



Engineered Installation Guide



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CARE, PREVENTION & PREPARATION

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

Chart taken from Wood Handbook; Wood as an Engineering Material, (Agriculture Handbook 72), Forest Products Laboratory, U.S. Department of Agriculture.

Humidity

As wood is a natural fiber, changes in the level of relative humidity in the home, will cause it to shrink or expand. Shrinkage and expansion is normal and will not harm your floor as long as the humidity level is kept at a normalized level (between 35% and 55%). **This can be easily accomplished through the use of an appropriate ventilation, humidification and dehumidification system.**

Appalachian engineered flooring may be installed on grade, above grade as well as below grade where conditions meet requirements as outlined in this guide and in the Appalachian Flooring "Warranty".

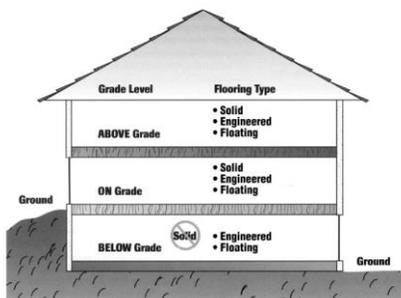


Figure 1 from NWFA Installation guidelines

Water and humidity

Material should be unloaded in dry weather, never in rain, sleet or snow. Engineered flooring should be stored in a Climate-controlled and well ventilated building. Ensure that the relative humidity is within the warranty range of 35-55% and the temperature between 60-80 F (16-27 C) for 14 days prior to installation, as well as during and after installation.

Crawl spaces and basements

Basements and crawl spaces must be dry. Crawl space should be a minimum of 18" (457mm) from ground to underside of joists.

Crawl space earth (or thin concrete slab) should be covered 100 percent by a vapour retarder of black

polyethylene (minimum 6 mil) or equivalent Class C puncture-resistant membrane, meeting ASTM D-1745.

If in or above a basement, please ensure that the basement slab is fully cured and the relative humidity does not exceed 60%.

Sunlight

The color of your hardwood floor will mature with time and exposure to sunlight and this will cause it to change color. Any area rug will block out light and should therefore be shifted on a regular basis to keep the color of your floor more uniform.

Liquids and spills

All liquids and spills should be wiped off as soon as possible in order to prevent any possible damage. You may consider using area rugs to protect susceptible areas (around kitchen sink, at exterior entrances etc.).

Do not wet mop your floor or use a steam cleaner. Water can harm or warp your floor.

Protection

Abrasive dirt such as sand, street dirt and cat litter can damage any hardwood floor regardless of the strength of the finish. However you can help protect your floor by using entrance mats and area rugs in high-risk zones such as at entrances and doorways. Regular cleaning or vacuuming of these rugs will prevent accumulation of dirt and thus keep it off your floor. The same logic applies to furniture. Not only should felt pads be placed under the legs of the furniture standing on your floor but the felt pads should be cleaned regularly in order to reduce the risk of damaging your floor. High heels with narrow points should also be avoided on your floor. The tremendous pressure exerted by the tip can dent and scratch the surface.

Care and Cleaning

[Please read the full guide on the website](#)

Your pre-finished Appalachian Floor is easy to clean and maintain. We recommend that you regularly sweep, dry-mop and vacuum your floor to avoid the accumulation of grit and dust on the surface. Appalachian Flooring multi-surface cleaner is the only recommended cleaner for use on our floors.

Using general household cleaners on your pre-finished floor may have a negative impact on the look and strength of your floor's finish and void the manufacturer's warranty. **Do not use wax, oil based detergents or other household cleaners as they may dull or damage finish and leave a greasy film that makes the floor slippery.** If you have any additional questions about the use of certain products or the general care and maintenance procedures applicable for hardwood floors do not hesitate to ask us.

Prior to Installation

- Inspect all door casings and wall moldings. Where necessary, use a jamb saw laid on an upside down piece of flooring to cut the door casings to allow the wood flooring to slide beneath them.
- Use a utility knife to scribe along the top edge of the base moldings before removing to prevent tearing paint or drywall.
- Remove all existing base molding.
- Remove the waste material and sweep away all debris.
- Plan the layout for the best visual appearance of the finished wood floor.
- Basements and crawls spaces must be well ventilated. Crawl space should have 1.5% of open venting per 1,000 s/f (92.90 sq. meters) of floor area. Vents must be properly located to foster cross ventilation.
- Direct Drainage away from Building
- Insulate overheating and un-insulated heat ducts to prevent hot spots.
- Rack out and acclimate engineered flooring for 48 hours prior to installation.
- Never rip-off box ends.
- Ensure that customer approves the color and layout before installation begins.
- If installing on a subfloor over joists, verify joist orientation prior to beginning. Flooring should be laid perpendicular to the floor joists for greater stability.
- Our installation instructions take precedence over NWFA installation guidelines. However in situations not specifically covered by our installation guide NWFA guidelines are recommended.

