GUIDELINES FOR THE INSTALLATION OF AN ENGINEERED FLOOR ON UNDERFLOOR HEATING

Research has shown that the quality of the floor surface strongly affects the feeling of comfort.

With wood flooring the feeling of comfort is there from the outset due its favourable warm nature. The advantage is that wooden floors always maintain the ambient temperature and never feel cold in the same way that "hard" surfaces such as tiles or stone would.

When laying wood floors on cement screeds, make sure a time frame of around 4-5 weeks is allowed for curing and natural drying. To remove residual moisture completely, it will be necessary to adhere to the process of turning the heating up and down, as described below.

When planning the underfloor heating, take care that the pipes are not laid too far apart from each other (distance of approx. 150 mm), in order to achieve a consistent surface temperature.

At present two different underfloor heating systems are in use:

a. Warm water : small pipes are laid in the screeds, min. 4,5 cm under the screed surface. Warm water is sent through these pipes and the resulting heat radiates up through the wooden flooring.
b. Electrical: Comes in various forms such as rolls of loose cable to lay in screed or on top of the subfloor and in the form of matting but the basic principal remains the same. Electricity is passed through the cabling, heating it up and therefore passing the heat through the wooden flooring. This method can be particularly useful where there is a low ceiling height or restrictions with door clearance.

For both heating systems the following has to be observed:

1. The surface and underside temperature of the wood floor should not exceed 26-27 °C. Also, at these temperatures it will start to feel uncomfortable for the occupants and dust particles will be stirred up at temperatures exceeding 28°C.
2. Underneath the heating system there must be good heat insulation and a heat diffuser above it.

When using underfloor heating careful consideration should be given to exactly which species of wooden flooring should be used. Different species and grain structures will react in different ways when underfloor heating is turned on, therefore species such as beech should be avoided. Generally, timber with plain, even growth rings & straight grain will conduct heat better than timber with heavily figured grain. Additionally, the density of the wood can be a major factor and heat conduction of hardwood is approx 30% higher than that of softwood.

To guarantee a damage-free installation of the floor, it is necessary to follow technical guidelines that refer to the wood floor as well as to the subfloor (heat insulation, moisture insulation). For this reason the floor should be planned and laid by a professional installer.

(Excerpt of a bulletin issued by the Federal Board of Forestry Industry, 1033 Vienna, Marxergasse 2, postal code 6)

Bulletin for the installation of wooden floor on underfloor heating

Timber and timber materials have been used for many years to construct wooden floors and have proven to work well with underfloor heating. The data below is the result of research conducted by the Holzforschung Austria (Timber Research Austria) and sponsored by the Ministry of Construction and Engineering, and the long-term experience of miscellaneous floor constructions over underfloor heating.

1. Moisture barrier

In rooms level with the ground, without basement, or above gateways, damp rooms, alleys or garages a non-transient moisture and vapour barrier should be laid underneath the floor construction. Yet, damages due to moisture pushing through the underground cannot be prevented.

2. Appropriate subfloor

Over underfloor heating you can apply screeds in a wet condition (e.g. cement screeds) or in a dry condition (e.g. chipboards, cement-bound chipboards). As for the dry system, the air layer between the heat pipe and the underside of the screeds leads to a lower heat conductance of the floor construction. The residual moisture content (measured with the CM method) should be no more than 1,8 % for cements screeds and 0,3 % for anhydride screeds.

3. Recommended heating systems

We recommend low temperature heating systems (with warm water underfloor heating flow temperatures of up to 55 ° C). The surface temperature on the readily laid wooden floor should not exceed 29 ° C not even in the outer areas. Optimum values are 26 ° C to 27 ° C.

4. Distance of the heating pipes

To restrict heat peaks and lows on the surface (at a given maximum temperature reduced variations result in a higher average temperature and therefore a better performance of the heat system), the heating pipes should be laid between 10 and 20 cm apart from each other.

5. Relation of the thermal resistance

The thermal resistance values of the individual layers of the floor construction are to be aligned with the requested heat capacity *according to the OENORM EN 1264-3.* Care should be taken to ensure that there is a reasonable relation between the thermal resistance of the layers above the heating element (cement screeds or anhydride screeds and flooring) and below the heating element (heat insulation). The heat emission downwards should not exceed 20 W/m² or 25 % of the heating capacity. That means that the thermal resistance of the floor construction should not be too high.

The naturally given thermal resistance of timber and timber material restricts the thermal peaks and lows on the floor surface and this way create a consistent surface temperature. A high density of the wood is favourable to the heat conduction of the flooring. The conduction of hard wood is 30 % higher than that of soft wood.

(Vienna, May 2002 Th. Anderl, K.-P. Schober)

6. Heating of flooring screeds

Cement screeds must be flat, sound and sufficiently dry (see item 2). When the screeds are cured (approximately 4 weeks), the underfloor heating should be put into operation step by step (increase the flow temperature by 5 °C daily). When you reach two thirds of the heating load, the screeds should be heated at a constant temperature. Before installing the flooring the temperature of the screeds should be lowered respectively (by turning off the heating).

7. Appropriate floorings

Basically, the wood floor you have chosen should be in accordance with the *OENORM B 3000, 1-11.* All wood floor types can be used as floorings (with the exception of cobble stone wood flooring). End grain wood block flooring, 1 strip wood floors or particularly wide lamellas as well as individual elements in laying units of floorings are less suitable. To reduce gaps, gradings with mainly vertical annual rings (for instance prime grading) should be used. Species that expand and contract heavily are not suitable (e.g. copper beech) or should be restricted to use with a dimensionally stable form.

The *OENORM B 2218 (country specific standards)* is applicable to the installation of wooden floors. When being installed, the moisture content of the floor should be in between 7 and 9 %. As it will go back to 5 - 7 % in the heating period, a low moisture content at the time of installation is recommended. By having a relative air humidity of 50 % visible gaps can be more or less prevented.

According to the OENORM B 2242-7 (country specific standards) the flooring is to be glued down over the entire surface of the screeds, a floating installation is not admissible. Before applying the glue, which should withstand a permanent temperature of 50 ° C, a precoat should be applied. The thickness of the wood floor should not be more than 24 mm.

Only begin to install the flooring after the heating process according to the *country specific standards* has been completed.

8. General

Gaps that can appear later are less noticeable with wooden floors that are laid in certain patterns (e.g. mosaic or parquet floors) where the directions of the grain vary and with shorter individual lamellas, than they are with wooden floor that is laid in rows and with long individual lamellas (e.g. planks).

To avoid damage to the wood floor and rising heating costs, do not lay carpets on floorings with an underfloor heating system installed.

9. Technical characteristics of some species

The differential degrees of shrinkage (change of dimension per percentage change of wood moisture content) in the table are listed for the different grain directions. When using gradings with mainly vertical annual rings (e.g. prime grading), the expansions and contractions are less distinct, because the change of width is here a result of the lower radial shrinkage.