

# JAMIE BECKWITH<sup>®</sup>

## COLLECTION

### ENIGMA<sup>®</sup> HARDWOOD SURFACING LINE

The Enigma<sup>®</sup> Hardwood Surfacing Line is a high-end engineered product designed and produced for flooring and vertical surfacing industries by Jamie Beckwith and presented to the trade in the Jamie Beckwith Collection<sup>®</sup>. The line is offered in the following wood species: Plain sawn White Oak, Quarter sawn White Oak, and Walnut. Our product is manufactured in multiple facilities, including Nashville, Tennessee and can be customized to meet client's specific needs.

#### PRODUCT SPECIFICATIONS

The Grover, Lotus, Jigsaw, Sextant, Jacks, Dice, Crescent, Wave, Buzz, Kaliedoscope, Hive, and Arrow patterns have a 4 mm thick top layer made of Oak or Walnut. It is glued to a 9 ply 1/2" Baltic Birch substrate.

"All Enigma tiles are 5/8" thick with a 4 mm wear layer of solid hardwood."

All Enigma patterns are pre-finished with an oil based no VOC finish by Rubio<sup>®</sup> Monocoat, but have the option to come unfinished.

#### Specific Finish Features:

Molecular bonding with the wood: durable protection

100% VOC-FREE

Respects the natural 'look and feel' of the wood

Low consumption

No starting marks or overlaps

Easy to maintain

Doesn't contain water

Applies to all kinds of wood, including furniture and floors (solid wood, veneer wood, MDF, etc...)

Durable protection, highly resistant to wear

Water-resistant: (suited for kitchens, bathrooms)

Resistant to heat up to 212°F

Fast curing

#### Technical Characteristics:

Oil Plus 2C (A) - Physical state at 20°C: liquid

Odor: natural oil/ Color: transparent

Accelerator (B) - Physical State: liquid

Odor: none/ Color: colorless to pale yellow

Flash point: >160°C (closed cup)

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### INSTALLATION INSTRUCTIONS

The Jamie Beckwith Collection defers to the National Wood Flooring Association Installation Guidelines. (See Below). ALL ENIGMA PATTERNS SHOULD BE INSTALLED BY A PROFESSIONAL INSTALLER. Please read all information carefully.

#### Storage and Handling:

We recommend at least 3 to 5 days of acclimation prior to installation of all Jamie Beckwith Collection wood products. Refer to NWFA guidelines for acclimation information below.

Handle and unload all Enigma products with care. Store in a dry place with at least a 4 inch air space under boxes which are stored upon "on-grade" concrete floors. All hardwood products should not be delivered to the site until the building is closed in with windows and doors in place and all other "wet" work is completed. The Enigma products should be stored in the environment where it is expected to perform. All air-conditioning and heating units should be operational. Please read installation guidelines below.

#### JBC Wood Flooring Adhesive:

The Jamie Beckwith Collection recommends using Bona R851 adhesive for hardwood flooring with the Bona 1250G trowel. This adhesive in conjunction with this trowel provides moisture protection up to 12 lbs. and 85% RH. Be aware that for additional moisture protection where concrete is above 12lbs. and 85% RH, the Bona MBP clip-on trowel can be used for up to 18lbs. and 95% RH moisture protection. For Advantech substrates you should abrade first with 60 grit sandpaper or similar. For additional Bona adhesive information or closest distributor, go to [mybonahome.com](http://mybonahome.com). Additional information on sound ratings and installation over concrete is also available on [mybonahome.com](http://mybonahome.com).

#### JBC Wall Treatment Adhesive:

For wall treatments use Bona R880 adhesive. For additional Bona adhesive information or to locate the nearest Bona distributor go to [mybonahome.com](http://mybonahome.com).

#### Cutting:

The use of a plunge cut circular saw and guide system is highly recommended. In addition, a new or newly sharpened high quality carbide-tipped blade should also be used. Festool offers one such system. A table saw or slide compound is not recommended, however can be used if fixtures are made to stabilize the pieces while cutting.