TOOLS AND MATERIALS

	GLUE DOWN	FLOAT	NAIL OR STAPLE	
	X	X		Flooring straps
	X	X	X	Hammer or rubber mallet
	X	X	X	Measuring tape
	X	X	X	Utility knife
	X	X	X	Tapping block
	X	X	X	Chalk line
	X	X	X	Straight edge
	X	X	X	Carpenter square
	X	X	X	Pencil
	X	X	X	Moisture meter
	X	X	X	Pry bar
		X		Pull bar
			X	Drill
	X	X	X	Hand saw, table saw, circular saw or band saw
	As needed	As needed	As needed	Jamb saw
			As needed	Air compressor and hose
			See below	Recommended flooring stapler/nailer
	X	X		Flooring Straps
	As needed			100-150 lb (45-69kg) roller
	X			Scraper
	As needed	As needed		Leveling compound
	As needed	As needed		Leveling bar
	X	X	X	Level
				2" Concrete nails and 1"x 3" x 8" lathe for first row holding back
	X	X	X	Wood filler
	X			3m blue tape
	See below			Recommended adhesives
	See below			Recommended trowel
		See below		Premium wood glue (PVA carpenters glue)
			X	1/4" - 1 1/2 fasteners
	As needed	As needed	As needed	Moldings, reducers, stairnosings
	X			#20 grit sandpaper
			X	6-d finish nails or pneumatic finish nailer and pneumatic finish nailer 1 1/4" - 1 1/2 fasteners
	As needed	X		Acoustic underlayment pad
		As needed	X	Vapor retarder / barrier
	X	X	X	Broom or Vacuum
	X	X	X	Appalachian Multi-surface floor cleaner
	X	X	X	Towel for cleaning tools
	X	X		Bostik Ultimate adhesive cleaner
	X	X	X	Safety glasses
	X	X	X	Dust mask

SUBFLOOR PREPARATION

Wood Subfloor

1. Ensure that all heating and ventilation ducts are insulated properly.
2. It is the builder's or general contractor's responsibility to provide the wood-flooring contractor with a subfloor that conforms to the necessary standards. Inspect the subfloor carefully. If there are movements or squeaks in the subfloor, refasten the subfloor to the joists in problem areas.
3. The floor must be level. Level is within 3/16" in 10' (5mm in 3m) and/or 1/8" in 6' (3mm in 2m)
4. Ensure that no creaking, loose edges, sags etc. exist. Repair them as Necessary before starting installation.
5. Sand subfloor joints to ensure floor is level
6. The panels can be laid on the diagonal or perpendicular with the joists, with an expansion space of 1/8" between panels. If the subfloor panels are not tongue-and-grooved and if there is not sufficient expansion space, use a circular saw to create the specified space. Do not saw through joints on T&G subfloors
7. Fasten panels down at least every 6" to form a minimum grid pattern. Walk across the floor to check for squeaks and add additional screw if necessary.
8. Ensure that there are no protruding fasteners
9. OSB must be APA rated and maintained in a controlled environment However OSB is not warranted for squeaky floors.
10. Wood subfloors should not exceed 12% and there should result in less than a 4% humidity difference between the flooring and the wood sub flooring material. If the subfloor has excessive moisture content, postpone installation find the moisture source and correct by raising the heat and increasing ventilation until proper conditions are met and apply a suitable moisture retardant or use an underlayment that also acts as a vapor retardant. It is important that the subfloor moisture is correct or the flooring is at risk for cupping. Cupping is not a manufacturing defect.
11. Make sure the subfloor is free of debris before beginning installation.

On truss/joist spacing of		MINIMUM REQUIREMENT
16" (406mm) o/c or less	4' x 8' sheets glued and mechanically fastened.	<ol style="list-style-type: none"> 1. nominal 5/8" (19/32", 15.1mm) CD exposure 1 plywood subfloor panels 2. nominal 3/4" (23/32", 18.3mm) OSB exposure 1 subfloor panels
more than 16", up to 19.2" (488mm) o/c	4' x 8' sheets glued and mechanically fastened.	<ol style="list-style-type: none"> 1. nominal 3/4" (23/32", 18.3mm) T&G CD exposure 1 plywood subfloor panels 2. nominal 3/4" (23/32", 18.3mm) OSB exposure 1 subfloor panels

More than 19.2" (488mm) o/c up to a maximum of 24" (610mm).	4' X 8' sheets, glued and mechanically fastened	<ol style="list-style-type: none"> 1. nominal 7/8" T&G CD exposure 1 Plywood subfloor panels 2. nominal 1" OSB Exposure 1 subfloor panels, 3. For double-layer subfloors, or two layers of subflooring. Or brace between truss/joists in accordance with the truss/joist a the first layer should consist of nominal 3/4" (23/32", 18.3mm) CD Exposure 1 Plywood subfloor panels (CDX) or a nominal 3/4" (23/32", 18.3mm) OSB Exposure 1 subfloor panels, The second layer should consist of nominal 1/2" (15/32", 11.9mm) CD EXPOSURE 1 plywood subfloor panels, The 1/2" plywood should be offset by 1/2 panel in each direction to the existing subflooring. The panels may also be laid on a diagonal or perpendicular, with 1/8" spacing between sheets.
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Installing over an existing floor

Vinyl sheet and VCT Tile

Make sure that all tiles or sheets are firmly secure. When gluing to vinyl abrade surface for greater adhesion. If applicable follow appropriate asbestos abatement regulations. Do not glue down on heavily cushioned or rubber tile.

Ceramic Tile

Make sure all tiles are bonded to the subfloor. If necessary repair tile to ensure that sufficient adhesion is present. Allow the repair to dry before applying adhesion. Roughen the surface with a terrazzo grinder or open 40 grit sandpaper. Clean dust created by sanding.

Concrete

Moisture

Before testing a Concrete slab for moisture it should be cured for a minimum of 30 days and 60 days is preferable. Moisture testing must be done and results recorded prior to flooring installation.

