Specification: Engineered End Grain
6/7/14

Installation instructions for Engineered End Grain:
White Oak, Cypress; Larch, Lauro Preto, Marblewood, Maple, Teak, Walnut, and Kaleidowood

Please read the entire specification before commencing with the installation.

CHECK HUMIDITY
With a reliable hygrometer, sling psychrometer, or electronic monitoring device, check the humidity in the space where the flooring is to be installed. Humidity should read between 35-50% assuming a 65°-75° temperature. If humidity is not normal, postpone installation until conditions are normal.

CONDITIONING
Do not install unless heating, air conditioning, and humidity controls are in full operation and room conditions are normal. Do not open cartons prior to installation. Store and acclimate unopened cartons inside the spaces where they are to be installed. The length of acclimation may be adjusted at the discretion of the installing contractor and is based upon the atmospheric conditions at the time of the year. In any event, the temperature of the room and the building must be uniformly maintained at not less than 65°F from delivery, through acclimation, as well as during and after installation. Inspect the boards in daylight prior to installation, for any visible faults or damage, and also check color and structure. No claims are accepted once flooring has been installed.

ACCLIMATION FOR ALL KASWELL INTERIOR WOOD FLOORING PRODUCTS
The purpose for acclimating wood block is to allow the moisture content of the wood to adjust to normal conditions; the temperature and humidity that will be typical once the facility is opened, and the permanent Heating, Ventilating and Air Conditioning (HVAC) system is up and running.

Before wood blocks are delivered, the jobsite must be checked to determine if it is ready. The structure should be fully enclosed, with doors and windows in place, and interior climate controls operational for at least 48 hours to stabilize the moisture conditions of the interior. Wood flooring should not be delivered until all wet-work is completed.
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Acclimation must include de-palletization or removal of all individual blocks (left image), strips (right image), or panels from cartons or boxes. Acclimation will be faster if the pile is low and more spread out. Acclimation will be slower if the pile is high and less spread out.

If conditions are not “normal”, acclimation may be harmful to the installation. For example, acclimation could dry the block too low if the humidity were too low. In so doing, you might install the block too dry during the heating season, and have problems during the more humid months.

If you know the Equilibrium Moisture Content (EMC) of wood in your region, the wood brought to a jobsite might already be at the proper moisture content, and acclimation for any length of time may not be necessary. The installer should have a clear understanding of the EMC in order to determine the length of acclimation. This requires knowing and recording the moisture content of the wood at the time of delivery, and what the expected moisture content will be.

At equilibrium, the moisture content of the wood neither gains nor loses water because it has reached equilibrium with the vapor pressure of the surrounding atmosphere. Changes in relative humidity and temperature of surrounding air cause both seasonal, long term, and daily short-term changes in the moisture content. Long-term changes are gradual as moisture slowly penetrates the wood, while short-term fluctuations influence only the wood surface. Protective coatings slow the changes in moisture content, but ultimately the wood will be in equilibrium.

**We always recommend at least 2 days of acclimation prior to installation.**
**We never deliver and install block flooring on the same day.**

We are often questioned about the humidity being too high or too low. Humidity maintained above 60-70% at normal residential temperatures can adversely affect wood components. Humidity sustained at or above this level can result in an EMC of 12% or more with associated expansion. Humidity maintained at or below 25-30% can adversely affect wood components and result in an EMC below 6%. This condition can cause greater than normal shrinkage with associated cracks. *(source: Wood Handbook U.S. Department of Agriculture, Forest Products Laboratory)*
ACCLIMATION (continued)
Ideal conditions for all wood flooring would be to acclimate and install at the average of the high end and the low end of the humidity spectrum, which we hope would be in the 35-50% range. We would be pleased to discuss with you length of acclimation for your particular installation.

CHECK CONCRETE SUB-FLOOR
The sub-flooring should be depressed corresponding to the depth of the plank specified. If cork or rubber underlayment is specified for added resiliency, allow for extra depth. A vapor barrier or reliable water resistant concrete sealer (i.e. Bostik’s MVP or Single Step, or an equivalent) should be used when moisture from below is of concern. New concrete slabs must be cured (at least 50 days) and dry. Below grade installations are not recommended. Be sure the concrete sub-floor is smooth and level. Tolerance should not exceed ¼" on a 10 ft. straight edge in any direction. Check floor level with straight metal strip on edge, double check edges and corners. Eliminate any washboard irregularity. All rough spots or gravel protruding must be ground smooth and low areas filled with leveling compound. If tolerance is not as specified, flooring contractor shall INSIST masonry contractor make necessary corrections. Concrete should be tested for moisture content, and be no greater than 3 lbs. per 1,000 sq. ft. We recommend a bond test before spreading mastic and installing blocks. A test should be made with your chosen adhesive and several of our blocks before beginning the installation. Check with us about your particular condition.