**IMPORTANT:** As with any other wood product, we do not recommend these tiles be used in wet applications such as shower walls, shower floors or any uncovered exterior application.

#### Flooring Installation Guidelines:

It is helpful to dry-lay the section of the surface first to get an idea of your layout. Use drawings provided by specified designer as reference.

When installing on a floor, stand or kneel on the subfloor during the installation to avoid shifting the tiles. Proper placement of the first tile is the key to the entire installation. Carefully place a tile at the intersection of the two chalk lines. Straight plank boards can be used to align and secure the tiles. Start at the center of the surface in one of the quadrants

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### Flooring Installation Guidelines (CONTINUED):

Continue laying the balance of the tiles along the starting quadrant. Align each tile squarely. Do not push or shove the tiles too strenuously as this could cause the first and second tiles to move. Simply realign the tiles and proceed with the installation. Avoid hammering or forcing the tiles together as this may destroy the shape of the tile. You may use a non-marring rubber mallet to tap the tiles.

After laying the tiles across the first starting area, trim the last tiles as needed to obtain the proper 1/2" expansion space next to the walls. Use a small band or saber saw for final trimming. Avoid pressing heavily or stepping on the recently laid tile as this may destroy the ridging of the adhesive and positioning of the tile. Allow a minimum of 24 hours drying time before moving furniture or walking on the newly installed Enigma Hardwood Surfacing Line.

### Wall Installation Guidelines:

When installing on a vertical surface, it may be helpful to set the first pieces with finish nails, placed within the 9-ply engineered wood construction, in combination with the recommended adhesive to avoid shifting of tiles as installation continues. Please note that nails are not necessary or recommended through the face of the product.

## MAINTENANCE

Vacuum as often as you would carpet. Brush between the chamfered edges. It is important to maintain the humidity level in the 35 to 60% range. Use portable or HVAC humidifiers during the heating season. Failure to properly maintain your wood surfaces will void all warranty.

### Overview

Once curing has completed Rubio Monocoat can be maintained as follows:

Clean the finish:

1. Sweep, dust or dry mop
2. Damp mop the finish with water
3. Damp mop the finish with:
  - Surface Care Spray - ready to use, non-residue cleaner
  - Rubio Soap - this is a concentrated version of Surface Care Spray. Mixed with water this becomes Surface Care Spray.
4. DO NOT use any other commercial cleaners as most of these will damage the finish.

When signs of wear occur, use either:

Textural - this is normally a dry or dusty look (most residences in 1-3 years, or whenever desired):

- Refresh - Restores the luster of the finish,

Textural and Color - this will appear as change or unevenness of color (most residences in 4-6 years, or whenever desired):

- Maintenance Oil - Restores the color and the luster of the finish.

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### Cleaning

Surface Care Spray: is a ready-to-use, non-residue, cleaning product and can be used as often as desired.

1. Spray Surface Care Spray on to the surface to be cleaned.
2. Wipe dry with a mop or microfiber cloth.
3. Allow the surface to dry for approximately 15 minutes.

### Rubio Soap:

1. Sweep the floor and eliminate dust.
2. Mix 1 part Soap with 66 parts water in a bucket - this produces Surface Care Spray.
3. Damp mop the finish with Surface Care Spray mixture.
  - For best results, damp mop back over the surface with clean water.
4. Allow the surface to dry completely, normally 30 minutes.
5. DO NOT:
  - Use too much liquid as this can enter between boards and damage the hardwood product.
  - Leave excess liquid on the hardwood product. Always wipe dry.

### Removing Stains

Localized stains can be treated easily with the ready-to-use Surface Care Spray. For treatment of fat and/or lime spots, we recommend using Rubio Monocoat LimeSpot Remover and Rubio Monocoat Grease Remover.

### Grease Remover

1. Apply a generous quantity of Rubio Monocoat LimeSpot Remover to the spot.
2. Allow several minutes for absorption.
3. Remove the product with paper towels or a dry cloth.
4. Clean thoroughly using a cloth dampened with water.