1. CALCIUM CHLORIDE TEST * One test per 1,000 s/f for 24 hours. Minimum two tests per jobsite. Always follow test manufacturer recommendations. Instructions per Test Kit: The surface where the test patch is to be placed must be brushed clean to remove any waxes, surface sealers, dust, dirt, oils or other surface contaminant's. At the time the test is conducted, the temperature of the floor and the surrounding area should be at least 65 degrees Fahrenheit. Leaving no gaps, apply the sealant tape completely around the perimeter of the plastic cover. Remove the lid from the plastic dish containing the calcium chloride and, being careful not to spill any of the calcium chloride, place the dish on the floor (remember to save the tape to reseal the lid to the cylindrical dish after the test is concluded). Immediately place the plastic

cover over the calcium chloride dish and press the cover firmly to the floor making certain that the sealant gives an airtight seal around the plastic cover. Leave the test undisturbed for the time prescribed in the test kit instructions. Note the date and exact time the test was started on the dish label. At the end of the prescribed time, remove the cover and reseal the lid to the dish again being sure that none of the calcium chloride is spilled. Note the date and exact time the test was concluded on the label. The test is then sent to a laboratory and documentation will be returned, (See manufacturers instructions on Calcium Chloride kits). Or you can purchase a scale and do the measurements in house. Calcium Chloride kits are generally available through your distributor

RESULTS INDICATES

0-3 lb dry
3-7 lb moisture barrier required
7+ lb too wet

2. RH probe such as the Wagner Rapid RH. Please follow all manufacturer instructions.

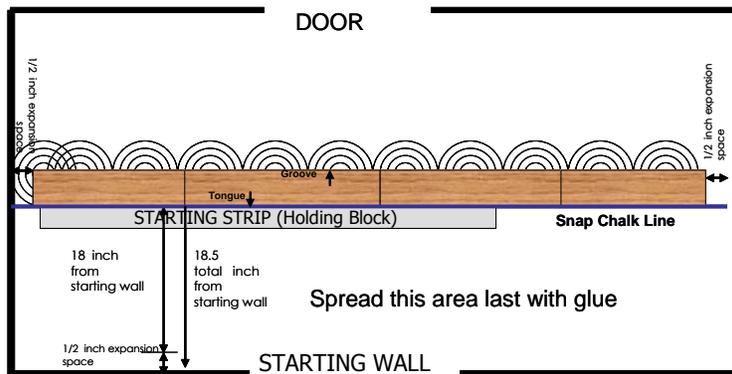
Debris- Cleanliness

1. Concrete must be free of contamination from materials such as paint, oil, wax, grease curing compounds etc. as these can result in unsatisfactory bonding of the adhesive.
2. To remove the contaminants ensure that a solvent bases stripper is not used as this will effect the bond of the adhesive
3. Loose flaky concrete to be sanded with open 20 grit sandpaper
4. Prior to installation sweep or vacuum

Level

1. The floor must be level. Level is within 3/16" in 10` (5mm in 3m) and/or 1/8" in 6" (3mm in 2m)
2. For high spots occur must be grinded level
3. For low spots they need to be filled with Portland based leveling compound PSI 3000+
4. Concrete sub floors must be smooth and free of structural defects
5. Do not install over concrete that has a compressive strength less than 2500 psi

GLUE DOWN APPLICATION



Recommended Adhesives

Bostik Greenforce www.bostik.com
Mapei Ultrabond 980 www.mapei.com
Sika Bond T-55 www.sika.com

BE AWARE OF FLASH AND OPEN TIME FOR THE ADHESIVE.

Flash time is the waiting time between application of the adhesive and the installation of the wood floor. Open time is the maximum amount of time recommended for the adhesive to be exposed to the air before the installation of the wood. Open time typically range from 75 to 180 minutes depending on the substrate and conditions.

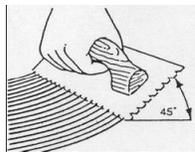
IT IS IMPORTANT TO CLEAN GLUE ON THE FLOORING PROMPTLY! Bostik Ultimate adhesive cleaner or Sika Hand Cleaner/Wipes are a good item to have on site to clean up adhesive.

Flooring straps may be necessary to assemble and hold rows together during installation.

STEP ONE STARTING LINE

1. The floor must be level. Level is within 3/16" in 10' (5mm in 3m) and/or 1/8" in 6" (3mm in 2m)
2. Insure that the shear strength of the glue does not exceed the strength of the adhesive. Light weight concrete (less than 3000 psi) will not be strong enough for a glue down application only for a floating application.
3. Place a mark approximately 18" from the corners of the starting walls add the width of flooring + 1/2" to allow for expansion and the tongue. Strike a chalk line through these two points the length of the room to the end lines
4. Measure the distance between the starting line and the wall the full length of the starting wall. If the wall is badly out of line (crooked) it may be necessary to rip boards to follow the irregularity in the wall.
5. Using no adhesive install a strip on the inside edge (closest to the wall) of the chalk line. This row may be of any straight wood material. Make certain each of the strip is in **perfect alignment** with the starting line. When satisfied, attach the board to the sub-floor using finish nails or concrete nails. This strip row is to minimize movement of the flooring during installation and will be removed once the floor is complete

STEP TWO SPREAD THE ADHESIVE



Read the label on the adhesive container. Using the trowel recommended by the adhesive supplier spread an area that can be covered with wood within the starting time of the adhesive (as noted on pail), An average spread is an area 14-25" deep and the length of the room. For Optimum adhesive application work trowel in circular

motion at 45 degree angle.