WOOD SUB-FLOOR
Engineered End Grain may be installed directly over wood or plywood sub-floors which are solid, level, and well ventilated below. There should not be any cupped area, or projecting nails. If Engineered End Grain is to be installed on an existing synthetic floor or raised computer floor system, ½" minimum plywood or hardboard underlayment should be added, glued, and screwed to the synthetic surface. NOTE: Use only screws or screw-type nails when constructing wooden sub-flooring.

EXPANSION VOID
Cork strips ½" to 1-½" wide should be used against all walls and columns, unless concealed by shoe moldings or other base. Place temporary wooden strips along the walls and columns equal to the width of the void to be created. After installing blocks flush to the strips, and at the end of the day remove the temporary strips, leaving a uniform void for expansion. In aisle ways and other narrow areas where wood meets carpet or other flooring, the expansion void can be omitted. Schluter strips should be used at block edges against carpet or other adjacent flooring materials.
APPLYING BLOCK FLOORING MASTIC
For older sub-floors, be sure the surface is clean and free from dirt, oil, or grease. Store all mastic/adhesive for 72 hours at room temperature. Use a 3/16" V notched trowel. If the coverage is less than 50 sq. ft. per gallon, change trowel angle or file down trowel to reduced depth. For all species we suggest Bostik’s Best Urethane or Mapei 980 adhesive. Adhesive open time up to 2-1/2 hours, but read mastic labels. Always use with adequate ventilation.

INSTALLATION
Engineered End Grain can be installed in any direction. However, board direction many times depends on the main source of light. We believe the boards should run parallel with the entering light for best appearance. However, the proportions of the room can also be emphasized by skilled selection of the direction in which the flooring is installed. In doorways and large areas over 33 feet in length and/or width, a cork expansion joint or other suitable material should be installed. Apply a molding or cover strip over the expansion joint. We can provide cork expansion joint ⅜" in height x any width up to 1". Insure that the boards are always laid lengthwise in narrow hallways.

For sound insulation and to smooth out slight irregularities of the sub-floor, use roll or sheet goods of ⅛" cork. Mylar foam underlayment can also be used below the flooring for a “floating” plank installation. Glue in place for a more permanent installation.

Start the installation in the right-hand corner of the room and fix the first flooring board in place with distance spacers from the wall ⅜" to ½". We suggest the groove side of the board be placed towards the wall, thus exposing the tongue as the laying is performed. Start every other row with a half of a strip or plank. Using hammer and tapping block, snug the newly installed planks hard over the exposed tongue. Measure the last board of the first row, and keep in mind to leave a gap of ⅜" to ½" between board ends and walls. Start the second row with the leftover piece of the first row, which will reduce cutting waste.

Join the subsequent boards together row by row, working from right to left. Snap the boards together at the long side using hammer and tapping block. Do not tap directly on the flooring edge. On completion, remove the distance spacers at all walls. Attach a base molding to the wall and not to the flooring, covering over the space created during installation. If no base is to be used, suggest filling void with pre-molded cork. Kaswell can supply all cork and mastic.

CAUTION: Since Engineered end grain has only a thin surface of end grain wood, there can be no voids left below the end grain surface. Therefore, when installing the plank up against another flooring surface, or up against schluter, you must cut off either the tongue or the groove, so that the end grain and ply bottom on which it sits fits tight against the adjacent flooring or schluter. If a void is left by installing the tongue side against schluter, you must first fill the void with 1/2 of a wooden slip tongue. **If a void is left after installation, the entire edge of the end grain surface will break away, requiring difficult repairs.** If there are any questions about this subject, please contact us before starting your installation.
If a custom color is desired, Engineered End Grain would be provided unfinished, factory sanded to 80-grit. Field finished sanding should begin with no less than 80-grit, but possibly 100-grit immediately after installation, using a drum or belt sander. After drum sanding, disc sand to 120-grit screen or finer. Vacuum clean and stain with the desired oil base stain, wiping all excess from the surface. We suggest the flooring be finished with an oil-based urethane. If water based urethane must be used, wait at least 4 days for the oil stain to dry before applying finish. Screen, tack clean, and apply additional coats as needed. Custom pre-finishing available only for Oak and Larch.

