value you create when you make the customer feel important.

Personal appearance, body language, facial expressions and gestures have a greater effect on the communication process and your customer’s perceptions than any words you use. First impressions have tremendous power to influence the customer’s long term judgments about their flooring experience. People trust people who understand them. **Flooring**

installation is really all about understanding the “job” through the customer’s point of view. If you can deliver and install a beautiful floor and also deliver the “ultimate flooring experience” for your customer, ***you will be successful!***

CFI stresses pride, professionalism, attitude, skill and knowledge which help you to work with dealers, contractors and customers. **You never get a second chance to make a good first impression!** Customers want to open their door to neat appearing, polite and well-groomed installers. Today, more than ever they want to feel safe and know that you will provide them with an installation of which they can be proud. **The ultimate goal is customer satisfaction.**

CFI promotes pride and professionalism. *The following practices make your day go smoother.....*

- **Prompt Arrival Time – Call the customer**
- **Arrive Prepared!** Avoid unnecessary trips; keep truck stocked with supplies and maintain your equipment.
- **Appearance** - Professional installers display personal neatness such as well groomed hair, clean-shaven or neatly trimmed beard, odor-free, wearing clean shoes free of mud or dirt and installation clothing in clean condition that does not require repair or display holes in the knees all contribute to a display of respect for the customer.
- **Attitude toward the customer** - Greet the customer with enthusiasm; introduce yourself and your co-worker. The way we respond to others affects the manner in which they respond to us. Be considerate and polite! You are in the customer’s “castle.” Treat it accordingly. No smoking. No music. Avoid using the bathroom, broom, trash bags, kitchen and personal items.
- **Attitude toward others** - Conversation with other workers should always be professional, never demeaning or loud. Address your co-workers in a business-like manner. Avoid foul language, off-color jokes, rudeness and discussion of your personal problems.
- **Ask permission** - Ask permission to park your vehicle in a specified area. Always be considerate of the customer’s surroundings. If truck leaks, place cardboard under it to protect the customer’s property. Avoid parking in the driveway.
- **Avoid controversy** - Your job is to install flooring! Do not discuss the shade, type or style, quality, cost or any item that is the sales associate’s responsibility. The answer if questioned is, “I suggest you contact your salesperson.” Never talk about the dealer or the sales associate!
- **Be sure you have the correct product!** Check to be certain it can be correctly installed **BEFORE** you begin the installation. **DO NOT** proceed with an installation where it is obvious that it will not be accepted. **Immediately** contact the store if a manufacturing defect is evident or other problems surface that are out of your control. Should a problem arise, if possible handle it immediately without involving the customer.
- **Show respect and concern for the customer** - Review areas to be covered, discuss the installation diagram and all information pertinent to the job **BEFORE** you begin work. Bring to the customer’s attention damaged trim or millwork, scratched walls, torn wallpaper, scratched or broken furniture. **NOTE** these items on the work order for future review.
- **ALWAYS follow the manufacturer’s installation guidelines** - When reviewing the job, if you have questions, contact the manufacturer’s technical department for assistance. If no one is available, call the CFI office. **Be prepared! Avoid customer dissatisfaction!** 35% of claims – acclimation and moisture preparation
50% of claims – improper use of expansion gap / improper end joint stagger
- **Leave the surroundings a place of beauty** - Clean the area! Never leave a mess! Clean up the trash! If included in the sale, remove and replace the furniture and fixtures with care. The customer’s perception of **NEW** flooring includes a beautiful area. Why ruin this? If there are concerns, dealing with them at this time is much less

costly than a callback. Customers have purchased a finished job! Review the installation and makes sure it meets their expectations.

- **Expectations of CFI Installers** - CFI installers present themselves at all times as professionals with actions that are above reproach, exhibiting dependability, integrity and honesty. No question should ever arise concerning their actions. CFI Installers create a lasting impression with genuine concern for the job and the understanding that **Customer Satisfaction is the Ultimate Goal!** CFI installers are expected to perform successful installations every time by promoting **pride and professionalism.**

Welcome aboard! CFI looks forward to working with you to increase your value through education and advanced training. The CFI Team shares the proven methods of tile installation that work for thousands of installers worldwide. We also invite you to share with us methods that work for you. Techniques that are demonstrated have proven to provide the customer with the highest degree of customer satisfaction.

“Tell me, I may listen.
Teach me, I may remember.
Involve me, I will do it.”

CFI Laminate / Hardwood STUDY GUIDE

Disclaimer: The International Certified Flooring Installers Association® assumes no liability for the application of the principles or techniques contained in this study guide. The information in its entirety was prepared for professionals in the industry to use as guidelines when addressing installation and difficulties that arise concerning the installation of ceramic tile. **The primary source of direction is the individual product manufacturers who reserve the right to provide specific installation instructions, which are to be strictly adhered to by installation professionals.**

CFI represents installers and provides training and certification in all types of flooring

CFI is the organization that promotes the professional flooring installers to the industry and consumers.

CFI installers are expected to perform successful installations every time.

CFI promotes pride and professionalism,

CFI Certified Residential Wood and Laminate Installers are required to pass oral, written and hands-on tests.

CFI stresses pride, professionalism, attitude, skill and knowledge which assist when working with dealers, contractors, manufacturers and customers.

THE CUSTOMER

1. People skills are described as the ability to satisfy the customer and communicate
2. The ultimate goal is customer satisfaction.
3. You never get a second chance to make a good first impression!

RULES and ORGANIZATIONS

1. **EPA** - Environmental Protection Agency
2. **OSHA** - Occupational Safety and Health Administration
3. **ANSI** - American National Standards
4. **ASTM** - American Standard Test Methods.
5. **NALFA** - North American Laminate Flooring Association
6. **NWFA** - National Wood Flooring Association

MEASURING and ESTIMATING

1. The best installation begins at the time of the sale
2. Manufacturer's installation guidelines are **ALWAYS** to be followed.
3. Length times width = square footage of the area.
4. Round off to the next full carton – flooring is sold by the full carton.

PRIOR TO THE INSTALLATION

1. Do NOT proceed until you check for the right product; free of manufacturing defects. If a problem, call the store.
2. Permanent, fully operational HVAC systems should be in place and working to allow for proper acclimation,
3. A consistent temperature is to be maintained between 60-75 degrees and relative humidity between 35-55%.
4. **Acclimation is required!** Upon delivery of the flooring, **acclimate** according to manufacturer recommendations.

OSHA and EPA GUIDELINES

1. **OSHA** - Occupational Safety Health Administration
2. **OSHA** - Office of the Federal Government
3. **OSHA #3165** (white-blue) "Employee's Right to Know" - Employees must be trained to install ALL products handled.
Note: New poster #3165 (white-blue) replaces the #2203-yellow.
4. **HAZCOM** -Hazardous Communications Plan
 - Keep Safety the #1 Priority
 - Plan lists training procedures for company employees
 - States location of MSDS Sheets
 - Identifies all products company uses and chemical inventory
5. **FINES** - Maximum first time fine is \$7,000.00 - Maximum-next offense is \$70,000.00. Fines are issued for items such as:
 - No HazCom Plan
 - No Kneepads
 - No First-Aid Kit
 - No Ventilation
 - Defective Tools
 - Improperly labeled or unmarked containers
 - Ground wire removed from electrical cords
 - No MSDS sheets (Material Safety Data Sheets)
6. **MSDS-MATERIAL SAFETY DATA SHEET lists:** (Request MSDS at time of purchase)
 - Manufacturer and product
 - Physical data (volatile, boiling point, etc.)
 - Fire and explosion hazard data -how to extinguish fire, etc.
 - Hazardous Ingredients
7. **CHEMICALS** can only be transferred by ONE person to another properly labeled container.
8. **HEALTH HAZARD DATA** listed **on MSDS** (exposure limits, first aid) includes the following.
 - Reactive data (stability - what not to mix with product)
 - Special handling precautions
 - Spill and leak procedures
 - Special protective equipment and procedures - gloves/ventilation
9. **ASBESTOS** should always be covered or encapsulated -Testing is only way to properly identify
10. **FIRST AID KIT**- Contents of kit must be undisturbed with a letter signed by a physician and readily available
11. **EPA** – Environmental Protection Agency of the federal government

PERSONAL SAFETY and POWER EQUIPMENT

PERSONAL SAFETY

1. **ALWAYS** know the location of the **first-aid kit**.
2. **To avoid tripping**, hoses and power cords should be placed along walls and away from traffic
3. Be aware of materials that **create silica dust**. Take precaution to avoid the intake of airborne silica and possibly lead or asbestos. Use water to wet down dust or **HEPA vacuums** to prevent airborne particles.
4. When lifting heavy objects, it is important to follow **safe lifting procedures** and use a back brace if recommended.
5. All tools and equipment are to be **properly maintained**.
6. Keep the **work area clean** and free of debris
7. To avoid injury, never be under the influence of **alcohol or illegal drugs**
8. As recommended, **wear safety glasses, gloves and all protective equipment**
9. Protect hearing by **using earplugs** when exposed to loud noises or equipment
10. All materials on jobsite require product material safety data sheets (**MSDS**) for in regard to safety and health.

ELECTRIC TOOLS

1. **Always follow manufacturer's recommended safety precautions when using power tools!**
2. **Power equipment** should only be operated by persons authorized to use the machines.
3. Power tools and extension cords are to be grounded by **3-prong plus and ground- fault circuit interrupter (GFCI)** protected. All electrical connections meet code; i.e., ground plugs, no cuts in cord, etc. Most electric tools are grounded with a third wire, which is **never cut off the plug** of the grounded tool
4. Damaged extension cords are **NOT** to be used.
5. When working with saws, installers are to **protect their hands and wear eye protection to guard against flying chips or nail heads**.
6. Operations involving sawing, sanding or machining wood products can produce **wood dust**.
7. **Airborne wood dusts** can be an explosion hazard. Wood dust may also cause respiratory, eye and skin irritation.
8. The power tool must be equipped with a **dust collector**
9. Use the appropriate **NIOSH-designated dust mask**. Avoid dust contact with eyes or skin.
10. All **blade guards** are to be properly attached.
11. Shop vacuums are **not** to be used for removing flammable liquids.

TO AVOID SHOCK

1. Keep **hands dry**.
2. Wear non-conducting **rubber-soled shoes and rubber gloves** when working on wet or damp surfaces.
3. Use **heavy-duty extension cords**.
4. Keep **electric lines** away from nails, sharp edges or corrosive chemicals or where they may be run over by vehicles.
5. Regularly **inspect** all electric cords and tools - Repair/replace **frayed cords** immediately
6. **Disconnect power lines** before changing tool accessories or before adjusting or repairing tools
7. Always use a ground fault circuit interrupter (**GFCI**) when using power equipment.

