



GENERAL INSTALLATION INSTRUCTIONS

Note: These instructions are intended to provide a thorough jobsite analysis for the suitability of wood flooring, including details that may or may not pertain to your individual jobsite. In all cases, the manufacturer's instructions and recommendations prevail, although we have yet to discover a conflict. If you have any questions, you can email them to info@planethardwood.com, or call Planet Hardwood's home office in Vermont at 802-482-4404.

JOB SITE CONDITIONS / OUTSIDE

Check the jobsite for conditions that will result in excess moisture or high humidity. Surface drainage should be away from the house. The slope should be minimum 6" in 10'. Gutters, drains and downspouts should be unclogged and functional, draining water away from the house. Eave overhangs should be sufficient to prevent rain from flooding the foundation. If there is a crawlspace, it must be cross-ventilated with a total ventilating area exceeding 1 1/2% of the first floor area, with no dead air spaces. For example, a 2,000 ft2 crawl space must have 30 ft2 of year-around open venting area. If the ground under the house feels damp, or is giving off excess moisture, lay a 6mil. polyfilm vapor barrier on the ground in the crawlspace below the installation area. *Remember to take into account seasonal changes in relative humidity which might affect jobsite suitability.*

JOB SITE CONDITIONS / INSIDE

If the flooring is prefinished, do not open flooring packages until you are ready to begin installation. Unfinished flooring should be allowed to acclimate to the target environment of the occupied building. The Equilibrium Moisture Content Chart that follows shows the resulting moisture content (MC) of the wood when allowed to "relax" to given temperature and relative humidity. When wood has "relaxed" to the point where it is neither accepting nor giving up moisture, it has arrived at its "equilibrium moisture content". In areas of wide seasonal swings in relative humidity, adding or removing airborne moisture through the use of humidifiers and dehumidifiers may be necessary to reduce movement. Wood is hygroscopic (like a sponge) , and will expand when absorbing moisture, or shrink when giving up that moisture to a drier environment. Look for signs of excess moisture and humidity i.e. musty odor, water stains on walls or floors, peeling paint (especially around windows and doors), rusty metal, rusty nail heads etc.. Flooring should be installed after all "wet" work in construction (i.e. sheetrock, concrete, tile or terrazzo etc.) is complete, and the prevailing relative humidity is between 40%-60%. The temperature of the room should be within 15 degrees F of the prevailing temperature of the finished space, between 45 and 70 degrees F. Engineered wood floors should not be installed on job-sites where the equilibrium point is below 6% M.C. (as they may cup and crack in equalizing to extremely low equilibrium points) or above 14% equilibrium. Solid wood floors are not recommended for below grade installations or on-grade installations where there is excessive moisture.

EQUILIBRIUM MOISTURE CONTENT CHART

Temp.	Relative Humidity, Percent																			
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	98
30° F	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° F	1.4	2.6	3.7	4.6	5.5	6.3	7.1	7.9	8.7	9.5	10.3	11.3	12.4	13.5	14.9	16.5	18.5	21.0	24.3	26.9
50° F	1.4	2.6	3.6	4.6	5.5	6.3	7.1	7.9	8.7	9.5	10.3	11.2	12.3	13.4	14.8	16.4	18.4	20.9	24.3	26.9
60° F	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° F	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° F	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	26.0
90° F	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° F	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

Source: "Wood Handbook / Wood as an Engineered Material" U.S. Department of Agriculture

Below grade installations must be protected from moisture through wall surfaces that touch the ground, or planters. Check for sufficient moisture barriers or waterproofing.

Check water heaters, dryers, dishwashers, plumbing fixtures or any other moisture producing appliance for proper venting and/or operation so they do not introduce excessive moisture to the installation area.

Remember to take into account seasonal changes in relative humidity that might affect jobsite suitability.