SANDING AND FILLING
No drum sanding. Disc sanding only. Disc sand with 100, 120, 150, and 180-grit screens. Vacuum clean. Fill cracks with a stain accepting patch compound to specified color or a mixture of the wood flour generated, and the finish to be used. **Be absolutely sure no liquids (i.e. paint, coffee, water, mud, etc.) touch the flooring at this point, and keep everyone out of the room until the surface is protected. If there is a time lag between sanding and finishing, resin spots might appear in some species. They will disappear once finished.

APPLY OIL FINISH
We recommend Woca Oil, or another VOC compliant oil finish. See WoodcareUSA.com for more information about Woca. After the flooring has been screened to 180-grit, apply the first coat of oil. The first application should be Woca Master Oil and is considered the primer coat. Its role is to act as a base for the subsequent oil applications. Choose your starting area and pour the oil into a paint tray. Spread the oil with a ¼” nap paint roller and extension pole. Roll the oil as if you are painting the floor. Continue to spread oil until finished. Do not buff the oil into the floor, as this forces too much oil into the floor and the oil will be too deep, which may cause later bleed back and prolonged drying. When finished, rest your roller in the paint tray or on cardboard. Coverage should approximate 130-170 sq. ft. per liter. It is best to let the primer coat dry and harden a minimum of 48 hours, but 24 hours is acceptable.

The second application is made with Woca High Solid (HS) Master Oil and is mixed with wood flour to fill and oil simultaneously. The Woca HS Master Oil is to be mixed with the sanding dust that you accumulated in the drum sander bag during the drum or disc sanding. This filler mixture can be forced into the voids with a sponge trowel or rags, then buffed clean with a towel to remove excess.

The third application of Woca HS Master Oil should be buffed into the floor with Kaswell green discs and 3M white pads until an even sheen has been obtained. Without the green discs you will not achieve optimum results. Coverage should approximate 300 sq. ft. per liter. Let this application dry and harden a minimum of 24 hours before commencing with the fourth application.
The fourth application is made with a Woca Master Oil with 3M white pads under the buffer, without green discs. We suggest removal of the small center hole of a 3M white pad, pour a capful of Woca Master Oil into the hole and buff and polish. Continue to spread and polish as you pass the buffer back and forth across the work area. The floor should appear silky, with an even look, with no oil spray or droplets visible. Pour more oil onto the floor as needed and continue polishing. Overlap work areas to ensure an even finish with no spray residue from previous passes. Repeat the process until the floor is finished. Coverage should approximate 1,250 sq. ft. per liter. The Master Oil will usually pre-harden in 4-6 hours. Allow the oil to cure 72 hours before placing rugs and furniture on the floor.

The fifth application (if needed) repeats the process of the fourth application (no green discs). After oil finish application(s) are complete, the surface can be top coated with Urethane.

If urethane is applied, no future oiling can ever be made unless stripping back with sanding machines.

**Woca Oils** are Volatile Organic Compound FREE. In 2007, new regulations were introduced in the European Union regarding VOC levels in coating materials. All Woca products fulfill these regulations. We feel that this is an important step in the protection of our working and living environment. Woca VOC free oils have the following features:

- Positive influence on the working area and living environment. Improvement of product characteristics and application methods. No effect on indoor-air quality.
- Woca products are certified by independent laboratories, the German Institute for Biological Building Materials, and are in accordance with DIN-Norm 53-160. Woca WoodCare Denmark products meet or exceed the most stringent US standards for volatile organic compounds.

**Woca Leed Rating** Woca is a plant-based non-emitting finish, which complies with South Coast Air Quality Management standards and always qualifies for the following LEED credits.

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<th>Environmental Feature</th>
<th>Leed Credit</th>
<th>Lead Points</th>
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<tr>
<td>Low-Emitting Adhesives and Sealants</td>
<td>Indoor Environmental Quality (EQ) Cr. 4.2</td>
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**Avoid spontaneous combustion** Water-soak all oily cloths after use and place outside of buildings and away from combustible materials.
APPLY URETHANE FINISH
Apply one or more applications of urethane finish, solvent-based or water-based. Solvent-based urethanes are preferable, but water base urethanes can also be applied. Check with the chosen manufacturer for more details. Apply thin coats until the surface is uniformly sealed. We recommend Bona Woodline Satin solvent-based, or Bona Traffic finish. See bonakemi.com.