IMPORTANT!

To remove a person in contact with live or hot tools, **shut off the power**. If this is impossible, push the person away with a non-conducting material such as wooden tool handle.

FIRST AID

1. Flush eyes or skin with plenty of water for at least 15 minutes.
2. **Knives cause more disabling injuries than any other hand tool**. To reduce the possibility of injury, always keep knives sharp and in good repair. Dull knives require more pressure and are more likely to slip. Always cut away from the body, using smooth, not jerky motions. Never store knives in pockets. Keep the knife in a pouch with the edge or point down into the pouch.

TOOLS and SUPPLIES

**Manufacturer Installation Guidelines

- Low-adhesion Blue Tape, such as 3M-orange label
- Adhesives and cleaner
- Broom and dust pan / Wisk broom small
- Bucket of water (lamine)
- Calcium Chloride Test Kits
- Chalk line and chalk
- Chisels (sharp) (1/4" wood, 1" wood, 1/2" wood)
- Cleaner for floor
- Cleaning rags
- Compressor (hoses, coupler kit, T-fitting)
- Drill with 1/16" drill bit
- Dust mask
- Ear plugs
- End clamps (lamine)
- Extension cords
- #15 Felt underlayment
- First-Aid kit
- Floor Protectors - felt
- Hammer
- HAZCOM plan
- Hydrometer
- Knee pads
- Knife – plastic putty knife
- Knife – utility
- Level – carpenter level
 - Minimum 6ft. straightedge
- Loose tongues
- Moisture retarder
- Moisture meters
- Moldings and trims
- MSDS sheets
- Nail set
- Nails - 6d flooring nails
- Nippers
- Pencils (Carpenters and regular #2)
- Plug adapters – 3-way plugs
- Polyethylene – 6 mil (if required)
- Pneumatic Finish - Nailer
- Pry / Lifter bar
- Pull bar
- Putty – filler repair
- Rags - Box
- Router -electric hand style w/ milling tool
- Rubber mallet
- Safety glasses
- Saw (sharp) blades for all tools
- Saw – doorjamb or undercut
- Saw – jig saw - fine tooth
- Saw – miter
- Saw – power / circular (carbide tip blade)
- Saw – table or band saw
- Scraper
- Screwdriver (Universal – straight / Phillips)
- Scribe / Dividers
- Sealant – 100% silicone sealant
- Shears - Lamine
- Spacers – distance spacers
- Square – combination square
- Stapler / Nailer / Boots for tools
- Staples and cleats
- Straps for installation (lamine)
- Tape measure
- Tapping blocks
- Teflon tape
- Trammel set
- Trash bags
- Trowels – recommended types
- Underlayment pad
- Underlayments
- Urethane adhesive cleaner
- Vacuum – HEPA
- Wrench - crescent

WOOD FLOOR STUDY GUIDE

(Includes requirements that may vary from CFI Study Guide according to the manufacturer of the flooring)

Hardwood floors in accordance with industry standards permit grading deficiencies up to 5% in every carton. When flooring is ordered 5% must be added to actual square footage, 10% for wider flooring or diagonal installation. The final inspector of the flooring installation is the installer or the owner.

MOISTURE

Concrete floors must have compression strength of three thousand PSI minimum. Acoustic floors should have minimum compression strength of two thousand PSI.

Subfloor moisture content should never be more than 4% higher or lower than the new strip flooring being installed. NWFA recommends the wood subfloor should be no more than 13% moisture content. All floors must be acclimated as needed.

Recommended moisture emission rate for calcium chloride test is 3 lbs. RH test on concrete not to exceed 75%. Tramex CME moisture meter is 4.5 on upper scale for concrete subfloor.

The recommended humidity levels on the EMC chart should be between 35% - 55%.

SOLID WOOD FLOORING

¾-inch solid strip or plank flooring starting rows should be faced nailed every 6-inches; ½-inch from groove edge and 1 to 3-inches each end, then blind nailed every 6 to 8-inches. Preferred nailing pattern for 1-½ to 3-½ inch flooring is 8 to 10-inches. Preferred nailing for 4-inch flooring and over-plank flooring should be a 6 to 8-inch nailing pattern. A minimum of ¾-inch expansion of all verticals should be followed. Use a blind nailing machine designed for installing ¾-inch flooring with staples or cleats. This tool must have a protective foot attached to prevent edge bruising and finish damage.

5/16-inch solid can be installed with either stapled or glued-down method, on or above grade subfloors only. The expansion around all verticals must be ¾-inch for staple-down and for glue-down installation. When gluing down 5/16-inch solid, a urethane adhesive must be used.

ENGINEERED WOOD FLOORING

Engineered flooring can be installed on all grade levels. ¼-inch through 5/8-inch plank or strip that is installed mechanically or glued direct to a subfloor must have a 1/4-inch expansion space. When installed as a floating floor must have a ½-inch minimum expansion space. Not all engineered flooring can be stapled. Performance Plus Acrylic infused engineered flooring may be stapled, glued or floated. Maple/hickory/pecan cannot be stapled. All engineered and solid flooring require a bead of PVA adhesive on end joint if over 3-¼ inch wide. Engineered flooring that is to be installed over radiant heat floors, the floor should be allowed to cool down three to four hours prior to installation. All end joints are to be glued with PVA adhesive. When engineered flooring exceeds 5-inches in width, it must be glued or floated. When mechanically fastening an engineered floor, the preferred staple pattern is every 3 to 4-inches along the length and 1 to 2-inches on each end. End joint spacing to adjacent rows should be 4-6 inch minimum.

Lock and fold engineered flooring when installed as a floating floor must have a ½-inch expansion space. When glued direct to a subfloor, ¼-inch expansion space must be maintained. End joints must be 6-inch stagger with 8-inches as the shortest board. Do not open packages until it is time to install.

MEASURING & ESTIMATING – THE SUCCESSFUL PROPOSAL

A. PREPARATION

Preparation makes the difference! This includes all parties. The importance of the detailed drawing contributes to the overall success of the installation. The diagram “paints a picture” of what is expected to happen. Every time a job is PROPERLY planned, it is finished to everyone’s expectations. It is not guesswork! “If it doesn’t start right, it absolutely will NOT finish right!” Proper planning pays big dividends!

THE “IF’S” THAT SATISFY CUSTOMERS...

- IF the flooring and installation are sold correctly,
- IF the customer has been properly prepared,
- IF the estimator has “painted the true picture” for the installation,
- IF the installer follows the detailed diagram...

ANOTHER HAPPY CUSTOMER WILL RETURN TO PURCHASE FLOORING AGAIN!

B. COMMUNICATION WITH CUSTOMER – If it doesn’t start right, it will NOT finish right!

Knowing what the customer expects from their flooring investment helps the installers to provide better service. Associates who develop a real partnership with installation professionals find they encounter fewer problems during and after the installation. Installation problems are minimized depending on the accuracy of the measurements and the care with which the details are recorded for the installer. Consider the numerous details in figuring an installation that must be properly planned and coordinated. A drawing is required in order to determine:

- Sub floor type – wood, concrete, grade levels, above, on, below
- Floor preparation – clean, flat, dry, sound
- Moisture test – document results
- Each area of installation – the floor area - Type and amount of wood or laminate
- Edge treatments - Required trim pieces - Various accessories
- Door and appliance clearance - Appliances and furniture to move - Subfloor type – Movement areas
- Stairs - Pattern layout – diagonal - Utility turnoffs – Responsibilities - Customer requests

Generally, for new construction, the installer receives architectural drawings with space names or number and a finished schedule of styles, patterns, colors and installation methods. Existing structures require new measurements and drawings. The estimator should use ¼-inch scaled graph paper and steel tape measure.

C. PLANNING, MEASURING and ESTIMATING

- Laminate is not fixed to subfloor – it is installed as floating floor, with sufficient space for movement around perimeter
- Before starting the installation in very dry or very humid climates allow **manufacturer’s recommended times** for laminate to acclimate in unopened cartons in the area the installation will occur.
- Relative humidity should be **30-55%** - temperature stable and within 15-degrees of normal operating temperature. **Manufacturer’s requirements vary** – verify these prior to estimating and the installation of the flooring.
- Prior to installation, **ALWAYS** check each panel to make sure it is not damaged. **ALWAYS CHECK MANUFACTURER REQUIREMENTS!**

D. SQUARE FOOTAGE FORMULATIONS

- Length times width = square footage of area
- Laminate 10% straight install, 15% diagonal install. Hardwood 5% straight install or 10% (diagonal patterns). The usage factor depends on product and manufacturer recommendation. **ALWAYS** verify the manufacturer requirements of the product **PRIOR** to estimating the flooring.
- Net square footage divided by the square feet in carton = full and partial number of cartons
- Round off to the next full carton = exact full cartons
- Full cartons times square feet per box = total square feet

EXAMPLE:

- Facts: Area is 20 feet long and 15 feet wide
Wood/laminate is generally packaged 21-square feet to a carton
- Answer: A. 20 feet times 15 feet = 300 square feet of area
B. 300 square feet times 5% = 315 square feet
C. 315 divided by 21 square feet = 15 cartons
D. Round off to next carton, if necessary

LAMINATE FLOORING

Most laminate floors today fit together with a click system; the “glueless” alternative. This is done by placing the tongue of one plank into the groove of another at an angle and pressing down or laying the plank flat and tapping together. This makes it possible to create a very tight connection during the installation. The floor can be walked on immediately. In general, “glueless” laminates are held together when the tongue of one plank is “clicked” into the groove of another. Check with the manufacturer of the specific flooring type concerning their installation recommendations.

Most laminate is 4 different layers; wear layer - DPL or HPL Decorative Paper or High Strength Paper - core layer and backing or stabilizing layer:

1. Wear Layer

The top wear layer is provided by the melamine resin, a highly wear resistant material that makes laminate flooring so hard wearing. The top layer is very similar to the top layer on counter work tops, but is usually much stronger, making the laminate flooring highly resistant to scratches, burns, dents, stains, etc.