SUBFLOOR CONDITIONS / GENERAL

- 1) The surface of the subfloor must be level to within 1/8" over a 10' radius. "Hills" should be sanded down, while "valleys" filled by a high compressive strength underlayment patch or self-leveling cement compound suitable for hardwood flooring like ARDEX 15 Self Leveling Compound or equal. Leveling large areas is not recommended. **DO NOT SAND EXISTING RESILIENT FLOORING, BACKING, LINING FELT OR ADHESIVE AS IT MAY CONTAIN ASBESTOS FIBERS.** Small cracks, nail holes or hammer dents, chips in the concrete, or small gaps between the underlayment are not a problem. You can use a long flooring board on edge to check for levelness.
- 2) Subfloor must be free of foreign material like oil, wax, plaster, paint, sheetrock mud, contaminants, and construction debris.

SUBFLOOR CONDITIONS / CONCRETE

Inspect concrete subfloor for cracks and buckling. By hydrostatic pressure, the water table may rise and force water up through the concrete floor. An improper mix of concrete will allow for capillary migration of moisture.

Concrete must be free from excessive alkalines or there is a risk of bond failure in gluedown installations. Test concrete PH for gluedown installation and neutralize excessive PH with an acid wash. Follow mastic manufacturer's recommendations for testing and balancing PH.

All concrete slabs must have a minimum 6mil. polyfilm moisture barrier between the ground and the concrete. New concrete subfloors must be cured to a hard, dry, non-powdery finish. Concrete subfloors must have a density of 90 lbs./cu.in., and must not contain more than 2% moisture on a dry weight basis. A moisture barrier under the slab sometimes retards curing, so always check for moisture. Slabs that are newer than 60 days are generally too wet for wood flooring. Moisture content in concrete can be checked in the following ways:

A) With plastic moisture resistant tape, tape 6" x 6" 6 mil clear polyfilm squares in several places on the concrete floor. If after 24 hours, there is any evidence of condensation (i.e. "clouding", drops of moisture, discoloration of concrete) between the plastic and the floor, the concrete is too wet.

B) Place a 3" unbroken ring of putty on the concrete floor. Inside the ring, put a 1/4 tsp. of Calcium Chloride crystals, and cover the putty with glass to seal the crystals from the air. If after 12 hours, the crystals dissolve, the floor is too wet.

C) Chip small pieces of the slab (in case there is any sealer on the surface of the concrete), and apply several drops of 3% Phenolphthalein-in-alcohol solution (available at most drugstores) to the exposed areas. If a red color appears, excess moisture may be present in the concrete. Since Phenolphthalein reacts with some chemicals by turning red, the presence of excess moisture should be verified by performing a different test.

D) There are several different types of moisture meters for concrete. Should the moisture in the slab exceed 5%, a moisture barrier must be installed. For gluedown installations Planet Hardwood recommends a concrete sealer. Follow manufacturer's instructions for use and compatibility with the mastic. For naildown or floating installation, an effective moisture barrier must be in place prior to installation of the floor.

It is recommended that all concrete be scoured with 3 1/2 open coat paper to remove any surface contaminants or loose concrete. High spots can be removed with a terrazzo grinder or carborundum stone. Follow the manufacturer's instructions for use.

SUBFLOOR CONDITIONS / WOOD-PLYWOOD

Plywood subfloors should be 5/8" T & G or 3/4" square edged minimum thickness, installed over floor joists adequately sized for the length of the span. They should be well nailed at all edges and through the center. High spots (exceeding 1/8" over 10' radius) should be sanded, and any old varnish, paint, shellac or wax should be sanded off. If plywood is used over an existing subfloor as an overlay, the total thickness must be at least 3/4". If the subfloor sags, inspect floor joists beneath for deficiencies. Re-nail any loose or squeaky areas. Cupping or unevenness usually means the subfloor is wet. Wood or plywood subfloors should not exceed 13% moisture content (MC) and should be within 4% MC of the finished floor. You can check wood or plywood subfloor moisture content with a wood moisture meter. A two pin electric resistance type meter with a slide hammer allows for surface and core readings. **Flooring should be installed perpendicular to floor joists when possible, and always perpendicular to a solid wood plank subfloor.** When installing flooring parallel to the floor joists, an additional layer of 1/2" – 5/8" plywood over the 3/4" plywood subfloor is recommended by the National Wood Flooring Assoc. (NWFA).

