

# UNDERFLOOR HEATING & COOLING GUIDE

WOODlife's instructions are based on Dutch building codes and regulations. Reservations are therefore made for national codes of practice. Please note that we can only offer advice about our own product, and thus, any additional advice lies outside the service we offer. Other building components and products require a degree of knowledge and insight that makes it necessary to seek advice from a specialist. WOODlife thus does not offer advice about the positioning of insulation and vapour barriers. As we have no control over the actual quality of workmanship, materials used and worksite conditions, these written instructions do not constitute an implied warranty of any kind.

## 1. GENERAL INFORMATION ABOUT WOODEN FLOORING OVER UNDERFLOOR HEATING AND – COOLING.

WOODlife's engineered flooring and underfloor heating and – cooling (UFH/C) go well together. But for this to work, the indoor temperature must vary only gradually and to a limited extent to prevent the wood from shrinking or expanding too much. A subfloor heating system is a 'slow' system: it takes longer for a room to reach the right temperature and for the heat to leave the room again. The heating behavior of the occupants is very important: the more stable this is, the better.

Too much heat causes the wood to dry out and shrink. Rapid and major fluctuations in the temperature may damage the floor. Practical matters also play a role: rugs and carpets on the floor and cupboards with no space underneath can also cause heat to build up, possibly resulting in shrinkage joints and cracks.

## 2. APPLICATION OF WOODLIFE FLOORING

WOODlife's engineered flooring consists of a top layer of solid wood, 4 or 6 mm thick, which is glued onto a 12-, 15-, or 18-mm birch plywood at the factory. For the following wood species, both 16- and 21-mm engineered flooring can be used in combination with UFH/C either as the main source of heat or as additional heating. Per wood specie we have pointed out a maximum width that can be used over UFH/C; please find these maximized widths in the table below. Elm is not suitable over UFH/C.

| SPECIES | MAX WIDTH |
|---------|-----------|
| OAK     | 380 mm    |
| ASH     | 260 mm    |
| DOUGLAS | 300 mm    |
| WALNUT  | 260 mm    |
| ELM     | 300 mm    |

The instructions you will need to follow are provided below.

NOTE: You must be very careful about making sure you adhere to the requirements imposed in terms of the climatological conditions. If the humidity in the room does not achieve the values stipulated, the chances of cracks forming in the top layer will increase significantly. Cracking because of this is not covered by the guarantee.

### 3. INSTALLATION METHODS

#### UFH in WET construction systems (in cement screed):

##### *Subfloor preparation*

- Sand the screed to remove glue, plaster residues and other construction debris.
- Note: Sand new anhydrite screeds prior to starting the heating protocol with diamond to aid the drying process

The boards can be glued directly onto the cement screed. Make sure that the cement screed is form-retaining and level. We recommend at least D20 cement. For more information on subfloor requirements, we refer to our Installation Guide, which is available as a download on our website. If you opt to glue the floor directly onto the cement screed (Option 1), we recommend that you take the following steps:

- In case the cement screed is not firm, but sandy, one should apply a primer and, if necessary, a liquid moisture barrier as well.
- Using WOODlife PE90 adhesive you should glue the boards on top within 24 hours with the help of a toothed T69 steel adhesive comb (or a B11 trowel).
- Make sure that pressure is applied to the boards for 24 hours after being glued into place using at least a 20kg weight per m<sup>2</sup>.

If the subfloor does not satisfy the requirements, one can level the floor using a high compression leveling compound (min. 2000 N / cm<sup>2</sup> (310 N/ in<sup>2</sup>). The engineered floor can then be glued onto the leveling compound.

#### UFH in DRY construction systems:

Dry construction means that no wet products such as sand-cement, concrete, anhydrite, etc. are used during the construction/installation of underfloor heating. We distinguish three groups of dry construction systems:

- A. Built-in underfloor heating
- B. Dry construction systems for renovations
- C. Electric underfloor heating

The built-in underfloor heating and the renovation systems are usually controlled by the existing central heating boiler. What systems are there in general?

- A: Milling into the existing subfloor and/or gypsum fibreboards
- B: Ready-made floor plates with pre-formed slots
- B: Bearing floor plates with grooves and aluminum profiles
- B: Insulating dry construction underfloor heating elements with heat-conducting aluminum slats.
- B: Plastic plates
- C: Electric floor heating with heating wires on a net
- C: Electric underfloor heating on insulating dry construction elements
- C: Electric underfloor heating with heated foil

Although certain suppliers of dry constructions state that engineered floors can be installed floating over the dry UFH system, WOODlife's engineered flooring must always be glued down.

*A: UFH milled into the existing subfloor and/or gypsum fibreboards*

Apply a high compression leveling compound (min. 2000 N / cm<sup>2</sup> (310 N/ in<sup>2</sup>) with a minimum thickness of 5 mm.