2. DPL (Decorative Paper) or HPL (Decorative Paper + Add High Strength Paper)

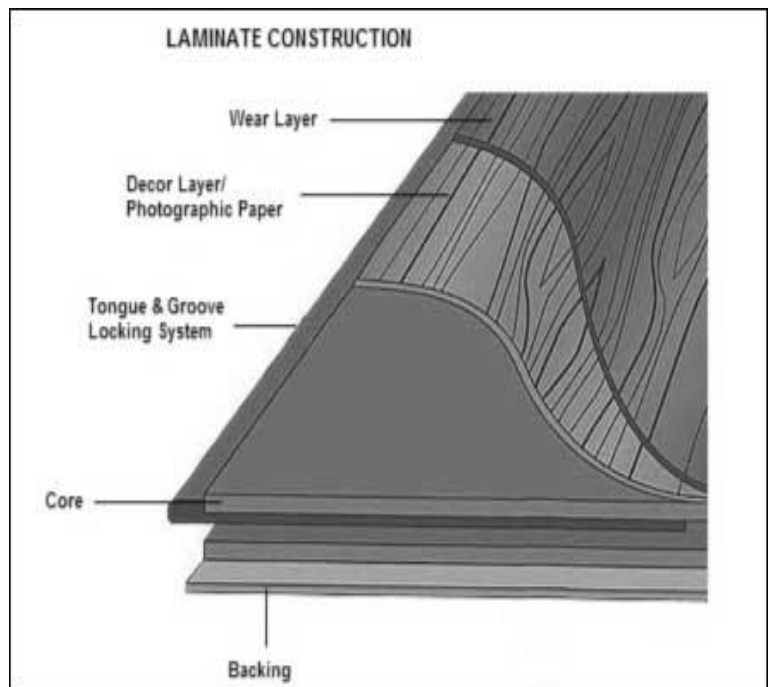
The decorative paper gives the laminate flooring its individual appearance, ranging from highly authentic wood reproduction, ceramic or stone designs.

3. Core Layer

This is either high density fiberboard (HDF) or medium density fiberboard (MDF). It is saturated in resins to make it extremely hard. Most manufactures also add a moisture resistant resin to the core to keep the flooring protected against moisture penetrating the boards.

4. Stabilizing layer - Backing

The bottom layer is the stabilizing layer; providing stability. It is made up of moisture resistant resins



Moisture – Alkalinity – Porosity – Humidity

Moisture tests are required for flooring installation at the time of the Detail and again prior to the installation of the flooring. It is the estimator's and/or the installer's responsibility to make certain that the moisture tests were conducted and the results are documented for future reference.

Two questions are to be answered on page two of the Estimate Sheet.....

Was the moisture reading taken? What is the moisture reading?

INDUSTRY WHITE PAPER on Moisture Emission Testing www.wfca.org Position statement on moisture emission testing and accompanying document, "Moisture Emission Testing – Responsibility and Qualifications for Testing" adopted by the World Floor Covering Association (WFCA) Board of Directors to begin the process of soliciting industry-wide support for the measure. The focus of the position statement is that concrete moisture vapor testing needs to be performed by qualified independent agencies, and not by floor covering personnel. This recommendation, if adopted, will require that architects move such testing away from Division 9 of Construction Specifications and place it with other construction-related test requirements. Building industry practice historically has been that floor-covering installers, dealers and contractors have been held accountable for testing of moisture emissions in concrete and the satisfactory installation of floor covering on this material. Horror stories abound about floor covering professionals being held liable for non-performance, often in extenuating circumstances beyond their control. Compounding complexity of the situation are technological advancements in concrete formulations, as well as new, "fast track" construction techniques. It was in this environment that WFCA brought together the Ad Hoc Task Force of interested professionals to attempt to rectify what has proven to be a serious problem. That led to the development of the "Position Statement on Moisture Emission Testing" that was finalized in 2001. Document is available online at www.WFCA.org and at www.CFinstallers.org.

SUBSTRATE MOISTURE – ALKALINITY – POROSITY – HUMIDITY

A substrate receiving a moisture sensitive floor must be dry; but what exactly does dry mean? What effect does moisture have on these products? Is old concrete dryer than new concrete? How much time is necessary for a new concrete floor to cure? What is vapor emission? What is hydrostatic pressure? How is moisture detected? What is meant by porous and non-porous? How does moisture affect wood substrates? Knowing the answers to these questions is critical in the success of the flooring installation.

Moisture can enter the substrate three ways; from above, from the side or from below. Moisture from above is an indication of a structural or plumbing leak. The source of the leak must be identified and rectified before the floor covering is installed. Moisture entering the substrate from the side is usually caused by hydrostatic pressure. Hydrostatic pressure is a misused term and is commonly mistaken for vapor emission. Hydrostatic pressure often occurs where the substrate is below grade such as basement areas. Basements can frequently be below the ground water table. Water pressure can build around the basement walls forcing moisture to leach in through porous concrete block. This problem is best addressed from outside the structure. Correct landscaping and ground water run-off controls designed to move excess water away from the structure can help lessen the impact of hydrostatic pressure, but basements are wet areas and are very difficult to waterproof.

Vapor emission is the most common source of moisture in a substrate and is the culprit in most flooring failures. Vapor emission occurs from below the substrate. Even in the driest desert conditions one can overturn a rock and find moisture. If you have experienced this phenomenon, you have experienced vapor emission. Concrete slabs should be poured on top of a vapor barrier (ASTM E1745 & E1643). When there is no vapor barrier present there will be vapor emissions. The amount of vapor emission is directly related to the temperature and humidity inside the jobsite. If conditions inside a jobsite change so can the rate of vapor emission. Vapor moves up through concrete into warm interiors of jobsites. When the jobsite is acclimatized either by HVAC or AC, the vapor emission rate will slow once the area reaches equilibrium. The use of a Hygrometer will measure the temperature and humidity and with the use of an EMC chart (pg 34) will give an ideal condition for each product.

CALCIUM CHLORIDE TEST (ASTM F1869)

Let's discuss accepted methods of checking for moisture vapor emission rates. The most widely known and accepted method of testing moisture vapor emission rate is the Anhydrous Calcium chloride test (ASTM F1869) commonly referred to as the calcium chloride test. Calcium Chloride tests must be conducted by adhering strictly to the ASTM F1869 standard, if not the results can be compromised and useless. Calcium chloride tests must be conducted within certain humidity and temperature ranges so accurate measurements of both must be recorded when setting the test. The air space above the tests should be at service temperature and service relative humidity for at least 48 hours before setting the tests. Refer to the ASTM standard for the service range for temperature and humidity. There must be three test set for the first 1000 feet of substrate with a test set per every additional 1000 feet. Areas where tests are to be set must be scarified prior to placement of the anhydrous calcium chloride tests, the actual test area shall be clean and free of all foreign substances and left exposed to the air for 24 hours.

The calcium chloride is placed in the test area and covered with the provided dome. The calcium chloride must be weighed and the weight recorded before and after the test. The dome should be burped and left undisturbed for 60 to 72 hours. Accurately conducting a calcium chloride test is a very complicated matter that is best performed by a trained specialist in calcium chloride testing. Refer to manufacturer's guidelines for acceptable vapor emission readings. Vapor emission rates from calcium chloride tests are expressed in pounds per 1000 square feet. Remember, moisture test results indicate conditions of the slab only at the time of the test.

RH IN SITU PROBES (ASTM F2170)

Relative Humidity In Situ Probes (ASTM F2170) are used to ascertain the relative humidity in the core of a concrete substrate. An RH meter is placed into a sleeve that has been inserted into a hole drilled into the concrete. The meter has a digital display that expresses relative humidity as a percentage. The relative humidity test requires 3 tests per 1000 square foot and one test for each additional 1000 square foot. Each test requires a hole be drilled the diameter of the sleeve with a depth a certain percentage of the thickness of the slab. The hole must be thoroughly cleaned the sleeve is inserted into the hole and sealed, after the 60-72 hour period the meter is inserted for the reading. Refer to manufacturers guidelines for acceptable RH readings. The use of relative humidity probes is fairly new to the floor covering industry in North America so not all manufacturers have a published guideline. As with the calcium chloride test the air space above the test area should be at service temperature and service relative humidity. Remember, moisture testing results indicate the moisture conditions of the slab only at the time of the test.

MOISTURE METERS

There are many electronic moisture meters available. Moisture meters can be very useful in determining the moisture content in various substrates. A pin moisture meter can measure moisture in wood substrate and underlayment. Wood subfloors are frequently suspended over crawl spaces exposed to the ground. These crawl spaces should be at least 18 inches in height from the ground to the bottom of the floor joist and be well ventilated on all sides to allow air flow to carry moisture away from the substrate. Six mil plastic should be installed on the ground across the entire crawl space with the seams overlapped at least 8 inches. Wood substrates should be no higher than 14 percent. The pin meter will help determine this.

Corrective work is often expensive and time consuming and should be performed by a specialist. A flooring installer can conduct corrective measures if he or she does careful research into the available products designed to inhibit moisture vapor emissions. Care should be taken to understand fully all procedures as they relate to specific warranty claims, for example a manufacturer may guarantee that the product will correct a vapor emission of up to 25 lbs per thousand sq ft. Be careful to fully understand what the requirements are to make this guarantee relevant.

Always refer to the manufacturer's recommendations as they relate to acceptable moisture emission rates.

SUBSTRATE POROSITY

Webster's Dictionary explains porosity as "possessing or full of pores – permeable to liquids". The **more porous the slab**, the more vapor migration occurs and the **less open-time** for adhesive. Porosity has a direct effect on vapor migration through a slab: **Porosity has a direct effect on adhesives.** When conducting pH testing, one can determine the porosity of a slab by watching the water that was applied for the pH:

- If the water absorbs quickly – the slab is porous
- If the water does not absorb – slab has a low porosity
- The more porous the slab, the less open time for adhesive
- Moisture from the adhesive will absorb into the slab
- The lower the porosity, the longer the open-time is for adhesives
- Moisture needs to evaporate from adhesive, rather than being absorbed into concrete
- Water cement ratios and on-site finishing methods are two key factors determining the amount of porosity a concrete slab displays.

SEALER – PENETRANTS

- Liquid sealers / penetrants are top coatings for a concrete slab and reduce the amount of vapor emissions by filling in the capillaries – usually silicate-based.
- NOT all sealers are ready for floor coverings within 24-72 hours
- Sealers address moisture, but not pH and can react with certain adhesives, causing a failure.

UNDERSTANDING "pH"

For many years, the Industry has looked upon moisture as being the primary contributor to flooring failures. As the Industry has become more knowledgeable with information gathered from some specialists in the field, it has been discovered that the pH level of a concrete substrate has a significant bearing on the success or failure of applied floor coverings, such as ceramic tile, carpet, VCT, hardwood, etc.

1. The pH tests determine the strength of salts, known as a base or the strength of acids in a substance, whether in a liquid or solid state.
2. An aqueous solution, which is pure water (distilled) is applied to the substrate and tested by the use of litmus paper or electronic meters. Test results will determine the value of acid or alkali (salts) present in concrete.
3. Alkali migrates to the surface through the capillaries in the concrete. Water in vapor form is the transport. Alkali can be present in the ground or in the aggregate mix.
4. The pH scale is logarithmic; the intervals are exponential and thus, represent far greater differences in concentration than the values themselves seem to indicate – each interval is 10 times itself starting from 7. The pH measures hydrogen-ion concentration of solution.