For stubborn marks, it is recommended to repeat this method as many times as needed to achieve the desired result.

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### Refresh

Whenever necessary depending on wear and tear.

Rubio Monocoat Refresh is a ready-to-use product that refreshes, restores, and protects surfaces treated with Rubio Monocoat Oil. Rubio Monocoat Refresh is used when the surface feels too dry or rough, or when the finish has worn off due to heavy traffic. This treatment is best carried out on the entire surface; however it can be used for spot rejuvenation.

1. Eliminate dirt and dust from the floor.
2. Clean the floor thoroughly with Rubio Soap plus water. Rinse well with water to eliminate any soap residues. Leave it to dry completely.
3. Spray Rubio Monocoat Refresh on to the surface to be treated, or apply the product with a cloth. Use a minimal amount of the product to prevent the hardwood surface from becoming sticky.
4. Allow the product to react for 1-2 minutes.
5. Wipe dry with a cloth, paper towel, or polishing machine with white pad. Finish the treatment using an absorbing cloth, until the surface feels completely dry.
6. Work with small sections that can be completed in 15 minutes or less; 10 minutes on hot, dry days. This is normally no more than 120 SF.
7. With good airflow and proper application, the surface can normally be used in 4-6 hours.

### Maintenance Oil

Whenever necessary depending on wear and tear.

Rubio Monocoat Maintenance Oil comes in all of our colors and is a ready-to-use product that refreshes the texture and color of surfaces treated with Rubio Monocoat Oil. Maintenance Oil can be used whenever you feel the color and luster of the finish is damaged. This treatment should always be carried out over the entire surface.

1. Eliminate dirt and dust from the floor.
2. Clean the floor thoroughly with Rubio Soap plus water. Rinse well with water to eliminate any soap residues. Leave it to dry completely.
3. Apply Rubio Monocoat Maintenance Oil with cloth, brush, sponge or buffer.
4. Allow the product to react for 1-2 minutes.
5. Wipe dry with a cloth, paper towel, or polishing machine with white pad. Finish the treatment using an absorbing cloth, until the surface feels completely dry.
6. Work with small sections that can be completed in 15 minutes or less; 10 minutes on hot, dry days. This is normally no more than 120 SF.
7. With good airflow and proper application, the surface can normally be used on in 4-6 hours.
8. Rub the surface with a lint-free cotton cloth (dry).

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### Cleaning After Refresh or Maintenance Oil

After application of Refresh or Maintenance Oil, do not clean the surface with water or any of our surface cleaners for 7 days. You may vacuum or dry mop during this time but do not use liquids on the surface.

### Spot Repairs and Local Restoration

Rubio Monocoat Oil Plus

The treatment is recommended where scratches or burn marks are present, or where heavy wear is showing either in patches or large areas of the floor. It also applies if a completely new color is desired over the entire surface area of a previously treated floor.

Scratches and burn marks:

1. Lightly sand the spot to be restored.
2. Eliminate dust.
3. Apply Rubio Monocoat Oil Plus with a cloth or sponge.
4. After 2-3 minutes, wipe away any surplus product with a cloth or paper towel.
5. The surface can be used again after 24-36 hours.

### Restoration

If a treated floor shows too much wear (in patches or overall) or if a completely new color is desired, we recommend a restoration of the entire surface of the floor using Rubio Monocoat Oil Plus or Rubio Monocoat Oil Plus 2C carried out by skilled professionals.

### Other Cleaning Options

Satin Soap and High Traffic Protection - cleaning systems that increase the sheen of our natural matte finish. See Rubio's website for additional information. [www.monocoat.us](http://www.monocoat.us)

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### N.W.F.A. INSTALLATION guidelines

#### CHAPTER 1

#### JOBSITE CONDITIONS

Wood flooring by design is not to be used to strengthen/stiffen a subfloor and will not do so. If movement of the subfloor occurs prior to installation and is not corrected, that same movement will occur after installation is complete.

