

Subfloor heating and cooling instructions for Hakwood flooring products Duoplank® 20mm (¾") and Duoplank® 15mm (⅝")

Hakwood is the inventor of the Duoplank®, the current standard for wide width, long length engineered flooring. The wood top layer is adhered to the highest grade multi-ply birch plywood to produce a dimensionally stable product. That is why Hakwood flooring offers the look of solid wood flooring, combined with the installation flexibility of an engineered floor. The Duoplank® is available in planks and herringbone.

Important information before you start

It is **EXTREMELY IMPORTANT** that you read and understand this information completely prior to starting, since improper installation can void the warranties.

Prevention

Do:

- Maintain indoor relative humidity between 40% and 65%. If this preventive measure is not kept, the Duoplank can crack, split, discolour, crook, bow and delaminate.
- Use felt leg protector pads under all furniture legs.
- Always clean the floor in accordance with the Hakwood Care & maintenance instructions
- Wipe up spills immediately.
- Use a dolly, rolled over plywood when moving heavy objects.
- Apply (slip resistant) runners or area rugs on high traffic areas.
- Use (slip resistant) door mats, to keep abrasives as dirt, grit and sand off the floor.
- Protect the floor from direct sunlight.
- Replace narrow, hard furniture rollers with wide rubber ones.

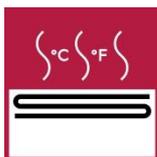
Don't:

- Allow water to stand on the floor.
- Walk on the floor with any hard and/or sharp object protruding from the sole.
- Use cleaning products that are abrasive or contain alkaline, ammonia, bleach, soap, citrus.
- Let furniture stand on the floor on small hard legs.
- Use a steam mop or any machine as you risk damaging the finish of the Hakwood floor.

Radiant heating is a growing source of heating both in residential and commercial installations. Hakwood flooring can be installed over radiant heat as long as you understand radiant heat and how it can impact wood flooring, what precautions to take, and what type of wood flooring to use.

Prior to installation of Hakwood flooring or radiant heat system it is important that our guidelines are followed in strict accordance.

For the Duoplank® to remain in good condition, the indoor temperature must remain stable. Sudden fluctuations in temperature and relative humidity will cause the flooring to shrink, expand, contract, crack, cup and bow excessively.



A subfloor heating system is a "slow" system; it takes longer for a room to reach the desired temperature and also for the heat to dissipate. To minimize the effect that rapid changes in temperature will have on the moisture content of the wood floor, it is recommended that an outside thermostat be installed. Unlike conventional heating systems, which switch on as needed, radiant systems work most effectively and with less trauma to the wood floor if the heating process is gradual, based on small incremental increases in relation to the outside temperature.

NOTE: Warranty voids can be caused by rugs, carpets, and cupboards with limited space underneath as these can cause the heat to build up, resulting in shrinkage of joints causing cracks.

Large temperature fluctuations should be avoided for subfloor heating and cooling. Cooling the floor too rapidly may cause surface condensation.

The Duoplank with a toplayer of the following wood species, can be used in combination with subfloor heating (either as the main source of heat or as additional heating) and subfloor cooling:

- Afrormosia
- Afzelia Doussié
- American Walnut
- European Oak
- European Ash
- Iroko
- Merbau
- Sucupira
- Teak

The instructions you will need to follow are provided in the following info.

NOTE: In geographic areas that experience extreme climate and humidity conditions, it is natural, due to the inherent properties of wood, for some minor expansion and contraction to occur which could result in visual changes such as gapping or cupping. These occurrences are not covered by warranty but should self-correct with seasonal climate changes. To minimize this visual change it is important that the relative room humidity never comes below 40 or exceeds 65%.

Installation methods

Option 1:

Glue Duoplank directly to the concrete. Make sure that the concrete is form-retaining and level. We recommend at least CW16 / 3000 psi concrete slab. The flatness can be checked using a 3 meter or 10 foot straight edge.