TESTING the pH of CONCRETE - The pH scale is from 0-14

- 7 is neutral
- 0-5 is a strong acid
- 9-14 is a strong salt (alkali) or base

THREE TYPES OF TESTS

1. PH paper – Litmus
2. Liquid Indicators
 - Phenolphthalein liquid - turns red with higher pH or pink with lower pH
 - Rainbow Indicator - reacts to the different values of pH
 - pH pencil - reacts to different values of pH
3. Electronic Surface Probes - Digital displays

PATCHING COMPOUNDS

1. **GYSUM BASED:** White in color – lower psi rating – susceptible to mold and mildew. Expands during dry out and expands with moisture after it is cured.
2. **PORTLAND BASED or CEMENTITIOUS:** Usually gray in color – higher psi rating – will not promote mold and mildew may shrink during dry out period - may need to apply a second coat
3. **SELF-LEVELING COMPOUNDS:** Used for irregular substrates

REMOVAL of EXISTING FLOORING

Proper precaution and OSHA procedures must be taken if there is an existing floor covering that may contain ASBESTOS. If in doubt, until the flooring is properly tested, assume that it contains asbestos. Estimators and flooring installers do not address old vinyl products or asbestos-contaminated flooring in any manner. **For existing and remodel projects, removal must be addressed at the time of the sale! This is critical to the success of the installation!** A knowledgeable sales associate can direct the end user in the right direction and offer the proper corrective procedures, resulting in a successful sale AND installation. Unless trained as required, CFI suggests that a recognized abatement firm be contacted to handle asbestos removal. The majority of installation firms may not be experienced or qualified concerning the chemicals necessary for removal or proper techniques and disposal methods.

GRADE LEVELS

SUBFLOOR GRADE LEVELS

- ABOVE GRADE
- ON GRADE
- BELOW GRADE

It is very important to be aware of the grade level so the correct flooring will be used.

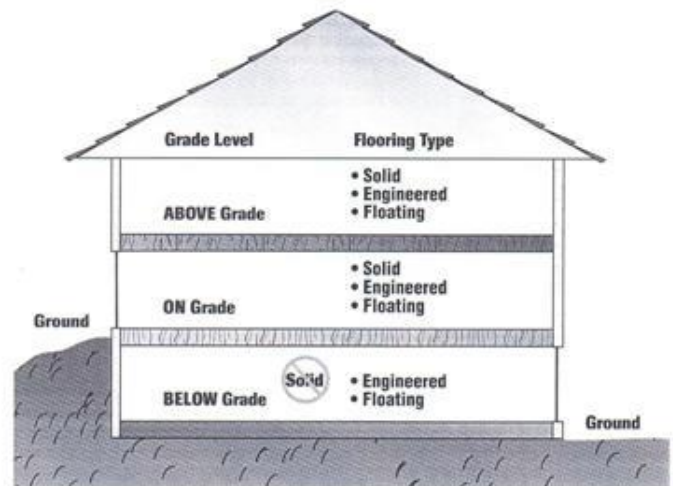
GRADE LEVEL

1. If there is more than 3" of soil against any wall, the entire level is considered to be **BELOW grade**.
2. Ground should be sloped away from the house (6" in 10') for proper drainage
3. Three grade levels are recognized as above-grade, on-grade and below grade.
4. Slabs on, above, below grade, and lightweight concrete should have a vapor barrier installed.
5. Laminate flooring can be installed on all grade levels

IMPORTANT: ALWAYS follow manufacturer guidelines!

ONSITE CONDITIONS

1. Building should be closed in and outside doors and windows must be in place.
2. All concrete, masonry, framing members, drywall, paint and other wet work should be thoroughly dry.
3. Jobsite HVAC must be on 14 days prior to installation.
4. Basements must be dry and well-ventilated.
5. Crawl space – 1 ½ sq. ft. of vent opening for every 100 sq. ft. of floor space with good cross ventilation. Ground in crawl space must be covered with a 6 mil resin polyethylene film: seams overlapped at least 8 inches. There should be a minimum of 18 inches between the ground and the bottom of the floor joist.
6. Do not install in areas with a sump-pump or floor drain.
7. Inspect the outside surroundings for improper drainage or obvious sources of moisture.
8. Yard should slope away from foundation at least 6 inches per 10 feet.
9. Eaves and gutters must adequately direct rainwater away from the foundation.



If any part of the soil surrounding a structure is above the floor of any level, consider that level below-grade. This includes walk-out basements. In addition, the surrounding soil should be sloped away from the structure with at least 6 inches of fall over the first 10 feet.

SUBFLOOR GUIDELINES – CONCRETE

1. Prior to installing laminate or wood, concrete slabs shall be cured for a MINIMUM of 90-120 days. **ALWAYS KNOW** the manufacturer's requirements.
2. Before beginning moisture testing, slab should be cured a minimum of 30 days (check with manufacturer)
3. Subfloor must be flat, dry, sound, clean and free of abrupt highs and lows.
4. Tolerance should be flat to within 1/8" in 6-feet or 3/16" in 10-feet.
5. High spots should be ground down with 20-grit (#3-1/2) paper or grinder with dust containment system.
6. Low spots must be filled in with a proper leveling compound or materials.
7. Many manufacturers recommend the use of a floating floor on lightweight concrete (less than 3000-psi).
8. Prior to laminate installation all organic materials should be removed from concrete substrate.

RULE OF THUMB:

- Draw a nail across the top. If it leaves an indentation, it is an indication of a low compressive strength slab.
- Slabs on, above, below grade, and lightweight concrete should have a vapor retarder installed.

RADIANT HEAT – Special Requirements

1. **PRIOR** to the installation system **MUST** be operational a minimum of 2-weeks
2. **DURING** installation Temperature set approximately 65-degrees
3. **AFTER** installation - Increase temperature **SLOWLY** – approximately 5-degrees per day
4. **MAXIMUM FLOOR TEMPERATURE** – 84-degrees

ACCLIMATION

1. Upon delivery of the wood or laminate flooring, **acclimate according to manufacturer recommendations** for each type and geographical location. Just as all materials in the area expand and contract, new floors react to changes in the environment. **ACCLIMATION IS NECESSARY!** **Check with the manufacturer for acclimation requirements.**
2. Before starting the installation in very dry or very humid climates allow **manufacturer's recommended times** for laminate to acclimate in unopened cartons in the area the installation will occur.
3. Permanent, fully operational HVAC systems should be in place and working to allow for proper acclimation, maintaining a consistent temperature between 60-75 degrees and relative humidity between 35-55%.
4. **Check with manufacturer** as some require that the climatic conditions in the room must adhere to the following before, during and for at least 3 days following the installation:
 - floor surface minimum 59-degrees
 - room temperature minimum 64-degrees
 - room humidity maximum 75%

LAMINATE FLOORING - Installation

UNDERLAYMENTS

1. Laminate floors are floating floors that are not attached to the subfloor.
2. Floors rest on a resilient underlayment that reduces noise, increases impact resistance, provide walking comfort and captures the adhesive oozing from the underside of the panel joints, maintaining the floating action of the floor.

POLYETHYLENE FILM

1. Vapor barrier is required on concrete subfloors – check with manufacturer
2. Layer of polyethylene film must be installed beneath the underlay foam or noise reducing underlayment.
3. If film sheets require overlap, follow manufacturer installation guidelines.
4. Polyethylene film should not be installed on wood, carpet, particleboard or other organic materials.

UNDERLAY FOAM

1. Foam gives comfort to walking and muffles impact sound and also helps to prevent indentation.
2. Foam is unrolled side by side, taped and loose fit. Seams of foam are not overlapped.
3. Underlay foam is **not** a moisture barrier.

2-in-1 PAD

Use polyethylene film moisture barrier with closed-cell foam cushion over hard subfloors to absorb noise-increase comfort

NOISE-REDUCING UNDERLAYMENT

1. Reduces drum and impact sounds, provides good walking comfort and increases impact resistance.
2. Recommended for use in multi-unit dwellings, such as apartments/condos
3. A layer of polyethylene film must be used as a vapor barrier, on concrete or radiant-heated subfloors

EXPANSION SPACE

Because of the nature of a floating floor, leave a minimum **1/4 - 3/8 -inch expansion space**. Refer to manufacturer around the entire perimeter of the room and any fixed objects to allow for movement

FLOATING LAMINATE Installation – No Fasteners

1. Start by measuring the width of the room, at a right angle to the direction in which the planks will be installed.
2. Measure, mark and chalk the primary line. If installing multiple rooms, chalk a secondary line.
3. Make reference marks on walls to maintain primary line. Underlayment will cover chalk lines on substrate
4. Measurements of the last row are to be close to 1/2 the width of a plank, but no less than 2-inches wide.

STARTING THE INSTALLATION

1. Undercut the door frames. Metal door frames must not be undercut, allow expansion and fill with matching sealant.
2. Lay a loose panel upside down against the door frame over a section of the correct underlayment.
3. Always inspect each carton and panel to ensure no defective or damaged cartons or panels prior to installation.

UNDERLAYMENT

1. If required, install polyethylene film first. Not all products require underlayment; for some it is already attached. **ONLY ONE** layer of underlayment is to be installed.
2. Place 6-mil polyethylene film using the manufacturer-recommended overlap
3. Next, roll out the underlayment or lay out underlayment panels and roll only one width of underlayment at a time.
4. If noise-reducing underlayment is being installed, contact manufacturer for specific installation recommendations
5. Loose lay the underlayment edge to edge. Do not overlap.

RANDOM INSTALLATION

1. Best appearance - install parallel to length of room to allow incoming light to fall along length of planks with random pattern
2. Best appearance halls – install panels lengthwise in length of hall, regardless of the light source.
3. Remove the tongue facing the wall.
4. To form a straight line, assemble the planks together in the first row
5. Begin and end each row with a plank that is at least 8-inches in length. Refer to manufacturer for minimum lengths.
6. If starting wall is uneven or necessary to balance plank width, scribe wall contour on panels in 1st row, disassemble/ cut
7. Work from left to right, or right to left as the manufacturer recommends.
8. Maintain manufacturer-recommended expansion area between the first row and the wall.
9. Use spacers to maintain expansion area around perimeter of installation.
10. Mark last panel in the row for cutting, by turning the panel 180-degrees
11. After cutting last plank in the first row, use the off-cut to start the second row
12. Space end joints the minimum number of inches apart in consecutive rows as **recommended by manufacturer**.
13. Manufacturer-recommended expansion gap should be left at walls, thresholds, pipes and other fixed objects
14. Use expansion profile in door openings, angled rooms, corridors corners. Refer to manufacturer for maximum length and width before expansion transition is required.