STEP THREE INSTALL THE STRIP

1. Install the first board making certain that the Tongue side is tight against the strip.

2. Insert the end of the next board into the adjoining tongue or groove and force the board tightly against the sacrificial board and the end of the adjoining first board. After three or more boards have been installed in the first row installation of the second row can began

3. Select a board for the second row that will allow at least 6" of difference between it and the length of the board in the first row. Continue installing in this manner until three or more boards have been installed. Continue adding rows, extending each as necessary until all the entire adhesive has been covered.
4. Avoid close alignment of joints in all rows throughout the installation, always attempting to get the maximum spacing available with a minimum of 6". Avoid alignment of joints in opposite rows, which may create an "H" pattern in the floor.
5. Once the first section has been completed inspect it closely, tightening all end and side gaps as necessary.
6. Clean all adhesive from the surface immediately. DO NOT wait to clean the surface until completion of the job, as the adhesive may not be removable.
7. If necessary use blue painter's tape to hold the joints tightly together until the adhesive cures if necessary. DO NOT use masking tape.
8. Measure the final row. Rip the boards (parallel cut) to fit the final wall allowing for 1/2" expansion. Use blue painter's tape to hold the final row in place.
9. Remove the strip row being careful to not damage the adjoining boards. Apply adhesive to the back of each board and gently press in place. Pull the boards tightly to the previously installed row and hold in place with blue painter's tape.

STEP FOUR COMPLETION

1. Remove all tape from the floor starting from the area in which the wood was first applied. Inspect for gaps, chips and adhesive residue while removing the tape. Remove all adhesive residues, touch up chipped areas and fill with the appropriate filler as necessary. Use colored latex filler for factory finished flooring.
2. Install/reinstall all moldings
3. Vacuum floor thoroughly.
4. Use appropriate hardwood floor cleaner. **NEVER WET MOP OR SPRAY CLEANER DIRECTLY ON FLOOR**
5. If required by the adhesive manufacturer, roll the floor with the appropriate weight roller. First use of the floor varies from one adhesive manufacturer to another. Generally the floor can have light foot traffic after the adhesive has cured for 18-24 hours with furniture being LIFTED into place after 24 hours. Save a few boards in case board replacements are necessary.

FLOATING INSTALLATION

Recommended Adhesive for Floating

Franklin Tongue and Groove adhesive
(cross linking polyaliphactic emulsion glue)
www.titebond.com

Roberts 1406 Tongue and Groove adhesive
PVA Adhesive
www.robertsconsolidated.com

7" Products cannot be floated
Flooring straps may be necessary to assemble and hold rows together during installation.

STEP ONE UNDERLAYMENT

1. The floor must be level. Level is within 3/16" in 10' (5mm in 3m) and/or 1/8" in 6" (3mm in 2m)
2. If the sub-floor is concrete install a 6-mil poly vapor barrier. All joints should be lapped 6" and taped with a moisture resistant tape. DO NOT install this vapor barrier over wood sub-floors.
3. Install the underlayment parallel to the starting wall and in the same direction that the Flooring will be installed. Do not overlap joints. Underlayment should be cut flush with the walls. Tape all joints using a water resistant tape such as packing tape or duct tape; allow no wrinkles. Tape the starting row to the floor to prevent movement

STEP 2 WORKING LINE

1. Place a mark approximately 18" from the corners of the starting walls add the width of flooring + 1/2" to allow for expansion and the tongue. Strike a chalk line through these two points the length of the room to the end walls on top of the underlayment. This line is the STARTING LINE.
2. Measure the distance between the starting line and the wall the full length of the starting wall. If the wall is badly out of line (crooked) it may be necessary to rip boards to follow the irregularity in the wall. Option: Using no adhesive install a **strip** on the inside edge (closest to the wall) of the chalk line. This row may be of any straight wood material. Make certain each of the Strips is in **perfect alignment** with the starting line using wedges to hold the flooring in place on the ENDS.

STEP 3 INSTALLATION OF BOARDS

1. Select the longest boards available. Lay the boards out the length of the room. Make certain that the last and final board in the row will be at least 12" in length. The last UN-CUT board must allow at least 12" between the board end and the wall. If the board in the row will need to be cut less than 12" in length to complete the row adjust the board selection accordingly.
2. Begin installation from the RIGHT corner with the tongue facing you and the long GROOVE facing the starting wall or **strip** row. The short end GROOVE should be facing the end wall. Align the first board with the STARTING LINE.
3. Select the second board. Place a 1/8" continuous bead



of glue in the *inside bottom edge* of the END groove. DO NOT apply glue to the long side groove at this time Carefully interlock the

joint with the first board always maintaining alignment with the STARTING LINE. **Remove any excess glue from the surface with a towel dampened in warm soapy water.** Use **3m blue tape** (not masking tape) to temporarily hold the end joints together.

4. Use wedges or waste material in the expansion gap on the side and end walls (ends only if sacrificial board was used) to maintain alignment with the STARTING LINE. Continue installing in this manner until the first row is complete.
5. Measure and cut to length the final board in the row allowing 1/2" expansion between the end of the board and the end wall. Select a longer board for this cut, as the material left over will be used as a starter board later. Apply glue in the groove and install. Set the waste end aside for later use.
6. Select a new set of materials. If the cut-off waste from the first row was 18" or longer it can be used as the first board in the row. Maintain 6" spacing between the end joints of all rows.
7. Place a continuous bead of glue along the **inside bottom edge** of the END groove and the same location on the side groove. Carefully align the tongue and grooves together and tighten the plank until all joints are snug. Remove any excess glue as before and temporarily hold the joints together using blue tape. Cut and install the final board in the row
8. Continue in this manner until the first four rows are completed. This four-row area is the base for the balance of the floor installation. Perfect alignment is essential, as any variance will worsen as the flooring proceeds further into the room. Carefully inspect for proper alignment before the glue sets. Adjust as necessary.
9. Continue with the installation as above. Continue using tape to hold the joints together and wedges to hold the end joints in place. DO NOT walk on the finished floor during installation, as this will break the uncured glue joint. **DO NOT roll the floor for the same reason.**
10. Finish the final row by cutting the boards to fit, always allowing 1/2" expansion space.
11. If a Starting strip was used remove it and replace with a row of materials that is properly edge glued as above.