#### Part I – Minimum Jobsite Requirements

- A. Wood flooring should be one of the last jobs completed on the construction project. Limit foot traffic on finished wood flooring.
- B. Evaluate the jobsite for potential problems before installation begins, and before wood flooring is delivered to the jobsite.
- C. Unless a waiver or letter of protest listing exceptions exists, installation constitutes acceptance of subfloor/substrate, the jobsite itself – including the ambient temperature and relative humidity at the time of installation, and all impacting variables that may affect a wood floor.
  - 1. Surface drainage should direct water away from the building.
  - 2. Do not deliver wood flooring to the jobsite or install wood flooring until the building is enclosed.
  - 3. If heating and/or air-conditioning is in operating condition, it needs to be operating. If it is not possible for the permanent heating and/or air-conditioning system to be operating before, during and after installation, a temporary heating and/or dehumidification system that mimics normal temperature and humidity conditions can enable the installation to proceed until the permanent heating and/or air-conditioning system is operating.
  - 4. Do not deliver wood flooring to the jobsite or install wood flooring until appropriate temperature and humidity conditions have been achieved. Appropriate temperature and humidity conditions are defined as those conditions to be experienced in the building after occupancy.
  - 5. Do not deliver wood flooring to the jobsite or install wood flooring until all concrete, masonry, plastering, drywall, texturing and painting primer coats are completed.
  - 6. Basements and crawl spaces must be dry. If power washing is required in the basement, do so before wood flooring is installed and allow subfloor and basement to dry before installing wood flooring.
  - 7. Crawl space should be a minimum of 18" (457mm) from ground to underside of joists.
  - 8. Crawl space earth (or thin concrete slab) should be covered 100 percent by a vapor retarder of black polyethylene (minimum 6 mil) or any recommended puncture-resistant membrane, such as Class C, meeting ASTM D-1745. See Figure 1-1.

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### 9. Crawl Space Conditions

- a. Where a proper ground covering is in place and when venting is required by local building codes, the crawl space should have perimeter venting equal to a minimum of 1.5 square feet per 100 square feet of crawl space square footage, unless local building codes differ from this specification. Note: Local-building codes may differ. Follow local building codes.
  - b. For crawl spaces without ventilation openings, vapor retarder joints must overlap a minimum of 6 inches and be sealed or taped. The vapor retarder should also extend at least 6 inches up the stem wall and be attached and sealed to the stem wall. Continuously operated mechanical exhaust and perimeter wall insulation or conditioned air supply and insulation must be provided.
10. Note the grade level so that the correct type of flooring and system can be specified for the job. Engineered and floating floors can be appropriate for above-grade, on-grade and below-grade installations. Solid wood flooring can be appropriate for above-grade and on grade installations, but not for below grade installations. If the soil surrounding a structure is 3 inches or more 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.
11. Subfloors (wood or concrete) should be checked by an appropriate method for establishing moisture content. Average subfloor moisture content should be within the range as specified for the product by the product manufacturer. See Chapter 3, Moisture Testing.
- #### Grade Levels
- If the soil surrounding a structure is 3 inches or more 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.
12. Where the minimum jobsite conditions are present, the flooring can be delivered and stored in the rooms in which it will be installed. See Chapter 2, Acclimation.

### Part II - Additional Jobsite Conditions for Factory-Finished Flooring

- A. All finished wall coverings and painting should be completed. Note: Base and shoe mold may be installed and finished after the flooring installation.
- B. After installation, if you choose to protectively cover the floor, cover the floor completely, since some species are light-sensitive and uncovered areas may change color. However, covering a glue-down application may not allow some adhesives to properly cure. Follow the flooring and adhesive manufacturer's recommendations. Use a covering material with a vapor permeance (perm rating) of 1 perm or more (tested in accordance with ASTM E-96) to avoid trapping moisture/vapor on or within the floor. A common reinforced builder's paper is a good choice. Any covering should be taped, using a low-adhesion tape, to base or shoe moldings. Avoid taping to finished flooring. When taping paper or sheets together, tape them to each other, not to the floor.