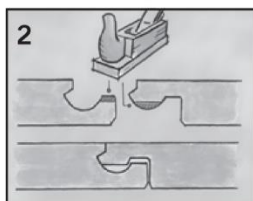
FINISH THE INSTALLATION

1. To calculate the correct width of the last row of planks, place the plank on top of the last installed plank.
2. Use scrap plank, plus appropriate spacer to allow for necessary expansion to trace contour of wall on full plank to fit
3. Cut according to the traced line.

LIMITED MOVEMENT AREAS



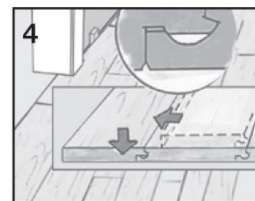
1
Some long edge joints cannot be installed using a 20° angle.



2
Remove top part of the tongue and groove profiles.



3
Use good quality wood glue to make the connection.



4
Slide panel into space horizontally and slot into profile. Use these modified planks under doorframes, radiators, cabinet fronts, etc. Use the pull bar to slide the planks where needed.

ALWAYS check with the manufacturer concerning recommended installation systems!

LAMINATE FLOORING – Kitchens and Baths (Wet Areas)

ALWAYS CHECK the manufacturer guidelines!

1. Laminate is resistant to water, but it is **VERY important** to prevent water or moisture from getting under floor
2. Not all flooring is rated for wet areas. Check with the manufacturer.
3. When working in “wet” areas, fill the expansion gap with 100% mildew resistant silicone
4. Depending on manufacturer, planks may require adhesive applied to their tongues when installing in “wet” areas
5. **Kitchen** cabinets should **NOT** be installed on top of a laminate floor.
6. Install the floor up to the front of the cabinets and leave proper expansion where the floor meets the cabinets.
7. **Bathroom** - Do not install laminate flooring in a bathroom with a floor drain.
8. Seal the expansion space between laminate and walls or other fixed objects such as radiators, bath tubs, showers, sinks or toilets with mildew resistant silicone sealant.
9. Before wall base, maintain space around perimeter of flooring for expansion and seal, include exposed edges of panels
10. Fill the space completely with sealant to avoid water getting underneath the floor or into the core material.
11. If required, when installing the flooring panels, make sure the grooves are entirely filled with adhesive
12. If adhesive is recommended, excess adhesive must appear on the surface when the panels are joined together.
13. **To finish the installation**, wipe away the excess adhesive with a plastic putty knife and a damp cloth.
14. Buff with a dry cloth to minimize any adhesive haze.
15. Apply acetone or manufacturer’s cleaner with white cotton cloth to remove haze. Do not apply acetone directly to floor.
16. T-molding is to be installed in the doorway between a bathroom and the adjoining hall.
17. Toilets must be removed before installation. Leave a ¼-inch expansion space around the toilet flange.
18. Fully seal the ¼-inch expansion area around the flange with a mildew resistant silicone.
19. Customer is to arrange for a plumber to reset toilet.

LAMINATE FLOORING – Moldings and Trims

1. **LAMINATE T-MOLDING**- joins 2 areas of laminate floors in doorways or large areas that require movement
 - Use T-moldings at every doorway, regardless of size unless the manufacturer states otherwise.
 - Two types of T-moldings – two-part, snap system and one-piece glue-down T-molding.
2. **LAMINATE CARPET-TRANSITION STRIP** – joins laminate to carpet
 - Two types of transition strips - Two-part, snap-in system and one-piece glue-down T-molding.
3. **LAMINATE END MOLDING** - finishes floor at door thresholds, sliding glass doors or other vertical fixed objects
4. **LAMINATE HARD SURFACE REDUCER** – Two-types to finish where the floor meets lower floor; two part, snap-in system and solid glue-down T-molding
5. When installing all molding types, do not use excessive liquid-nail adhesive, as this may reduce expansion gap.
6. Place weight on the molding until adhesive cures.

INSTALLATION of FOUR-in-ONE MOLDING

The installation of the FOUR-in-ONE Molding is addressed in the skills sessions.

NEW DESIGN

- The patented T-Molding is a base for 4-different molding solutions makes installation even simpler, safer and quicker
- Track locks the components together and attaches to the subfloor
- Addition for hard surface reducer and carpet edge and end molding
- Track is wide to provide tight fit, eliminating the need for a plastic shim
- It attaches directly to the subfloor for all flooring heights from 7mm to 12mm
- Molding ensures a flat installation of the T-molding no gaps or raised edges
- No dovetail to remove
- Spacing between adjoining floor and laminate is 1-1/8" T-molding application
- Spacing between adjoining floor and other applications is 1-3/8"
- Screws must be used at either end of track and in every other hole and no two consecutive screws can be skipped
- New and old moldings can be installed side by side if separate instructions are followed.

****Please refer to Pergo detailed instructions*

LAMINATE FLOORING – Stairs

1. The **ONLY** time that a laminate floor should be glued to the subfloor is during a stair installation
2. Remove loose or damaged treads or risers and repair or replace.
3. Stairs must be cleaned thoroughly from any loose paint, debris or old adhesives.
4. Fasten all stair nosing **with manufacturer recommended fasteners** on wood or concrete surfaces.
5. General conditions where the stair nosing is used: Step down from a floating floor; Tread is flush or even with the riser; Tread is extended and round-edge nosing or Tread is extended and square-edge nosing

STEP DOWN FROM A FLOATING FLOOR - Cut the stair nosing to the desired length. **Fasten nosing with the manufacturer's recommended adhesive and fasteners.** Keep ¼-inch expansion space between nosing and floor.

TREAD FLUSH OR EVEN WITH THE RISER - Install the riser before the stair nosing is fit into place

1. If installing from a floating floor, follow the manufacturer's guidelines
2. If installing on a stair tread, the nosing is installed after the tread and riser are in place.

TREAD WITH AN EXTENDED ROUND EDGE NOSING - Square rounded portion of the extended nosing

1. Remove only radius (rounded part) and leave as much of the extending nose of the tread as possible
2. Glue a narrow strip of laminate flooring to finish exposed edge of the tread on the edge of the squared nosing.
3. The laminate nosing is installed to finish the nose of the tread after the tread and riser are installed.

TREAD WITH EXTENDED AND SQUARE EDGE NOSING

1. Cut a narrow strip of laminate flooring and glue it on the edge of the existing tread.
2. Install the tread and riser and finish the edge with laminate nosing

LAMINATE FLOORING ON STAIR TREADS AND RISERS - Dry fit the laminate planks net or snug, stringer to stringer.

1. The depth of the laminate is cut to accommodate the width of the laminate nosing.
2. This overlaps either a riser of laminate or the section of laminate which is glued on the edge of the step.
3. One plank of laminate will finish most risers.
4. Two planks are necessary for the tread since the tread depth exceeds the width of one laminate plank.
5. When gluing treads with recommended adhesive, also glue the tongue and groove of the planks for the tread
6. The joint between the tread and riser is sealed with sealant. Quarterround can also be used.

AFTER DRY FITTING - planks can be adhered to stair treads with full spread premium adhesive – Check manufacturer

1. Press the laminate plank into the adhesive to obtain the proper bonding
2. Check manufacturer - Apply several continuous beads of premium quality construction adhesive across full width of tread and firmly press the laminate plank into the adhesive to achieve proper bonding
3. Before using the stairs, allow the recommended time for the adhesive to fully set up

INSTALLATION OF LAMINATE WALL BASE – Nail with finishing nails, adhere with a premium quality construction adhesive or screw into place.

INSTALLATION OF QUARTERROUND

1. It must be nailed to the base, not to the floor, using nails or screws, countersink them through the laminate
2. Fill the recessed nail hole with a matching color wax stick or finishing putty

INSTALLATION OF LAMINATE END PIECE COVERS

If the end of the wall base of quarter-round is visible, use end piece covers with a durable, self-adhesive backing to cover the exposed area.

LAMINATE FLOORING – Repair and Replacement

Repairs and board replacements will be performed in classroom setting. **ALWAYS** refer to the manufacturer's guidelines to perform the procedures according to written installation instructions.

SUBFLOOR GUIDELINES – WOOD FLOORING

CLEAN – DRY – FLAT – SOUND

ALL SUBFLOORS

1. The surface of the floor must be clean.
2. Surface must be flat, defined as maximum difference between two adjacent high points and the intermediate low point – **3/16" in 10' - 1/8" in 6' - 1/4" in 10' for mechanically fastened wood floors.**
3. Check low spots or ridges as allowed by the manufacturer.
4. It must be structurally sound.
5. Fill excessive voids or low areas using a leveling compound.
6. Allow the leveling compound to thoroughly dry before beginning the flooring installation.
7. High areas can be ground down or floated over with a manufacturer-approved self-leveling compound.
8. The subfloor must not slope or incline more than 1-inch in 6-feet.
9. Use laminate flooring foam or noise-reducing underlayment with floating floors.
10. Remove existing carpet, cushion and/or wood flooring on concrete subfloors prior to installation.

WOOD SUBFLOOR REQUIREMENTS

1. Wood subfloors must have stable moisture content. No more than 12-14% depending on manufacturer.
2. Creaking subfloors must be repaired before installation.
3. Sand or plane high areas; low areas – for glue direct or floating floors, patch or fill with correct leveling compound or cover with a rigid underlayment. For mechanically fastened floors use felt paper or scrap vinyl
4. Leveling compound is to dry completely before starting the installation – check with manufacturer
5. When installing 5/16" solid wood flooring, 6 mil polyethylene film must be used between the flooring and the wood sub floor.
6. Over wood floors or subfloors, 2-in1 pads can be used.
7. Subfloor must be flat, dry, free of wax, paint, oil and debris, sound, clean with no squeaks or protruding nails /staples.
8. Subfloor tolerance should be flat to within 1/8-inch in 6-feet, 3/16-inch in 10-feet, or 1/4-inch in 10-feet for staple and nail down products.
9. **PREFERRED** – minimum thickness for joist spacing:
 - 16" o/c - 5/8" CD X or 23/32 OSB
 - 19.2" o/c – 3/4" CDX or 3/4 OSB
 - 24" o/c – 7/8" CDX or 1" OSB

SOLID BOARD SUBFLOORING should be 1" x 6" nominal dense softwood. Solid board subfloors - No wider than 6" installed at 45-degree angle, all board ends full bearing on joists and fastened.

SCREED OR PLYWOOD ON SLAB

1. See manufacturer guidelines. For a floating subfloor over concrete, add moisture barrier before applying underlayment.
2. Install 2 layers $\frac{1}{2}$ " CDX grade plywood 4x8 underlayment
3. Loose lay **first layer** with $\frac{1}{8}$ " gapping between sheets with staggered joints
4. Lay **second layer** perpendicular or at 45-degree angle to first and keep $\frac{3}{4}$ " gap at all vertical obstructions
5. Staple, screw or nail **second layer to first layer 12" on center** not to protrude through the bottom of the subfloor.