STEP 4 COMPLETING THE JOB

1. Remove all tape from the floor starting from the area in which the wood was first applied. Inspect for gaps, chips and glue residue while removing the tape. Remove all glue residue, touch up chipped areas and fill with the appropriate filler as necessary. Use colored latex filler.
2. Install/reinstall all moldings and clean the floor with the appropriate cleaner
3. First use of the floor varies from one glue manufacturer to another. Generally the floor can have light foot traffic after the glue has cured for 8-24 hours with furniture being LIFTED into place after 24 hours. **NOTE: Avoid walking on the floor during installation as traffic may loosen or break glue joints.**

STAPLE/NAIL INSTALLATION

NOTES

1. Do not cut short boards to finish a row. The leftover materials will be used for future starter boards. Short lengths cannot be used and will become waste.
2. Ensure that staple plate is clean and free from nicks.
3. Follow the maintenance guide provided by your stapler/nailer manufacture
4. When stapler/nailer not being used never place directly on the hardwood floor
5. Check air pressure: different subfloors and engineered flooring require different pressures.

7" engineered notes

6. 7" wide products must be glue assisted if nailed or stapled down
7. A bead of polyurethane adhesive should be applied in a 2" serpentine pattern to the back of the boards and adhered directly to the subfloor.
8. 7" wide products cannot be floated.

INSTALLATION ON SCREEDS

1. Check slab for flatness, fill low areas and grind down high areas
2. Use flat, dry, pressure-treated screeds 2" x 4" (5cm x 10cm). Leave 3/4" inch space between walls and screeds
4. With treated screeds, stainless steel fasteners are required
5. Use nominal 3/4" (23/32 18.3mm) exposure 1, or 5/8" (19/32" 15.1mm) exposure 1 CDZ plywood or nominal 3/4" (23/32 18.3mm) OSB underlayment spaced and oriented perpendicular to screed direction.
6. Lay plywood on top of the screeds and place vapour barrier on top of the plywood.

TOOLS AND ACCESSORIES

Check stapler /nailer prior to starting installation as the installer will be responsible for damage caused by nailer/stapler and never place nailer directly on the hardwood as it may dent or scratch the flooring. Check the plate on the nailer before and during installation to avoid scratches. Ensure that the base sits flat on the floor and the top of the tongue. Check the base plate condition and verify proper hose and air compressor for the model is used. When using a pneumatic gun set and check air pressure regularly ensuring the nail/staple enters at a 45 degree angle and that the nail or staple is flush with the flooring as if not properly set it can cause dimples if pressure is too low in flooring or break the tongue if pressure is to high.

Do not use a another piece of wood to tap wood into place as it can cause damage to the finish, use a rubber tapping block

measuring tape	flooring nails	rubber mallet
square	finishing nails	mitre saw
chalk line	touch up pencil	handsaw
hammer	shank nails	vacuum cleaner
nail punch	broom	stapler
protective eyewear	Rubber tapping block	brad nailer (optional)
pry-bar (small and large)	manual or air-driven hardwood hammer	electric drill with a 3/32" (2 mm) bit

FASTENER SCHEDULE

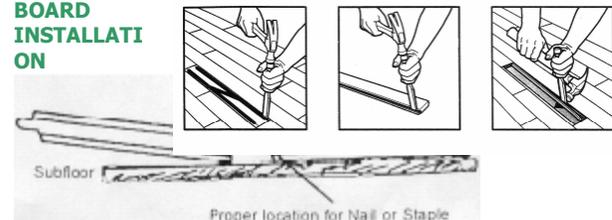
8 inch centers with a max of 3" from the end of every board

WOOD FLOORING TYPE	FASTENER TO BE USED	FASTENER SPACING
3/4" thick less than 3" width	1 1/2" -2" fastener	blind fastener spacing along lengths of the strips, minimum two fasteners per piece neat the ends (1-3") in addition, every 8-10" apart for blind nailing, 10-12" for face nailing
3/4" thick more than 3" width	1 1/2" -2" fastener	blind fastener spacing along lengths of the strips, minimum two fasteners per piece neat the ends (1-3") in addition, every 6-8" apart for blind nailing, 10-12" for face nailing

STEP ONE STARTING MARK

1. The floor must be level. Level is within 3/16" in 10' (5mm in 3m) and/or 1/8" in 6" (3mm in 2m)
2. Install the first board making certain that the **Tongue** side aligns with the **Starting Mark** with the **groove** facing the **wall. IT IS VERY IMPORTANT TO START STRAIGHT AND SQUARE**
3. Using 6d finish nails and a pneumatic finish nailer, nail the first board every 6-8" approximately 1/2" from the groove edge parallel to the starting wall. Nail the edge not the ends. **Maintain 1/2" expansion space at all times.** Ensure that nail head are close to the wall so they are hidden by the baseboards and quarter round.
4. "Blind" nail every 3-4" within the tongue side nail pocket at a 45° angle. Use 1 1/4" - 1 1/2" fasteners, minimum 2 per piece and within 2" of each end.