The flooring can then be glued onto the leveling compound using WOODlife PE90 adhesive.



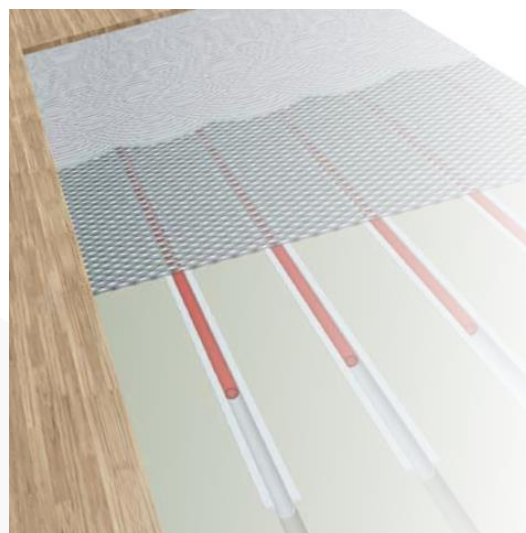
*B: Ready-made floor plates with pre-formed slots*

Fill the slots with gypsum bonded filler or cover the panels with gypsum fibreboard. Check the instructions of the underfloor heating supplier. The flooring can then be glued down using WOODlife PE90 adhesive.



*B: Bearing floor plates with grooves and aluminum profiles*

Check whether the floor plates are properly glued to the existing subfloor. Fill the heating slots with a sealing compound prescribed by the supplier. Cover with a reinforcement net in accordance with the supplier's instructions. Level the floor with gypsum bonded leveling compound with a layer thickness > 5 mm. The flooring can then be glued down using WOODlife PE90 adhesive.



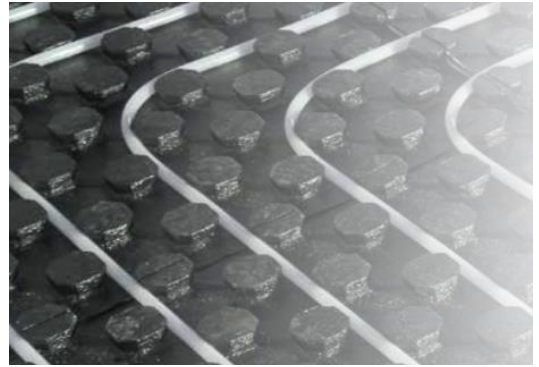
*B: Insulating dry construction underfloor heating elements with heat-conducting aluminum slats.*

Create an intermediate self-supporting construction using, for example, Fermacell, plywood plates or high-density gypsum. The underfloor heating slots do not need to be sealed first. The flooring can then be glued down using WOODlife PE90 adhesive.



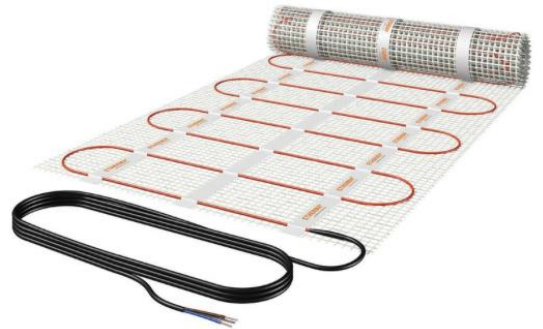
### *B: Plastic plates*

Level the floor by filling it with anhydrite or gypsum-bound cast floor. The cover on the pipe must be at least 10 mm. The flooring can then be glued onto the leveling compound using WOODlife PE90 adhesive.



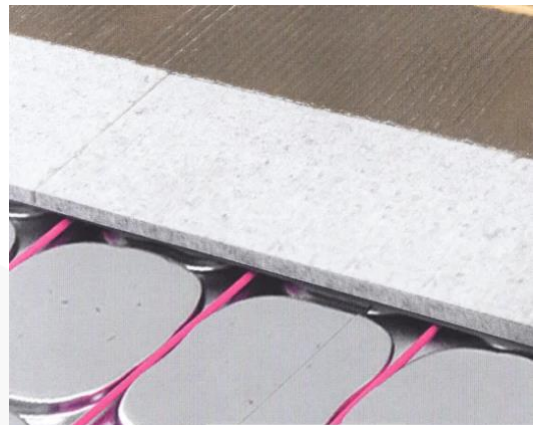
### *C: Electric floor heating with heating wires on a net*

If the underfloor heating net is not self-adhesive, the underfloor heating must be bonded to the subfloor with quick cement. Then level with a minimum layer thickness of 5mm. The flooring can then be glued onto the leveling compound using WOODlife PE90 adhesive.