GLUE-DOWN Subfloor

1. Minimum $\frac{5}{8}$ " CDX grade plywood underlayment
2. Sections of 2x8' or 4x4' in staggered joint pattern in adhesive, using $\frac{1}{4}$ "x $\frac{1}{4}$ " notched trowel
3. Spacing - $\frac{1}{8}$ " between sheets with staggered joints and $\frac{3}{4}$ " expansion space at all vertical obstructions
4. Use 1- $\frac{1}{2}$ " mechanical fasteners to install hardwood

CONCRETE - NAIL-DOWN Subfloor

1. Minimum - $\frac{5}{8}$ ", $\frac{3}{4}$ " preferred, CDX grade plywood sheathing preferred 4x8' sheets
2. Spacing - $\frac{1}{8}$ " between sheets with staggered joints
3. Start at the center of the panel and work toward the edges; use a minimum of 32 nails (shots) per 4x8' panel.
4. Expansion space - $\frac{3}{4}$ " all vertical obstructions and use 1- $\frac{1}{2}$ " mechanical fasteners to install hardwood

FLOATING SUBFLOOR – DRI CORE

1. 2' X 2' – $\frac{3}{4}$ " OSB panels that fit together with a hard plastic on the bottom side

CHECK MOISTURE

1. Record and/or document the residual moisture content and record in a reliable manner for future reference.
2. Use a wood moisture meter to check moisture content of wood subfloor is LESS than 12%-14% depending on manufacturer.
3. Subfloor moisture content must be within **4%** for **wood strip flooring**. Many manufacturers recommend 2% for plank (3-inches and wider). Subfloor moisture content **not to exceed 12%-14%**, depending on the manufacturer.
4. Indications of high moisture content are darker or discolored concrete, cloudy polyethylene film or condensation on the underside of the film.
5. New concrete subfloors and basements should be cured for a minimum of 90-120 days prior to the installation.
6. Existing sheet vinyl/linoleum full spread with welded seams in good condition can also serve as vapor barrier, 6-mil polyethylene film is also recommended. **Some manufacturers allow the vinyl to remain in good condition, but a moisture barrier is still required. ALWAYS VERIFY**

WOOD FLOORING – Onsite Conditions – Checklist

CAUTION: WOOD DUST Sawing, sanding and machining wood products can produce wood dust. Airborne wood dust may cause respiratory, eye and skin irritation. The International Agency for Research on Cancer (IARC) has classified wood dust as a nasal carcinogen in humans.

PRECAUTIONARY MEASURES: If power tools are used, they should be equipped with a HEPA filter dust collector. If high dust levels are encountered, use an appropriate designated dust mask. Avoid dust contact with eyes and skin. First-aid measures in case of Irritation: flush eyes or skin with water for at least 15 minutes.

PRIOR TO THE INSTALLATION Jobsite Checklist

1. Allow 5 % for straight lay, 10% for diagonal lay, and 10% for chopped up custom areas
1. Flooring must be properly acclimated for as long as necessary to meet minimum installation requirements for moisture content according to the manufacturer's requirements.
3. Review the plans and **ALWAYS follow manufacturer-specific installation instructions.**
4. Arrangements are to be made prior to the arrival of the installers to move furniture, appliances, and/or disconnect water or gas. Water and gas lines should be disconnected by the customer or proper utility company. **DO NOT ATTEMPT** to disconnect ANY lines.
5. If not noted on the diagram, discuss any existing damage with the customer, such as scratched walls, furniture, torn wallpaper, scratched or dented wood and trims, soiled or chipped paint. If customer is not available, make notes and contact retailer prior to starting the installation.
6. Review the MSDS (Material Safety Data Sheets) for each item and have available on the job.
7. Job-site environment and substrate surfaces must meet applicable construction and material industry standards.
8. Materials supplied for the job. Check the flooring to make sure the proper floor type was ordered and the correct amount of flooring is available for the required installation.
9. If adhesive is required, check that quality/type of the adhesive is recommended by the manufacturer.
10. If obvious defects and imperfections are visible, DO NOT install flooring without consent of dealer / manufacturer. Work is not to commence if a product defect or unexpected problems should occur. Contact the appropriate personnel. Do not alarm the customer; contact the store first.
11. Upon completion, clean work area, including installed floor and properly dispose of all trash.

HARDWOOD FLOORING – Installation

WOOD Pre-Finished Mechanically Fastened Solid Strip (3/4" x less than 3" wide)

1. Consider aesthetics, doors and fireplace area when selecting starting wall; perpendicular to the floor joist
2. Place an approved vapor retarder before installing wood flooring (15lb asphalt felt / craft paper)
3. Undercut casings and jamps
4. **Always use the recommended stapler or cleat and protective boot for factory finished flooring if required** for the specific product being installed. Use minimum 1-1/2"-2" fastener recommended by the stapler manufacturer.
5. For the first two rows, use the longest, straightest boards available
6. Align tongue of first row on chalk line.
7. Top nail and blind-nail first row - Top nail every 8"-10," use 6d-8d casing or finish nails, staying 1"-3" from ends.
8. Countersink nails and maintain the expansion area
9. **BLIND-NAIL**– 45-degree angle through tongue every 10"-12". If needed to ensure proper fit of next board, countersink nails flush minimum two fasteners per piece.
10. Use this method and continue blind nailing following rows until stapler can be used.
11. Racking" of flooring provides opportunity to inspect for problem boards and proper staggering of joints
12. For a favorable overall appearance, stagger end-joints of adjacent rows a minimum of 4-to-6," when possible
13. Install the remainder of the floor, working from several cartons.
14. The last 1-2 rows are to be face-nailed when clearance does not permit blind nailing with stapler or brad nailer.
15. Install transition molding and fill in top nailed areas and minor gaps with matching filler.

Glue-Direct Engineered Hardwood Installation Procedures

ALWAYS document moisture readings of concrete

Floor preparation – ALWAYS meet flatness requirements

1. Apply manufacturer moisture-reduction system, if necessary
2. Preferred - Start on longest wall; usually exterior walls are the straightest.
3. Undercut casings and jambs
4. Measure off wall 2-3 rows and strike a chalk line. Allow for expansion area.
5. Nail a sacrificial row of wood flooring with 1" concrete nails along dry side of chalk line.
6. Work away from the wood flooring. If it is necessary to work directly on the adhered flooring; use a kneeler board.
7. Chalk line grids to maintain clean work area.
8. Grid out only the area that can be installed before adhesive skins over.
9. Do not allow adhesive to skin over – If this occurs, remove adhesive and apply fresh adhesive

ALWAYS use manufacturer's recommended products, tools and guidelines

Adhesive application

1. Use manufacturer recommended trowel and adhesive for installation of wood flooring
2. Use low-adhesion Blue Tape when needed and remove it as soon as possible, preferably the same day, but no later than 24 hours.
3. Use a blue tape with minimal adhesive, such as 3M Orange Label. **DO NOT** place tape over any residual adhesive remover, as this may cause the finish of the hardwood to peel.
4. Install wood in a random stagger application.
5. Place board to be installed close to installed board to minimize adhesive displacement and memory pull back.
6. Engage end joints first; than length of board.
7. Some manufacturers may recommend gluing the end joints on plank flooring (wider than 3 inches) Check with the manufacturer!

Finishing the installation,

1. Do not allow urethane adhesive to dry on face of the wood
2. Clean up as you proceed with the installation, using a white cotton towel and adhesive remover.
3. Use urethane adhesive remover for urethane adhesives; paint thinner for hybrid and pressure-sensitive adhesives
4. Roll floor with appropriate roller if manufacturer recommends. Fill in minor gaps with blended filler
5. Keep traffic off of the floor for a **minimum of 24-hours**.

Floating Engineered Hardwood without Mechanical Fastening – Installation Procedures

Floor Preparation- Meet the flatness requirements.

1. Start off longest wall. Strike a line allowing for expansion space. If wall is not straight, scribe to wall and transfer lines to boards.
2. Cut boards to fit wall and install correct underlayment. Use spacers to maintain proper expansion
3. Use the correct adhesive if the manufacturer recommends gluing of tongue and groove
4. Use tapping block that is recommended by the manufacturer.
5. Random stagger the joints. Fill in minor gaps with blended filler.
6. Clean up adhesive residue with clean cotton towel and adhesive remover
7. Products with locking mechanisms follow all manufactures guidelines on expansion space, end joint stagger, and smallest allowable piece.

Engineered Hardwood Nail or Staple

Undercut door casings and jams

1. Start off longest wall. Strike a line allowing for expansion space. If wall is not straight, scribe to wall and transfer lines to boards.
2. Always use the manufacture's recommended staple or cleat, gage, and length of fastener
3. Follow fastener schedule for face and blind nailing, end joint stagger, and shortest possible piece.
4. Set compressor at proper pressure rating. If tongue damage occurs, lower air pressure
5. To determine proper pressure and alignment of fasteners, fasten at least two test boards, stapled side by side
6. **Before proceeding, CHECK** for surface damage, air pressure setting, tongue damage, edge blistering, etc. and make all adjustments and corrections before installation begins. Once proper adjustments are made, remove and destroy the boards.

*******Always Follow Manufacturers Guidelines**

*****FAILURE TO MEET THE ABOVE REQUIREMENTS
CAN RESULT IN BUCKLING and OTHER PROBLEMS!**

Adhesives

SOLVENT BASED ADHESIVES:

- This type adhesive is the industry's standard because of its lower cost, strongest bond, easy spread, easy clean-up, and strongest initial grab.
- Originally petroleum based solvents, it has been reformulated with an alcohol base that is safe for both the environment and for one's health, yet it retains all the desired features of the original.
- Alcohol based solvents lead the industry in having the strongest bond and shear strength to hold wood floors in place, especially during the normal seasonal changes to wood floors.
- It has the strongest initial grab of any adhesive because it cures as it evaporates, resulting in virtually no hollow spots and less sliding that leaves gaps between boards.
- It works best with engineered flooring, but also can be used with quality solid wood floors.
- It has mold, mildew, and antimicrobial preventatives added to eliminate those problems.