NOTE: The subfloor should be flat to within 5mm (3/16") in 3m (10') or 2mm (1/8") in 2m (6') radius.

If you choose to glue the flooring directly onto the concrete (Option 1), we recommend that you take the following steps:

- Allow sufficient time for the concrete to dry (minimum 30 days) before testing for moisture content.
- Test the concrete for moisture content prior to installing the flooring using either the calcium chloride (ASTM F-1869) or relative humidity testing (ASTM F-2170) methods.
- The acceptable moisture limit is 3 pounds per 1000 square feet (approximately 1.36 kg per 93 square meters) per 24 hours, using the calcium chloride method or as otherwise stated by the adhesive manufacturer.
- The acceptable limit using the relative humidity testing method is 75%, or as otherwise stated by the adhesive manufacturer.
- If readings exceed these limits, use an appropriate vapor retarder compatible with the adhesive to be applied.
- Apply a primer compatible with the adhesive and, if necessary (always when below grade) place moisture barrier such as Sika MB or 2mm poly.
- Using a Sikabond® or competitive adhesive you should glue the boards on top within 24 hours with the help of a toothed T69 steel adhesive trowel or the trowel recommended by the adhesive manufacturer.

- Make sure that pressure is applied to the boards for 24 hours after being glued into place using at least a 20kg weight per m².

Option 2:

If the subfloor does not satisfy the above requirements, an (oak) mosaic subfloor should be installed. Glue Duoplank 20mm (¾") or Duoplank 15mm (⅝") to this subfloor (in combination with an oak mosaic subfloor, the thermal resistance of Duoplank is too great for main heating).

NOTE: With this option the risk of the thermal resistance being too high is significantly greater.

When installing using a mosaic subfloor (Option 2), take the following steps:

- Glue a mosaic subfloor onto the concrete using a Sikabond® or competitive adhesive.
- Once the adhesive has set, sand the subfloor until it is even.
- Then glue the boards on top using a Sikabond® or competitive adhesive with the help of a toothed T69 steel adhesive comb and also blind nail the boards to the subfloor.

How effective is wood as an insulator?

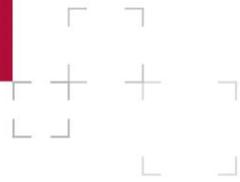
Wood is an outstanding thermal insulator: unlike a stone floor, it does not feel cold. Although wood is slightly slower to heat up, it retains the heat for longer thanks to its excellent insulating properties. However, to ensure good heat emission, the conductivity resistance (Rc value) of the wooden floor should not be too high. This is determined by the thickness and composition of Duoplank. If it is established at an early stage that the Rc value of the Duoplank or Duoplank light is more than permitted, the maximum allowable Rc value could be raised. Possible adjustments to inflow and outflow temperature, the centre-to-centre distance of pipes or the thickness of the layer on top of the pipe to the surface of the topping should then be thoroughly assessed.

Technical values

Rc value of Duoplank 20mm (¾"):	0,118 m ² K/W
Rc value of Duoplank 15mm (⅝") :	0,088 m ² K/W
Rc value of oak mosaic subfloor 8mm (5/64"):	0,044 m ² K/W
Rc value of chipboard subfloor 8mm (5/64"):	0,050 m ² K/W

Heating up before laying the Hakwood Duoplank floor

- Before you use the subfloor heating system for the first time, the sand/cement screed should be at least 42 days old. Set the temperature to 20 °C (68 °F) on the first day of use, and then raise it by 5 °C (41 °F) every day.
- Make sure that the supply water temperature does not exceed 45 °C (113 °F). Maintain this maximum temperature for at least 24 hours per centimetre of floor thickness.
- The lowering of the water temperature should also be in increments of 5 °C (41 °F) every 24 hours until you reach a water temperature of 20 °C (68 °F).
- The entire heating process takes 14 days – ensure good ventilation during this period to allow moisture to escape. Check the concrete for residual moisture after this process. This must not exceed 1.8% for a concrete subfloor and 0.3% for an anhydrite floor; if a liquid moisture barrier is used, the maximum is 3%.
- With water-heated radiant-heat systems, a pressure test must be performed and documented by a qualified plumber or the system installer prior to beginning the installation of the wood flooring. For other underfloor heating systems as Electric under floor systems please consult Hakwood for instructions and options.
- Check heat system manufacturer guidelines.
- The heating system has to be turned off before installation.