### *C: Electric underfloor heating on insulating dry construction elements*

Create an intermediate self-supporting construction using, for example, Fermacell, plywood plates or high-density gypsum. The underfloor heating slots do not need to be sealed first. The flooring can then be glued down using WOODlife PE90 adhesive.



### *C: Electric underfloor heating with heated foil*

This type of underfloor heating is also referred to as infrared heating. Create an intermediate self-supporting construction using, for example, Fermacell, plywood plates or high-density gypsum. The underfloor heating slots do not need to be sealed first. The flooring can then be glued down using WOODlife PE90 adhesive.



### *General note to electric UFH*

The maximum permissible heat radiation capacity must not exceed 55W / m<sup>2</sup>. The surface temperature at any point of the subfloor must not exceed 28 °C. At the beginning of each heating season, the temperature must be gradually increased by max 2 degrees per day.

#### 4. HOW EFFECTIVE IS WOOD AS AN ISULATOR?

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 a long period thanks to its excellent insulating properties. However, to ensure good heat emission, the conductivity resistance ( $R_c$  value) of the wooden floor should not be too high. This is determined by the thickness and composition of the engineered floor.

##### Technical values

|                                                        |                         |
|--------------------------------------------------------|-------------------------|
| $R_c$ value of our 24 mm engineered flooring:          | 0.14 m <sup>2</sup> K/W |
| $R_c$ value of our 21 mm engineered flooring:          | 0.12 m <sup>2</sup> K/W |
| $R_c$ value of our 19 mm engineered flooring:          | 0.11 m <sup>2</sup> K/W |
| $R_c$ value of our 16 mm engineered flooring:          | 0.10 m <sup>2</sup> K/W |
| Thermal conductivity of our 24 mm engineered flooring: | $\lambda = 0.185$ W/mK  |
| Thermal conductivity of our 21 mm engineered flooring: | $\lambda = 0.17$ W/mK   |
| Thermal conductivity of our 19 mm engineered flooring: | $\lambda = 0.16$ W/mK   |
| Thermal conductivity of our 16 mm engineered flooring: | $\lambda = 0.15$ W/mK   |

#### 5. UNDERFLOOR HEATING - PRECONDITIONS

##### Heat up the underfloor heating system before laying the wooden floor.

- Before you use the subfloor heating unit for the first time, the sand/cement screed should be at least 42 days old. Set the water temperature to 20 °C on the first day of use, and then raise it by 5 °C every day.
- Make sure that the supply water temperature does not exceed 45 °C. Maintain this maximum temperature for at least 24 hours per centimeter of floor thickness.
- The lowering of the water temperature should also be in increments of 5 °C every 24 hours until you reach a water temperature of 20 °C.
- The entire heating process takes 14 days – ensure good ventilation during this period to allow moisture to escape. Check the cement screed for residual moisture after this process. This must not exceed 2,0% for a sand/cement screed and 0,3% for an anhydrite floor; if a liquid moisture barrier is used, the maximum is 3%.

##### Use a Fidbox®

Fidbox heat sensors should be installed underneath the wooden floor in each space. The Fidbox is a monitor for temperature (°C) and relative humidity (%) as well as a data log for long-term data recording all in one, which is concealed in the hardwood flooring itself. The Fidbox can either be purchased direct from the manufacturer, or through (your) WOODlife (dealer). For more information we refer to the supplier's website: <https://floorprotector.at/fidbox/en/>

##### Heating up after laying the wooden floor

- When laying the floor, the screed should be between 15 and 20 °C. Maintain this temperature for at least 5 days after laying, then you can slowly raise the temperature (1 to 2 °C 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 2.0% for a cement screed and no more than 0.3% for an anhydrite floor.
- The maximum contact temperature of the subfloor is 28 °C. The maximum surface temperature of the floor is 26 °C. These values are 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.

### Key points

- The relative humidity in the room must be kept between 30% and 70%. Measure the relative humidity using a well-calibrated measuring device in a non-draughty room 10 cm above the floor. NOTE: if the RH is too low, cracks may form.
- The cover on water pipes must be at least 30 mm thick to ensure a good distribution of heat.
- The maximum contact temperature of the subfloor is 28 °C. The maximum surface temperature of the floor is 26 °C.
- 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 every day).
- If the cement screed is uneven and/or weak, use an oak mosaic intermediate floor.
- Sand an anhydrite floor beforehand with K24, remove all dust and always apply a primer.
- If there is a chance of rising moisture, or residual moisture exceeding 2.0% (for an anhydrite floor no more than 0.3%) with a maximum of 3%, then apply a moisture barrier.
- If there is no wooden intermediate floor, the cement screed needs to be of excellent quality. It is essential that 20 kg of pressure per m<sup>2</sup> be applied to each board immediately after gluing into place.
- Use WOODlife PE90 adhesive or something similar – ask your supplier for advice.
- Apply the adhesive using a toothed T69 steel adhesive comb.
- Do not place any thick rugs on top, or cupboards with no space underneath.
- Cracks and shrinkage joints are often caused by insufficient relative humidity and/or an excessively high water temperature.