STEP TWO BOARD INSTALLATION



1. Insert the end of the next board into the adjoining tongue or groove and force the butt ends tightly

- together. Fasten as above until all boards in the row are complete.
2. Cut to length a board that fits at the end of each row always allowing for 5/8" **expansion space at the wall.**
 3. Continue adding rows in this manner, blind nailing the tongue side only until enough rows have been installed to make room for the "blind" fastening machine. Avoid close alignment of joints in all rows throughout the installation, always attempting to get the maximum spacing available with a minimum of 6". Avoid alignment of joints in opposite rows, which may create an "H" pattern in the floor.
 4. Working from several cartons "rack" an area of the floor by loosely laying materials side by side in a pleasing pattern avoiding close joints.
 5. Install the area using cut pieces from the end as starter boards for the next rows to reduce waste. Continue in this manner until the entire floor that can be installed with the "blind" nailing machine is complete.
 6. Using 6d finish nails or a pneumatic finish nailer blind nail and face nail the final rows. A recommended urethane adhesive can also be used to install the final rows.
 7. Measure the final row. Rip the boards (parallel cut) to fit the final wall allowing for 1/2" expansion.

STEP 3 COMPLETING THE JOB

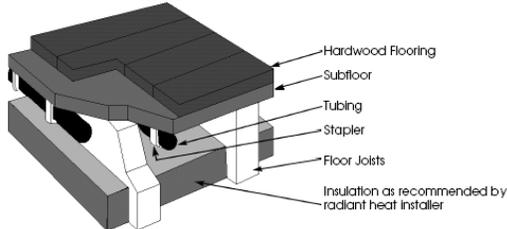
1. Inspect for gaps, chips and adhesive residue while removing the tape. Touch up chipped areas and fill with the appropriate filler as necessary. Use colored latex filler
2. Install/reinstall all moldings and clean the floor with the appropriate cleaner. Use only a cleaner designated specifically for prefinished floors.

RADIANT HEATED SUBFLOORS

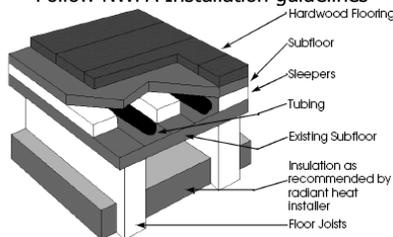
- Prior to any installation the slab must be cured naturally. See the timeline chart and checking for moisture content for further information.
- Always check for subfloor moisture prior to installing.
- Make sure all testing of system functions has been completed and you are approved to start installation
- Insure that the shear strength of the glue does not exceed the strength of the adhesive. Light weight concrete (less than 3000 psi) will not be strong enough for a glue down application only for a floating application.

SYSTEMS ABOVE RADIANT HEAT

1. Plywood with vapor barrier is recommended for all applications glue, float and staple over radiant heat.
2. If directly over concrete it is possible to have two layers of plywood interlocking covered with a moisture barrier
3. Direct nail to subfloor with floor joists. The plywood is screwed and glued into place on the floor joist which the radiant heating system is installed. The vapor barrier is between the floor and the subfloor.



4. Direct nails to subfloor over sleepers installation
Follow NWFA Installation guidelines



WITH RADIANT HEATING IT IS EXTREMELY IMPORTANT THAT THE RELATIVE HUMIDITY STAYS BETWEEN 45-55%, NEVER GOES BELOW 35% AND THAT THE SUBFLOOR TEMPERATURE DOES NOT EXCEED 81F (27C). TYPICALLY A HUMIDIFIER AND DEHUMIDIFIER WILL BE NEEDED.

IN ADDITION TO THESE POINTS PLEASE READ THE INSTALLATION PROCEDURES FOR THE TYPE OF INSTALLATION YOU PLAN TO DO OVER THE RADIANT HEAT

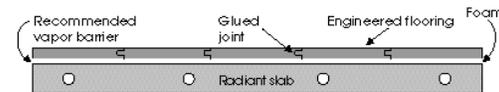
GLUE DOWN



Radiant Heat Glue down Installation NWFA Installation Guidelines

- DO NOT GLUE DOWN ANY FLOORING DIRECTLY TO THE EXPOSED RADIANT HEAT PIPING.
- DO NOT DIRECTLY GLUE DOWN ANY WOOD FLOORING OVER BRITTLE OR LIGHT WEIGHT CONCRETE

FLOATING



Radiant Heat Floating Installation NWFA Installation Guidelines

Ensure that recommended glue that is used is suitable for floating over radiant heat

Use of an underlayment pad is recommended. To ensure that it is suitable for under radiant heat it must be resistant to temperatures above 30 degrees Celsius or 85 degrees Fahrenheit.

NAILING

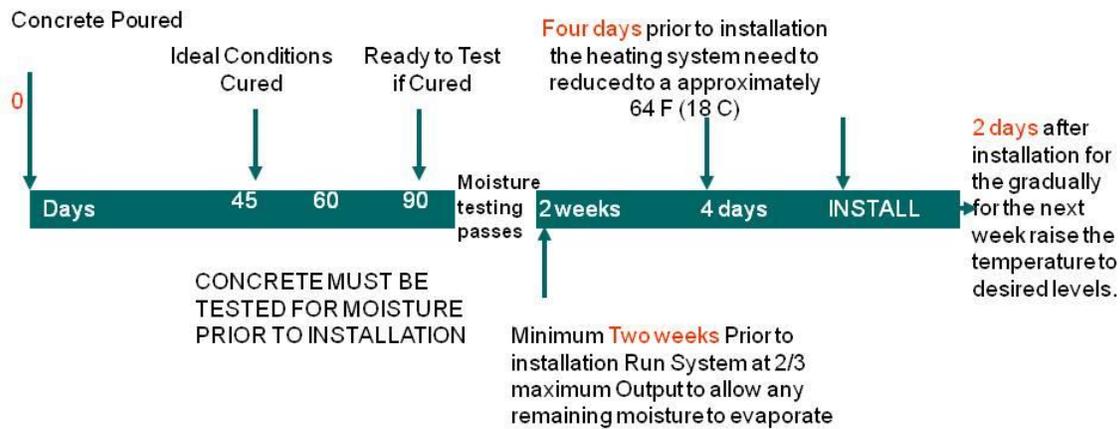
- The essential requirement in proper applications of wood flooring over radiant heated systems is to avoid penetration of the heating element. Be sure nails are not so long as to penetrate heating elements.