SUBFLOOR HEATING AND COOLING



Heating up after laying the Hakwood Duoplank floor

When laying the floor, the concrete should be between 15 °C and 18 °C. (59 °F and 64,4 °F) Maintain this temperature for at least 5 days after laying, then you can slowly raise the temperature (1 to 2 °C / 33.8 to 35.6 °F every day) until you reach the temperature you desire or the maximum permissible temperature.

- The residual moisture in the floor must be no more than 1.8% for a concrete subfloor and no more than 0.3% for an anhydrite floor.
- The maximum contact temperature of the concrete subfloor is 28 °C.(82.4 °F) The contact temperature is the temperature of the surface of the concrete / anhydrite floor, measured 3 heating days after setting the temperature (depending on the depth of the pipes).

Heating during the season

- Raise the temperature very gradually at the start of the heating season, and lower it again very gradually at the end (1 to 2 °C every day).
- To keep the floor as stable as possible, do not create any difference in day and night temperatures.
- Seasonal gapping can be expected.

Key points

- The Relative Humidity (RH) in the room must be between 40% and 65%. Measure the RH using a well-calibrated measuring hygrometer in a non-draughty room 15 cm above the floor. If the RH is too low, cracks may form.
- It is highly recommended that the radiant heat system be designed specifically to accept a wood floor.
- Use of an in floor temperature sensor as well as a separate thermostat for the individual room is required.
- Radiant heat is dry heat. A humidification system may be necessary to maintain wood flooring in its comfort zone.
- The cover on water pipes must be at least 30mm thick to ensure a good distribution of heat.
- The maximum contact temperature of the cement screed is 28 °C (82.4 °F).
- Heat the room at a steady temperature.
- Follow the heating protocol before, during and after installation.
- When you begin to turn up the subfloor heating again in winter, do so gradually (raise the temperature approximately 1 to 2 °C (33.8 to 35.6 °F) every day).
- If the cement screed is uneven and/or weak, use an oak mosaic subfloor (take care not to exceed the maximum Rc value).
- Sand an anhydrite floor beforehand with K24 (sandpaper), remove all dust and always apply a primer.
- If there is a chance of rising moisture, or residual moisture exceeding 1.8% (for an anhydrite floor no more than 0.3%) with a maximum of 3%, then apply 2 x PU280 perpendicular to act as a vapour retarder.
- If there is no mosaic subfloor, the concrete needs to be of excellent quality. It is essential that 20 kg of pressure per m² be applied to each board immediately after gluing into place.
- Use a two-component adhesive such as Sikabond® or competitive– ask your supplier for advice.
- Apply the adhesive using the appropriate trowel recommended by the adhesive manufacturer.
- Placing rugs on top often causes discoloured area's, do not place cupboards with no space underneath.
- Cracks and shrinkage joints are often caused by insufficient RH and/or an excessively high flooring temperature.
- For a subfloor cooling system, condensation protection must be installed.

Guarantee

We guarantee a stable product and also give a guarantee against delamination, excessive deformation and cracking.

Heat sensors should be installed according to *Hakwood Heat Sensors* in the floor project. Hakwood may reject claims where these sensors have not been used, or based on recordings of the sensors/ reports.

Installation should be carried out in accordance with the above instructions.

The subfloor cooling system must include condensation protection.

Cracking that does not exceed the quality description by more than 10% is not covered by the guarantee.