## 6. UNDERFLOOR COOLING – PRECONDITIONS

There are two types of underfloor cooling (UFC): systems that cool to 18°C and systems from manufacturers that recommend cooling to 15°C. The latter variant is not suitable in combination with wooden floors, because condensation may form.

With UFC, it is not possible to work with an indefinitely low water temperature due to the risk of condensation. The water temperature can only be a few degrees lower than the actual room temperature.

To allow UFC to do its job optimally, it is generally recommended that the floor pipes are laid tightly. This usually creates an overcapacity for UFH. This overcapacity can be compensated by lowering the hot water temperature. Choosing the right control unit is of great importance.

With both UFH and UFC, it is important to pay attention to how the parquet behaves when it is heated and cooled down. In particular, the release and absorption of moisture, by respectively increasing and decreasing the parquet temperature, must remain within set limits.

Failure to pay attention to this can lead to damage to the parquet floor. That is why the temperature of the floor may not be raised or lowered indefinitely. Maximum and minimum values are recommended for parquet floors on UFH and UFC. These values depend on how the pipes are laid. In general, the heat of the supplied tap water for UFH may be a maximum of 40°C. A minimum temperature of 18°C applies for UFC.

*PAY ATTENTION! If floor cooling is present, protection against condensation is required.*

The dew point is the same as the condensation point and stands for the moment at which the moisture from the air will condensate at a certain temperature. This dew point highly depends on the relative humidity in the room. Moist air will condense faster than dry air. A temperature below the dew point can lead to local condensation.

Think of it, for example, as when a cold drink that has just been poured from the refrigerator into a glass in a warm room. The glass will fog up with a layer of moisture (condensation).

The same can happen when the water temperature of the underfloor cooling is too low. The floor surface becomes too cold in relation to the room temperature and condensation will occur. The higher the relative humidity increases in a room; the quicker condensation can be expected to occur.

Condensation can be monitored in various ways.

The easiest way is to place a sensor on the coldest part of the installation. When detecting condensation, this will switch off the cooling or shut off the primary supply of chilled water in the installation.

A more complicated controller calculates the dew point (= 100% humidity) and switches off the installation before the dew point is reached (eg at 95% humidity).

## 7. WARRANTY

### Commitment to the Customer

We feel that no other hardwood flooring in the industry is manufactured to higher quality standards than a WOODlife engineered wood floor. The warranties described below are given to the original purchaser and are SUBJECT TO THE PROCEDURES, LIMITATIONS, DISCLAIMERS AND EXCLUSIONS SET FORTH HEREIN. The warranties cover only approved product applications as recommended by WOODlife Flooring BV within this document and are effective on WOODlife's engineered flooring purchased after May 1<sup>st</sup>, 2008.

### A 10-year warranty

WOODlife Flooring warrants, to the original purchaser, that its products, in their original manufactured condition, remain free from delamination, excessive deformation and –cracking during a period of at least 10 years. Cracking that does not exceed more than 10% is not covered by the guarantee.

Fidbox® heat sensors should be installed underneath the wooden floor in each space. We may reject claims where these sensors have not been used.

In cases of UFC, protection against condensation is mandatory.

The climate should satisfy the above requirements (relative humidity between 30% and 70% measured 10 cm above the floor using a calibrated hygrometer; the contact temperature of the subfloor must be no higher than 28 °C).

Wood is a natural product and therefore sometimes shows unexpected behavior. The warranty does not cover the normal expansion and contraction that wood floors may experience between boards at different times during the year. If minor separations do occur, they are not covered by this warranty. Cupping or crowning due to excessive moisture or humidity is not covered by this warranty.

## Claims

In the unlikely event that any portion of your WOODlife floor should fail with respect to the provisions of the warranty, WOODlife Flooring, at its discretion, to the original purchaser, will provide the appropriate amount of affected square footage of the same product, if available or one of equal value. At the customer's request, a refund for the amount of the defective product in lieu of an exchange is an option. Labor expenses are not covered by this warranty. To file a claim, contact us by registered letter:

WOODlife Flooring | NEDlit International UAB  
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LT-69104 Marijampole  
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Claims must be filed within the warranty coverage period with information verifying date of purchase, such as the sales receipt for the flooring. WOODlife Flooring reserves the right to inspect the floor and remove samples for technical analysis.

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