SUBFLOOR CONDITIONS / RADIANT HEAT

These instructions are additional to "SUBFLOOR CONDITIONS / GENERAL", "SUBFLOOR CONDITIONS / CONCRETE", and "SUBFLOOR CONDITIONS / WOOD-PLYWOOD".

Most engineered flooring can be installed over RADIANT HEAT with the proper subfloor and jobsite conditions. The following conditions of the radiant heat subfloor must be met:

- 1) Moisture content of concrete must be between 1 1/2%-2% on a dry weight basis. Moisture content of plywood must be between 6% and 13%.
- 2) Heating pipes must be covered with minimum 1 1/4" concrete or minimum 1/8" below bottom of a plywood subfloor.
- 3) Concrete installed and cured at least four weeks with no heat transference.
- 4) Heat should be run at 2/3 maximum output for at least two weeks to allow any residual moisture to evaporate, without damaging the subfloor.
- 5) Three or four days before installation, the heat is turned off to allow the slab to be at room temperature (+or-65 degrees F) during installation. Relative humidity should be between 40% - 60%.
- 6) Beginning two weeks after installation, gradually over a period of seven days raise the temperature to a normal operating level. At no time during the life of the floor should the boiler exceed a 110 degree F setting, or the floor temperature exceed 81 degrees F.

Solid wood flooring can be installed over radiant heat using a naildown method if you float a plywood subfloor, or over a sleeper system. Although radiant heat systems are now less stressful to wood flooring, these are the only methods endorsed by the National Wood Flooring Association (nwfa.org).

Solid wood flooring up to 6" wide can be installed over radiant heat using a gluedown method with an approved non-hardening mastic like Sika, UZIN or equal. Follow manufacturer's instructions.

To float a plywood subfloor:

- 1) Place a vapor retarder of 6 mil polyethylene if over a slab.
- 2) Build 2 layers of 1/2" yellow pine or fir plywood by laying one layer square to the room, and a second layer at perpendicular or at a 45 degree angle to the first leaving a 1/4" - 1/2" space around the perimeter of the panels in both layers to allow for expansion and contraction.
- 3) Fasten the two layers to each other (but not to the subfloor) using 7/8" ring-shanked nails or screws in a 12" grid pattern starting from the center. Avoid trapping any debris between the layers that will result in humps.
- 4) Nail flooring to the floated subfloor using fasteners that do not extend below the plywood.

If installed over sleepers:

- 1) Sleepers should be 2 X 3's or 2 X 4's pressure treated and kiln-dried after treatment to a 12% or less moisture content. Sleepers should be flat with minimum twist or crook cut to maintain flatness 18' - 48'.
- 2) Set sleepers (or screeds) widest dimension in rivers of adhesive for 100% contact, space 1/8" at end joints. Screed joints should be staggered and not fall directly under panel edges.
- 3) Lay screed runs parallel no wider than 16" on center at right angles to the direction of the finished floor.
- 4) Put a 6-8 mil vapor barrier on the screeds and nail 3/4" CDX plywood if 16" O.C. or 5/8" plywood if 12" O.C..
- 5) Nail flooring using fasteners that do not or minimally extend below the plywood.

If solid wood flooring is considered over radiant heat without the NWFA approved sub-floor systems, then the following hierarchy of decision-making should prevail:

- 1) Stay narrow: 2 1/4" preferable, 3 1/4" face width at a maximum.
- 2) Favor a specie with inherent stability.
- 3) Make sure the wood is slowly introduced to radiant heat by slowly ramping up the system as previously described.