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### CHAPTER 2

#### Acclimation and Conditioning of Wood Flooring

ALWAYS FOLLOW THE MANUFACTURERS' RECOMMENDATIONS REGARDING HOW AND WHETHER TO ACCLIMATE WOOD FLOORING.

##### Part I – General Acclimation/Conditioning Guidelines

###### A. Storage and Conditions

1. Do not store wood flooring at the jobsite under uncontrolled climate conditions. Garages and exterior patios, for example, are not acceptable areas to store wood flooring.
2. Ideal interior climate conditions vary from region to region and jobsite to jobsite. It is your responsibility to know what your “ideal” climate conditions are and build your floor around those conditions. For a general view of moisture-content averages by region, refer to Appendix D and Appendix E.

###### B. General

Note: Some manufacturers do not require acclimation for certain products prior to installation. If the manufacturer recommends that the wood flooring be acclimated before installation, proceed as follows:

1. Ensure that the building is enclosed.
2. Verify that the building is maintained at normal living conditions for temperature and humidity.
3. Where building codes allow, permanent heating and/or air-conditioning systems should be operating at least five days preceding installation to promote proper acclimation. For radiant heat see Appendix H.
4. If it is not possible for the permanent heating and/or air-conditioning system to be operating before, during and after installation, a temporary heating and/or dehumidification system that mimics normal temperature and humidity conditions can enable the installation to proceed until the permanent heating and/or air-conditioning system is operating.
5. Upon delivery, check wood flooring moisture content with a moisture meter to establish a baseline for required acclimation. Check the moisture content of multiple boards. A good representative sample is typically 40 boards for every 1,000 square feet of flooring. Acclimate to manufacturer's recommendations or as necessary according to geographical location and your jobsite location.
6. Prior to installation, ensure that wood flooring is within acceptable range of moisture content with the wood sub floor. For solid strip flooring (less than 3" wide), there should be no more than 4 percent moisture content difference between properly acclimated wood flooring and subflooring materials. For wide-width solid flooring (3" or wider), there should be no more than 2 percent difference in moisture content between properly acclimated wood flooring and subfloor materials.

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### CHAPTER 3 MOISTURE TESTING

#### Part I - Moisture Testing for Wood Subfloors

##### A. Testing Requirements

1. Test for moisture at several locations in the room for a minimum of 20 per 1,000 square feet and average the results. A high reading in one area indicates a problem that must be corrected. Pay special attention to exterior and plumbing walls.

#### Part II - Acceptable Vapor Retarders Over Wood Subfloors

- A. ALWAYS FOLLOW LOCAL CODES AND MANUFACTURERS INSTRUCTIONS FOR ACCEPTABLE VAPOR RETARDERS.
- B. An acceptable vapor retarder is a vapor resistant material, membrane or covering with a vapor permeance (perm rating) of greater than or equal to .7 and less than or equal to 50 when tested in accordance with ASTM E-96 Method A. Installation of a vapor retarder reduces the potential for moisture or vapor related problems, but does not guarantee elimination of moisture or vapor related problems. Install a vapor retarder over wood panel or board sub-floors prior to installing nail down solid strip or plank flooring. Over-lap seams a minimum of 4 inches or more as required by manufacturer or specifier and local building codes.
- C. Some examples of acceptable vapor retarders over wood subfloors include:
  1. An asphalt laminated paper meeting UU-B-790a, Grade B, Type I, Style 1a.
  2. Asphalt-saturated kraft paper or #15 or #30 felt paper meeting ASTM Standard D-4869 or UU-B-790, Grade D.
- D. NOTE:
  1. A vapor retarder has some extra benefits in that it eliminates wood-on-wood contact, wood strips slide more easily when positioned, minimizes the impact of seasonal humidity change and may reduce dust and noise levels.
  2. However, by today's standards asphalt saturated kraft or felt paper may not be an effective vapor retarder in all applications. The 2006 International Residential Code requires a vapor retarder on the warm-in-winter side of exterior floors (a floor over a vented crawl space, for example), with a vapor permeance of 1 perm or less in Zones 5 and higher.
  3. Over a wood subfloor, do not use an impermeable vapor retarder material with a perm rating of .7 or less, such as 6 mil polyethylene film or other polymer materials, as it may trap moisture on or in the wood subfloor.
  4. Do not use common red rosin or building paper which is not asphalt saturated. They are not vapor retarders as their perm rating is far greater than 50.