URETHANE BASED ADHESIVES:

- Urethanes replaced solvent based adhesives in the U.S. under an EPA mandate and when major U.S. manufacturers were unable to create a substitute for solvents.
- Urethanes are known for their strong bond and ability to stick to most any surface.
- Good quality urethanes are typically more costly than a solvent based adhesive. (NOTE: So called Acrylic Urethanes' are not Urethanes and do not have the same features. They are an acrylic or water-based adhesive.)
- Urethanes require moisture to cure, thus taking longer to grab and potentially having hollow spots and sliding boards out of place during installation.
- Most urethanes are extremely difficult to remove from any surface and will etch pre-finished wood floors if left on the surface.
- Urethanes work equally well with engineered flooring and with quality solid wood floors.
- Urethanes are waterproof when cured, antimicrobial, and mold resistant.

POLYMER BASED ADHESIVES

- The latest technology in wood floor adhesives, Polymers are designed to overcome the etching caused by typical urethane adhesives and their difficult clean-up and spreading; they are easily cleaned and spread.
- They require moisture to cure (like urethanes) and are thus subject to the longer cure time, slower initial grab, hollow spots, and sliding of boards during installation that is not an issue with solvents.
- Polymers are typically more costly than solvent or urethane based adhesives..
- Their unique formulation allows them to prevent moisture penetration from the sub floor when applied using specific installation techniques.
- Polymers work equally well with engineered wood flooring and quality solid wood floors.
- Polymers are waterproof when cured, antimicrobial, and mold resistant.

WATER BASED ADHESIVES:

- Developed to meet environmental requirements that called for 'greener' adhesives and to reduce costs, they are typically the least costly of all types of wood floor adhesive
- Because water causes wood to expand, they can be a factor in cupping, bowing, end lifting, and finish degradation in wood floors when applied incorrectly or conditions are not dry and stable.
- Water based adhesives require longer time to grab and cure, and thus are subject to more hollow spots and sliding of boards during installation.
- They are typically waterproof when cured and with mold and bacteria preventatives added to reduce those problems.
- Shear Strength of water based adhesives is more important than in all other types because it can vary from 150 to 650 PSI by manufacturer. Make sure the water based adhesive you choose has the highest shear strength possible (minimum 200 PSI) to insure long-lasting adhesion and performance.
- While some water based adhesives may 're-bond' if there is a hollow spot or dimensional change, this can only be temporary since the shear strength is not adequate to permanently hold any rigid floor product in place.

GLOSSARY of TERMS

Above Grade Any floor that is above the level of the surrounding ground on which the structure is built

Acclimation The adaptation of the laminate floor to its installation environment

Alkali Soluble chemical substance referred to as “bases” that may cause severe skin burns. Alkali turns litmus paper blue; pH values above 7.

Alkalinity Test Used to determine the pH of concrete slab prior to installing flooring. A pH reading above 9 requires corrective measures. Consult manufacturer for recommended testing and corrective procedures.

ASTM www.astm.org American Society for Testing and Materials, an organization of voluntary members representing a broad spectrum of individuals, agencies and industries who are concerned with testing standards for a variety of products, systems, services and materials. ASTM is the world’s largest voluntary standards program.

Backing In laminate flooring, the bottom layer, or backing, is a melamine plastic layer that lends dimensional stability to the planks and also helps guard against moisture from the sub-floor.

Balanced Construction A panel construction that has materials of similar properties bonded to both sides of the panel.

Below Grade A cement slab poured below the level of the surrounding terrain.

Calcium Chloride Test Used to determine the quantitative measure of the concrete slab moisture by a change of weight of moisture-absorbing anhydrous calcium chloride. Represents amount of moisture that is transmitted from the area. The value is expressed as “pounds,” equivalent weight of the water that is emitted from a 1,000 square foot concrete slab surface area in a 24-hour period. It is generally recognized that it is safe to install a floor if the slab emission is 3.0 pounds or less. **ALWAYS check with the product manufacturer.** Minimum of 3 tests required for the first 1,000 square feet and one test for each additional 1,000 square feet.

Click Installation System The “glueless” alternative; done by placing the tongue of one plank into the groove of another at an angle and pressing down. This makes it possible to create a very tight connection during the installation. The floor can be walked on immediately

Coniferous or Softwood Term used to describe lumber produced from needle and / or cone bearing trees (conifers)

Core The center of a panel (i.e. surface layer, core, backer).

Crook The distortion of a board in which a deviation is present, in a direction perpendicular to the edge; from a straight line to the end of a piece; a curvature from end to end.

Cross-ply Construction Engineered wood plies that are stacked on top of each other but in the opposite direction is called cross-ply construction. This creates a wood floor that is dimensionally stable and less affected by moisture than a 3/4" solid wood floor. Cross-ply construction allows the plies to counteract each other which will stop the plank from growing or shrinking with the changes in humidity. The other advantage is versatility. This type of floor can be installed over concrete slabs in basements also.

Crosspull A condition occurring at an end-joint with the ends of flooring strips pulled in opposite directions

Crowning A “convex” or “crowned” condition or appearance of individual strips, with the center of the strip higher than the edges (opposite of cupping) **Crowning - Laminate** A specific type of warping when a panel assumes the shape of an inverted lengthwise or width across the face (i.e. convex).

Cupping A “concave” or “dishes” appearance of individual strips, with the edges raised above the center (opposite of crowning); sides are higher than the center.

Deciduous or Hardwoods Generally, one of the botanical groups of deciduous trees that have broad leaves in contrast to the conifers or softwoods. The term has no reference to the actual hardness of the wood.

Deflection The bending of a material between supports when a load is applied.

Delamination The separation of layers in a laminate, though failure within the adhesive or at the bond between the adhesive and the laminate.

Depression A dent in the surface of a panel.

Dew Point The temperature at which gas begins to condense as a liquid at a given pressure. In air, it is the temperature at which the air becomes saturated when cooled with no further addition of moisture or change in pressure.

Dimensional Stability The ability of a material to resist changes caused by environmental factors (i.e. moisture or temperature)

Eased Edge Each board is just slightly beveled. Some manufacturers add an eased edge to both the length of the planks as well as the end joints. Eased edges are used to help hide minor irregularities, such as uneven plank heights. Eased edge is also called micro-beveled edge.

Efflorescence – residue deposited on the surface of a material by the crystallization of soluble salts.

End Joint The place where two pieces of flooring are joined together end to end.

End Matched In strip and plank flooring the ends of individual pieces have a tongue milled on one end and a groove milled on the opposite end, so that when the individual strips or planks are butted together, the tongue of one piece engages the groove of the next piece.

Engineered One of the three common types of wood floors. (Others are Solid and Long-Strip Plank) Engineered wood floors are generally manufactured with 2, 3 or 5 thin sheets or plies of wood that are laminated together to form one plank. Most engineered floors can be nailed down, stapled down, glued down or floated over a wide variety of subfloors, including some types of existing flooring.

Equilibrium Moisture Content The moisture content at which the material neither gains nor loses moisture at a given

Expansion Gap A space necessary between fixed objects, i.e. walls of a room, pipes and cabinets, and between the material itself to allow for the movement of the material.

Filler In woodworking, any substance used to fill the holes and irregularities in planed or sanded surfaces to decrease the porosity of the surface before applying finish coatings.

Filler-Wood - For cracks, knot holes, worm holes, etc. Usually, commercial wood putty, plastic wood, or other materials mixed to the consistency of putty. Wood filler may also be mixed on the job using sander dust from the final sanding, or other suitable material, mixed with sealer or finish.

Floating Floor System – LAMINATE Laminate floors are installed using a “floating floor system” in which a padded underlayment sits between the subfloor and the laminate planks. The planks sit directly on the underlayment and are not anchored to the subfloor on the bottom but rather are anchored on the edges.

Floating Floor Installation – WOOD Wood floor is not mechanically fastened to any part of subfloor with a floating installation method. Place a thin pad between wood flooring and subfloor. Apply recommended wood glue in the tongue and groove of each plank to hold planks together. Padding has its advantages: it protects against moisture, reduces noise transmission, is softer under foot and provides for some additional "R" value. Some engineered floors and all long strip floors can be floated.

(HDF) High Density Fiberboard - fiberboard with density greater than 50lbs. per cubic foot or 800 kg per cubic meter.

Graining Each wood species has its own unique graining and texture. The graining on the boards is determined by the way it has been cut. Natural variations in the color and grain are normal and to be expected.

Hardwood Generally, one of the botanical groups of **deciduous trees** that have broad leaves in contrast to the conifers or softwoods. The term has no reference to the actual hardness of the wood.

Janka Hardness Test Wood hardness rating test measures force needed to embed a .444 inch steel ball to half its diameter in piece of wood. The higher the number; the harder the wood. Although, one of the best methods to measure ability of wood species to withstand indentations. It is used as general guide to compare various species of wood flooring

Joist One of a series of parallel beams used to support floor or ceiling loads and supported in turn by larger beams, girders, or bearing walls.

Laminate A product made by bonding together two or more layers. A manufactured product that simulates the look of hardwood, hardwood tile, natural stone and many other types of flooring. A rigid floor covering with a surface layer consisting of one or more thin sheets of fibrous material (usually paper), impregnated with amino-plastic thermosetting resins, usually melamine.

Sheets are either pressed as such (HPL or CPL, Compact), and in case of HPL or CPL bonded on a substrate, or with DPL, directly pressed onto substrate. The product is normally finished with a backing primarily used as a balancing material. Its performance values are set by the NALFA Standard.

Long Strip Plank One of three common types of wood floors (engineered, solid and long strip plank). Long strip plank floors are similar to engineered floors and have several wood plies that are glued together. The center core is generally a softer wood material and is used to make the tongue and groove. A hardwood finish layer is glued on top of the core. The top layer can be almost any hardwood species and is made up of many smaller individual pieces that are laid in three rows. This gives the effect of installing a board that is 3 rows wide and several planks long. Long strip floors come in a wide variety of domestic and exotic hardwood species and when damaged they are easy to replace.

Mat Test This is performed by placing a section of impervious material (sheet vinyl, rubber) no smaller than 2' x 2' and no larger than 3' x 3' on a slab in an area that is the least subject to drying out. The edges are securely sealed with a wide tape, such as duct tape, so air cannot penetrate. Remove the material after 24-hours. Check if the slab has changed appearance. If it has, this indicates the presence of moisture.

Moisture Content The amount of water in the material, expressed as a percentage of the dry weight.

Moisture Meter Tool used to measure moisture content.

Moisture Test All concrete floors should be tested for a moisture emission rate by utilizing an anhydrous calcium-chloride moisture test kit. Moisture emission rate is stated in pounds per 1000-square feet in 24-hours.

Nail-down This method is typically used with the 3/4" solid products. However, adapters are available for thinner flooring sizes. To attach the flooring to the subfloor, 2" nailing cleats are used with a wood flooring nailer and mallet.

Nosing A hardwood molding used to cover the outside corner of a step, milled to meet the hardwood floor in the horizontal plane, to meet the riser in the vertical plane; usually for landings.

On-Grade A cement slab that exists on the same plane as the surrounding terrain.