STARTING THE RADIANT HEATING SYSTEM

The heating system should be run at 2/3 of maximum output for a minimum of 2 weeks before hardwood installation to allow any remaining moisture to evaporate.

- Four days prior to installation, during installation and 48 hours after installation, the heating system needs to be reduced to a approximately 64 F(18 C)
- 2 days after installation gradually and for the next week raise the temperature to desired level
- The surface temperature of the subfloor should never exceed 81F (27 C)
- Most radiant heat systems do not have a humidification system. However, the relative humidity MUST BE MAINTAINED AT 35-55%. Add humidification to maintain this level and to ensure that the warranty conditions are met.
- Expect some seasonal shrinkage during the heating season.

Time line with Radiant Heat and Concrete Subfloors



The surface temperature should never exceed 81F (27 C). It is always suggested that gradual increases are made throughout the life of the product to prevent problems.

Currently Appalachian flooring does not accept solid flooring installation of hardwood flooring over radiant heat. Engineered flooring is recommended with the exception of Jatoba, Hickory, Santos and Tigerwood.

Here are three simple rules to follow:

1. Low Temperature - Keep the subfloor temperature as low as practical while still heating the space.
2. Even Heat - Spread the heat in the subfloor as evenly as possible.
3. Acclimate - Make sure the subfloor and the wood flooring are normalized or acclimated to the finished room before the wood is installed. The subfloor or slab must be dry.

While temperature does not harm the wood, it does affect its moisture content. As the temperature goes up, the moisture content generally goes down. Heating the wood too much will cause it to shrink and gaps will occur between the boards. Once the temperature is lowered, the moisture returns and the gaps close up. This is why a humidifier may be necessary in the room.

In most climates, winter air is dryer than summer air. This can cause seasonal gapping between boards and will occur regardless of whether or not there is a floor heating system installed. If an indoor humidity control is not present, occupants should expect some seasonal gapping on any wood floor with or without radiant heating.

While cupping of boards can be a result of improper wood floor installation, it can also be a result of uneven heating of the floor. Low, even temperature distribution is the key to avoiding this problem.

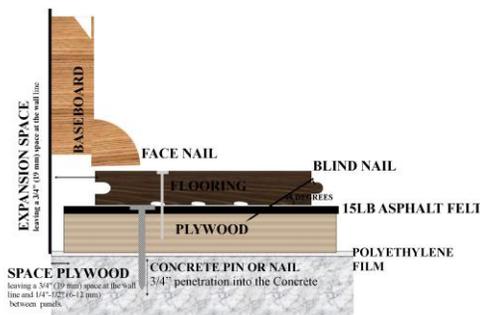
A moisture barrier between the wood and the subfloor is a must over concrete or gypsum floors and recommended even over a wood subfloor. The barrier helps maintain an even moisture balance in the floor

Plywood on slab

1. **Ensure Concrete testing for moisture, level specifications and density are completed.**
2. Cover the entire slab with **4-6 mil polyethylene** film, overlapping 4-6" (10 to 15 cm) and taping the edges, or with **Sika primer** and allowing enough film to extend under the baseboard on all sides.
3. Verify that the moisture content of the plywood is 10-12% before starting the installation.
4. Install the plywood after the vapor barrier is in place. Loosely lay a nailing surface of 3/4" x 4" x 8" (19 mm x 1.22 m x 2.44 m) exterior plywood panels over the entire area, leaving a 3/4" (19 mm) space at the wall line and 1/4"-1/2" (6-12 mm) between panels for expansion .
5. Cut plywood to fit within 1/8" (3 mm) near door jambs and other obstructions where finish trim will not be used. Lay plywood diagonally across the direction of the finished floor to help prevent cracks along panel edges.
6. Fasten plywood to the slab with **power-actuated fasteners**, ensuring that the **nails or pins penetrate the concrete at least 3/4"** securing the center of the panel first, the edges, using **one fastener per square foot**. Fastener should be driven with slight countersink. To be sure to "flatten out" the plywood, start at the center of the panel and work towards the edges. **Ensuring Level as within 3/16" in 10' (5mm in 3m) and/or 1/8" in 6" (3mm in 2m)**. Stanley Bostich, Porta-Nails , Aerosmith & ET& F Fastening are all examples of suppliers of the machines and nails/pins for this application. The tooling will depend on the age of the slab thus determining the PSI required to penetrate 3/4" into concrete.
7. **If plywood bowed it should be installed crown side up (frowning or edges touching and gap in middle when not fastened)**
8. Ideally a double layer of plywood interlocking would be used