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### Part III - Moisture Testing for Concrete Slabs

NOTE: All tests give a result at the time the test is done and in general give you the ability to start or not start a job. These tests do not give a permanent condition of your substrate, merely a “at the time the test was performed” indication.

#### A. Testing Requirements

1. Before moisture testing begins, the concrete slab must be a MINIMUM of 30 days old.

#### B. Qualitative Moisture Tests

1. Electrical Impedance Test and Electrical Resistance Test (Moisture Meter)

Follow meter manufacturer’s instructions.

- a. Use moisture meters designed specifically for concrete moisture testing.
- b. Test within the body of the slab (electrical resistance), as well as at the surface (electrical impedance).
- c. These testing methods are not recognized by any standard and should not be used for accepting or rejecting a floor. These electronic tests are useful survey tools to broadly evaluate the relative moisture conditions of a slab and to select locations for quantitative moisture tests.
- d. If the moisture meters indicate the presence of excessive moisture, as per wood flooring or meter manufacturing recommendations, further testing is required using relative-humidity testing (ASTM F-2170), calcium chloride testing (ASTM F-1869) or calcium carbide (CM) testing (ASTM D-4944-04 and MilSpec CRD-C154-77).

#### 2. Phenolphthalein Test

- a. Perform one test per 200 square feet of surface area, with a minimum of two tests per jobsite.
- b. Chip a small section of concrete off the floor and apply 3 percent phenolphthalein in alcohol solution (available at most druggists) in the area. A red color indicates that moisture is present. Always chip the concrete as this protects against the possibility that a concrete sealer was applied.

IMPORTANT: Keep phenolphthalein out of direct sunlight. The average shelf life of phenolphthalein is six months.

- c. If the phenolphthalein test indicates the presence of excessive moisture, further testing is required using relative-humidity testing (ASTM F-2170), calcium chloride testing (ASTM F-1869) or calcium carbide (CM) testing (ASTM D-4944-04 and MilSpec CRD-C154-77).

#### C. Quantitative Moisture Tests

1. Relative Humidity Testing ASTM F-2170 (Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes)

- a. Select test locations to provide information about moisture distribution across the entire concrete floor slab. For slabs on grade and below grade, include a test location within three feet of each exterior wall.
- b. Perform three tests for the first 1,000 sq. ft. and one test for every additional 1,000 sq.ft. thereafter.
- c. At least 48 hours before test is placed, concrete floor slabs should be at the same temperature and humidity that is expected during service conditions.
- d. Use a rotary hammer-drill to drill holes in the concrete slab; 40% depth of slab is required for the holes when concrete is drying from one side and 20% when drying from both sides. Follow manufacturer’s instructions provided with test kits.