Overlapping Stair Nosing Similar to a flush stair nosing except the nosing overlaps the exposed edge of the floor. The overlapping stair nosing is secured to the sub floor and not to the laminate floor so the floor is free to move

Overlay A product of paper, plastic, film, metal foil, or other material incorporated into laminate flooring that provides the wear resistance and protection.

Particleboard A core material primarily composed of cellulosic materials (usually wood), generally in the form of discrete pieces or particles, as distinguished from fibers. The cellulosic material is combined with a synthetic resin or other suitable bonding system by a process in which the inter-particle bond is created by the bonding system under heat and pressure.

- **Flakeboard** - A particle panel product composed of flakes.
- **Oriented Strand Board** – A type of particle panel product composed of strand-type flakes which are purposefully aligned in directions which make a panel stronger, stiffer, and with improved dimensional properties in the alignment directions than a panel with random flake orientation.
- **Waferboard** - A particle panel product made of wafer-type flakes. Usually manufactured to possess equal properties in all directions parallel to the plane of the panel.

Pattern End Matched Ends of flooring panels, typically similar patterns, matched end to end for continuous linear effect

Peaking Areas of the laminate flooring at adjoining panel seams that have raised above the intended horizontal plane of the flooring surface. Seams that raise where the laminate planks or tiles join.

pH Test Determines strength of salts, known as base or strength of acids in substance, whether in a liquid or solid state.

pH Value Concentration of hydrogen ions in gram equivalents per liter used to indicate acidity or alkalinity of a substance on a scale from 0-14, with 7 representing neutrality or distilled water. Numbers less than 7 indicate increased acidity. Numbers above 7-14 indicate increased alkalinity. Lab and field testing for pH is done with distilled water

Polyurethane A clear, tough and durable finish that is applied as a wear layer.

Porosity Test Method to determine degree of porosity of concrete substrates prior to installation of flooring, by pouring water in several areas of substrate and observing time and amount of absorption. If water remains on surface or beads up, this indicates a non-porous substrate. Serious problems with porous slabs come from extra water added in order to make a concrete batch a workable material. Water/cement ratio is to be carefully considered if flooring problems arise

Qualitative Test The test indicates only the presence of moisture; additional testing is required if moisture is pre

Radiant-Heated Floor System Floor system that transfers heat directly from its source to another conductive material without passing through airspace. Heat is derived from heated water running through pipes or tubes buried just below the surface of a floor. Caution is used to avoid puncturing the tubing during the flooring installation.

rh – Relative Humidity Measured in percentage, relationship between air volume and amount of moisture the air holds of the total moisture-holding capacity of that volume of air, at a stated temperature. The water vapor holding capacity of a solvent decreases as the temperature of the solvent increases.

Resins A polymeric material used for impregnating and bonding layers of laminate flooring.

Screed Usually a 2" X 4" laid flat side down and attached to a concrete subfloor to provide a nailing surface for tongued and grooved strip flooring or a wood subfloor. **Sleeper** – another name for screeds.

Screens – LAMINATE The quality of the laminate partially has to do with the photography and the number of photographs per style, which is known as "screens". The more screens a product has, the more variation it can offer and the more "authentic" the laminate appears.

Shake A separation along the grain

Slip-Tongue A spline or small strip of wood or metal used to reverse or change direction in installing standard tongue and groove strip flooring. Sometimes used in laying 3/4" solid tongue and groove parquet.

Softwoods / Conifers General term used to describe lumber produced from needle and/or cone bearing trees; conifers

Solid One of the three common types of wood floors – engineered and long strip plank. Solid wood floors are one solid section of wood that have tongue and groove sides. Solid wood floors can be unfinished or pre-finished 3/4" solid wood floors. Solid wood floors are sensitive to moisture. Because of this, they are used in nail-down installations and are not recommended for installation below ground level or directly over a concrete slab.

Stapled Down 1-1/2 to 2-inch staples are used versus nailing cleats to attach the wood flooring to the subfloor. A pneumatic gun is used to drive the staple into the wood flooring and subfloor.

Subfloor A pre-existing supporting surface in a structure.

Tongue and Groove The joining of two boards. One board has a tongue on its edge that fits into a groove in the edge of the other board.

Tongue and Groove Wood (T&G) In strip, plank, and parquet flooring made from strip, and some mosaic parquet; a tongue is milled one edge and a groove on the opposite edge. As the flooring is installed, the tongue of each strip, slat, or unit, is engaged with the groove of the adjacent strip or unit.

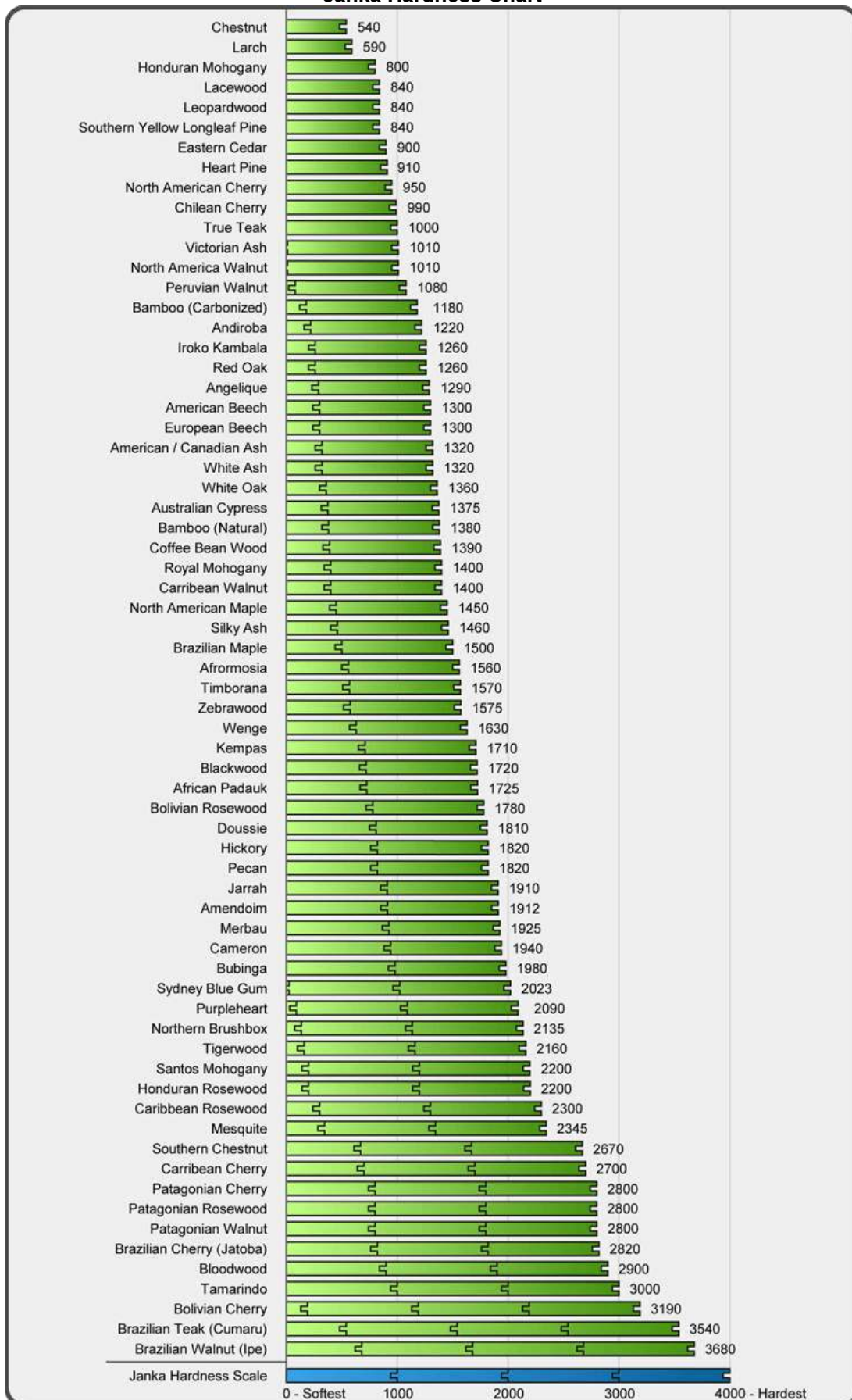
Vapor Barrier A material with a high resistance to vapor movement, such as foil, plastic film, or specially coated paper, which is used to control condensation or prevent migration of moisture.

Warping Crowning, cupping or crook or any distortion of a piece of flooring from its true plane that may occur in seasoning.

***Information is presented from manufacturer printed materials, the North American Laminate Flooring Association, the National Wood Flooring Association and the CFI-RITE training manuals developed with the World Floor Covering Association.*

Reference Guides

Janka Hardness Chart



Equilibrium Moisture Content (EMC) Chart

This chart provides the equilibrium moisture content for wood based on a shop's humidity and temperature. Measure the humidity with a hygrometer, check the shop temperature, and look up the numbers in the chart.

RELATIVE HUMIDITY %	AMBIENT AIR TEMP (DEG. F)							
	30	40	50	60	70	80	90	100
5	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.2
10	2.6	2.6	2.6	2.5	2.5	2.4	2.3	2.3
15	3.7	3.7	3.6	3.6	3.5	3.5	3.4	3.3
20	4.6	4.6	4.6	4.6	4.5	4.4	4.3	4.2
25	5.5	5.5	5.5	5.4	5.4	5.3	5.1	5.0
30	6.3	6.3	6.3	6.2	6.2	6.1	5.9	5.8
35	7.1	7.1	7.1	7.0	6.9	6.8	6.7	6.5
40	7.9	7.9	7.9	7.8	7.7	7.6	7.4	7.2
45	8.7	8.7	8.7	8.6	8.5	8.3	8.1	7.9
50	9.5	9.5	9.5	9.4	9.2	9.1	8.9	8.7
55	10.4	10.4	10.3	10.2	10.1	9.9	9.7	9.5
60	11.3	11.3	11.2	11.1	11.0	10.8	10.5	10.3
65	12.4	12.3	12.3	12.1	12.0	11.7	11.5	11.2
70	13.5	13.5	13.4	13.3	13.1	12.9	12.6	12.3
75	14.9	14.9	14.8	14.6	14.4	14.2	13.9	13.6
80	16.5	16.5	16.4	16.2	16.0	15.7	15.4	15.1
85	18.5	18.5	18.4	18.2	17.9	17.7	17.3	17.0
90	21.0	21.0	20.9	20.7	20.5	20.2	19.8	19.5
95	24.3	24.3	24.3	24.1	23.9	23.6	23.3	22.9
98	26.9	26.9	26.9	26.8	26.6	26.3	26.0	25.6



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