NOTE: There are many excellent finishes for wood flooring. The choice is many times made according to the experience of the workmen, but in all cases the finishes should be a commercial or industrial brand. Coverage rates on finishes will vary depending on the wood specie. We suggest checking with us before purchasing your chosen finish.

SHRINKAGE OF WOOD BLOCK FLOORING
There is no official “standard” for determining contraction tolerances for wood block flooring installations. Kaswell Flooring Systems has established a standard of 3% as the amount of contraction that could be expected for most wood block installations, and should be considered normal. To determine percentage shrinkage, measure all voids, add them, and take them as a percentage of the flooring, 10 feet in two directions. If our block flooring is properly installed, shrinkage after installation should appear uniformly, and can provide a natural space for future expansion. Only re-filling and re-sealing should restore the flooring to a like new condition.

If there are any questions or concerns, please do not hesitate to contact us before or during installation and finishing. Call or e-mail for technical support. Kaswell Flooring Systems cannot be responsible for results of installations made by others.

We reserve the right to change specifications without notice.
CARE & MAINTENANCE FOR YOUR WOOD BLOCK FLOOR

To protect your investment, and to ensure that your KASWELL FLOORING SYSTEM maintains its beauty with years of lasting service, we offer the following recommendations for care and maintenance.

For Oil Finished Flooring: Lightly clean with Woca Commercial Oil Cleaner. Re-oil by spray, towel off immediately, and buff with standard buffer with soft pads. We can supply 3M pads if needed. Keep the flooring free from dirt and abrasive particles by daily sweeping or vacuuming. Use a treated flat mop or regular dust mop. Soft buffing at will. The resins in the oil will become harder over time, which will densify the wood. Wax can be added for higher gloss. Woca videos are available on request.

For Urethane Finished Flooring: Keep the surface free from dirt and abrasive particles by daily sweeping, using a treated flat mop or regular dust mop. Under no circumstances should water be permitted to remain on the flooring more than 10 minutes, either from spills or from washing. Routine cleaning is best accomplished with a damp mop. Be sure no puddles are created or left on the surface. Soft steel wool buffing and waxing can be added. However, if waxes are used, they will make future re-coating with urethane more difficult. An acrylic “after market” product can be used to “dress up” the surface. To refinish with the same urethane used originally will first require screening by rotary disc type sanding machine. Tack-rag dust and recoat.

Annual maintenance
For Woca oil finishes, see WoodcareUSA.com. For other oil finishes after thorough cleaning, apply finishing oil lightly again, being sure penetration is 100%. Buff as usual. Disregard oiling if it does not penetrate. As the oils age, they will harden, and dry buffing will increase luster. Urethanes will require screening before re-application. Check with the chosen manufacturer for maintenance products.

AT A GLANCE, KASWELL’S TOP 10 MAINTENANCE STEPS:

1. Maintain proper humidity conditions, ideally in the 35-50% range.
2. Vacuum or sweep daily to remove sand and grit.
3. Apply carpet or felt protection to chair legs.
4. Wipe spills promptly.
5. Use walk off mats at entrance doors.
6. Reapply finish at the appropriate time.
8. Avoid using wax or oil soap products.
9. Use only maintenance products furnished and recommended by the finish manufacturer.
10. Call or e-mail Kaswell regarding your flooring.
KASWELL LIMITED WARRANTY

Seller warrants for a period of two years from date of delivery that Kaswell flooring is free from defects, which makes the flooring not fit for use for which they are normally intended. Seller’s only obligation during this warranty period is, at its sole option, to either repair, replace, refund or credit the purchase price of the flooring, or part thereof, found to be so defective. At the conclusion of this warranty period, Seller shall be under no further obligation whatsoever. This warranty is void in the event of negligence, abuse, abnormal usage, misuse, accidents, improper installation, improper maintenance, or any circumstances or conduct beyond the control of the Seller, most particularly job-site conditions. Seller is not liable for consequential damages arising out of or in connection with the sale or use of the blocks, including, but not limited to, all labor and/or material charges or loss of income or profit relating to the goods in any way whatsoever.

Conditions of Sale

All pricing is per sq. ft. or surface measure with no milling or cutting waste figured. All orders are subject to availability of stock for prompt delivery. Special orders are non-cancelable and non-refundable. A 15% restocking and handling charge is applicable on all authorized returns.