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- e. Allow 72 hours to achieve moisture equilibrium within the hole before making relative humidity measurements.
  - f. ASTM F-710 provides installation guidelines for acceptance of hardwood flooring using relative-humidity testing. Typical limits for wood and wood-based products are 75% relative humidity. When getting readings over 75%, you must use a proper vapor retarder, based on the flooring manufacturer's recommendations, or wait for further concrete curing.
2. Calcium Chloride Test ASTM F-1869 (Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub floor Using Anhydrous Calcium Chloride)
- a. Select test locations to provide information about moisture distribution across the entire concrete floor slab.
  - b. Perform three tests per 1,000 square feet of surface area. Add one additional test for each 1000 square feet thereafter.
  - c. At least 48 hours before test is placed, concrete floor slabs should be at the same temperature and humidity expected during service conditions
  - d. The actual test area shall be clean and free of all foreign substances. Use approved OSHA work practices for removal of all existing flooring materials and debris.
  - e. Blast or grind a minimum area of 20 inches by 20 inches and let stand for a minimum period of 24 hours prior to setting test.
  - f. Follow manufacturer's instructions for properly placing test onto concrete.
  - g. Tests are to be covered and left in place for 60-72 hours. Following manufacturer's instructions for labeling and recording time and date of test.
  - h. Send the test to a certified laboratory for results and documentation, or perform the measurements as per ASTM F-1869.
  - i. Always following the flooring manufacturer's guidelines and specifications to determine when the concrete slab is ready for installation.
  - j. ASTM F-710 provides installation guidelines for acceptance of hardwood flooring using calcium-chloride testing. Typical limits for direct glue-down wood flooring is 3lbs/1000sf/24hr. When getting readings over 3 lbs. and up to 7 lbs., you must use a vapor retarder. A reading over 7 lbs. may not be acceptable for wood flooring installation. Follow the wood flooring manufacturer's recommendations in the case of a glue-down installation, the adhesive manufacturer may also have recommendations. Be advised that Bona R851 Adhesive using standard G1250 trowel offers moisture protection up to 12 pounds and 85% RH. Bona clip-on trowel covers you to 18 pounds and 95% RH. NOTE: For information on the tests listed above, contact your distributor or call NWFA at 800-422-4556 U.S. or 800-848-8824 Canada for the source nearest you.
3. Calcium Carbide (CM) Test ASTM (modified) D-4944-04, MilSpec CRD-C154-77
- a. The calcium carbide test, also known as the CM test or calcium carbide bomb, is more widely used in Europe than in the United States. It is a gas-pressure test in which moisture in the concrete reacts with calcium carbide crystals to create acetylene gas, and the gas pressure produced is measured to provide a moisture content reading, expressed as a percentage of moisture. Follow the directions provided by the test-kit manufacturer. A reading of over 2.5% requires use of a vapor retarder. A reading over 4% may not be acceptable for wood flooring installation. Follow the wood flooring manufacturer's recommendations. In the case of a glue-down installation, the adhesive manufacturer may also have recommendations.

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### Part IV - Acceptable Vapor Retarders Over Concrete

- A. ALWAYS FOLLOW LOCAL CODES AND MANUFACTURERS INSTRUCTIONS FOR ACCEPTABLE VAPOR RETARDERS.
- B. Test concrete for moisture. For concrete slabs with a calcium chloride reading of greater than 3 lbs., a relative humidity reading of greater than 75%, or a calcium carbide (CM) rating of greater than 2.5%, install an impermeable vapor retarder with a perm rating of less than .15 perm. Adding a vapor retarder is not required on installations over slabs with a calcium chloride reading of 3 lbs. or less, a humidity reading of 75% or less, or a calcium carbide (CM) rating of 2.5% or less. However, in on-grade and below grade applications, adding a vapor retarder is always recommended.
- C. The 2006 International Residential Code defines a vapor retarder as a vapor-resistant material, membrane or covering such as foil, plastic sheeting or other material recommended by the manufacturer having a permeance rating of 1 perm or less, when tested in accordance with ASTM E-96 Method A.
- D. The NWFA recommends an "impermeable" vapor retarder with a perm rating of less than or equal to .15, thereby limiting the passage of moisture to near zero.
- E. Some acceptable vapor retarders over concrete include:
  - 1. A minimum 6 mil construction grade polyethylene film, with perm of .13, or other impermeable material with a perm of .15 or less is recommended. A premium polymer material meeting ASTM D-1745 for concrete with higher tensile, tear and puncture resistance is highly desirable.
  - 2. Double felt: Two layers of #15 asphalt saturated felt paper that meets ASTM Standard D-4869, with the first layer adhered to the slab in a skim coat of appropriate adhesive, and a second layer adhered to the first layer with appropriate adhesive.