Flooring directly on sleepers

1. **ON SLEEPERS, PLYWOOD IS RECOMMENDED ESPECIALLY FOR OPTIMIZING ALL LENGTHS IN GRADES, ADDITIONAL RISK OF NOISY FLOOR AND ADDITIONAL STRESS TO THE WOOD FLOORING THAT MAY RESULT IN STRESS CRACKS.**
2. In a Screeds System (sleepers) use Flat, dry, preservative-treated 2" x 4" (5 cm x 10 cm) sleepers in random lengths from 18" to 48" (0.5-1.2 m).
3. Begin by sweeping the slab clean then apply Sika Primer (may need to be modified depending on moisture testing of concrete).
4. Stagger joints and lap ends at least 4" (10 cm) and leave a 1/2" (12 mm) space between lapped edges.
5. Place them on 12 inch centers unless plywood is being used which 16 inch centers is acceptable.
6. Leave a 2 inch space between ends of space and base late on the wall to allow for expansion
7. Be sure 100% contact between sleepers and slab. Leave a space of 3/4" (19 mm) between ends of sleepers and walls with a continuous run of sleepers at end walls.
8. Before installing the floor, loosely lay an additional vapor retarder of 4-6 mil polyethylene film over the sleepers, overlapping the edges on top of the 2 x 4s.
9. Avoid bunching or puncturing the film, especially between the sleepers. Nail the finished flooring to the sleepers through the film.



Please note the vapor barrier system will depend on the concrete testing results as to which product will be needed for the application.

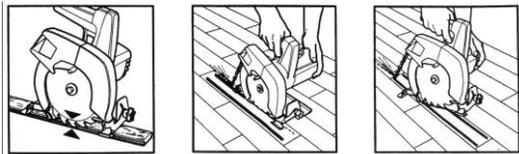
BOARD REPLACEMENT

Wood is a natural product and repairs during and after installation are normal. Using a touch up marker, wax filler, or putty filler to fix imperfections in the flooring is standard practice. In addition for the larger repairs a board replacement is a normal procedure during and after installation

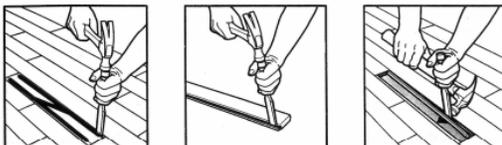
STEP ONE BOARD REPLACEMENT SELECTION

Individual wood flooring boards can be repaired /replaced in solid, engineered and parquet products without affecting adjoining boards. Always check the species to insure a proper match,(i.e. red oak, white oak,etc).Prefinished boards should be selected for gloss and color match

STEP TWO REMOVING DAMAGED BOARD



- Removing the plank or strip on wood and concrete subfloors
- Make sure you have a replacement board. Set a circular saw to the depth of the thickness of the board to be removed.
- Make one cut inset 1/2" from groove side running from end to end on the board to be removed.
- Make a second cut inset 1/2" from tongue side running from end to end on the board to be removed.
- Make a third cut across the center of the board at a 30-45 degree angle from first long cut to second long cut.



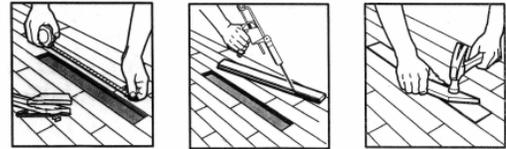
- With a chisel cut completely through both ends at cut lines and lift out center of the board. The groove side piece can now be easily removed.
- Carefully remove nails or staples and side tongue piece. Avoid damage to adjoining boards.

Alternate method on wood and concrete subfloors

- Split board down the center and along the grain with chisel. Pry out pieces. Avoid damaging the adjoining boards.

Alternate method on wood subfloors only

- Drill a series of large holes across center and against grain of board to be removed. Avoid drilling too far into subfloor.
- Using a sharp chisel cut off the tongue of the board being replaced. Avoid damaging adjoining boards.
- Remove the board and trim the edges of the opening. Replacing flooring that has been nailed/stapled down Clean all debris from the area.



STEP THREE BOARD REPLACEMENT

- Measure the opening and cut replacement board to size. Carefully test the new board against the opening for precise fit.
- From the back side of the replacement board, chisel off or cut lower half of its groove side and end match so that it will fit over the tongue of the adjoining boards in the replacement area.
- Carefully dry fit the replacement board. Coat tongue and groove with glue. If available, use a polyurethane adhesive suitable for hardwood flooring to coat the back of the board to avoid the use of nails (described below) in the repair. If glue is used, board must be placed in contact with the subfloor or glue compatible membrane.
- A fifty pound weight should be placed on top of the clean board for 24h post replacement.
- Insert tongue, then drive it into place, using a wood block and mallet. If adhesive has not been used to secure the board (as described above) to the subfloor drill pilot holes for nails at each end of board and along sides of long boards. Make holes smaller than the size of the cement coated nails.
- Sink nail heads with a nail set. Use color putty to fill holes and joints

BOARD REPLACEMENT FOR FLOORING THAT HAS BEEN GLUED DOWN.

- Clean all debris and old adhesive from the work area. Repair subfloor if necessary. Measure the opening and cut replacement board to size.
- Carefully test the new board against the opening for precise fit.
- From the back side of the replacement board, chisel off or cut lower half of its groove side and end match so that it will fit over the tongue of the adjoining board.
- Dry fit the replacement board. Coat tongue and groove with glue. Apply adhesive to the back of the board or to the subfloor
- Use a polyurethane adhesive sparingly to prevent the unit from rising after replacement is complete. Insert tongue, and then drive it into place, using a wood block and mallet. Do not use a PVA (carpenters glue) for this application.
- A fifty pound weight should be placed on top of the clean board for 24h post replacement.