References

Increased living comfort thanks to underfloor cooling in a single-family house in Oulu



Uponor involvement

- 20 mm underfloor heating pipes as well as thermostats and actuators suitable for heating and cooling regulation

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The heating system of a two-storey wooden one-family house built in 2004 was renovated in 2011 by upgrading Uponor's hydronic underfloor heating to an underfloor cooling system.
HVAC planner Janne Nevala's house, which was built in 2004, is a two-storey wooden one-family house with Uponor's hydronic underfloor heating. The house, which was originally heated by oil, switched to geothermal heating in 2011. At the same time, Nevala also built an underfloor cooling system in the house.

Project Facts:

Location	Completion
Oulu, Finland	2011
Building Type	Product systems
Single family home	Radiant Heating & Cooling
Project Type	
Renovation	

Partners

HVAC planning and installation:
Janne Nevala
LVI-Sasto Oy

– Underfloor cooling was easy to combine with hydronic heat distribution. I decided to build a trial construction site in order to get measured empirical data on the functionality of underfloor cooling. This is the first underfloor cooling system I have designed, and in practice it was born just for fun, says Nevala.

Excellent efficiency of underfloor cooling

Nevala's one-family house used to have a supply air cooling system running on cold from the ground. However, the solution was not efficient enough to cool the house to a pleasant level.

– On summer evenings, all windows had to be opened to let the bedrooms cool down to a bearable level. Now that both systems are in use, all problems have disappeared. Even during the 2013 summer heat wave, the temperature in the living room remained constantly below 24 degrees, which is an extremely good result.

The functionality of underfloor cooling has been actively monitored. The floor surface temperatures and the indoor air temperature have been 20–22 degrees and 24 degrees, respectively.

– Underfloor cooling works nicely without any draft and has proved to be extremely efficient in practice – up to three times more efficient than supply air cooling. The system was brilliant with geothermal heat, states Nevala.

A combination that increases living comfort

According to Nevala, supply air cooling and underfloor cooling are an excellent combination. The supply air duct contains a cooling radiator that collects cold from the ground. Humidity is removed from supply air during the process, which makes indoor air more pleasant.

– When humidity decreases, temperature differences do not feel so strong. Underfloor cooling is also barely noticeable: the parquet floor feels nice all year round.

Nevala has a tip based on experience for the underfloor heating of the bathroom.

– The wet rooms are a bit too chilly in summer as they are in the same heating loop as the other rooms. The washing facilities should be in a separate loop, so that they can be heated also in summer.

The use requires a degree in engineering – control centre on the shopping list

The system currently requires continuous monitoring by Nevala as the regulators are not intended for cooling regulation.

– The system is automatic in principle, but it is not fully reliable. It is important to monitor the supply water temperature of underfloor cooling, which must be at least 19 degrees. Lower temperatures cause a risk of condensation and, in the worst-case scenario, the intermediate wooden floor can become wet.

When the cooling system is on, Nevala monitors the supply water temperature every hour. The water temperature has remained above 19 degrees so far, but Nevala does not want to leave its creative system unsupervised. – This is a delicate subject as supply water temperature control plays a decisive role. For the time being, using the system requires a degree in HVAC engineering, says Nevala with a smile.

Uponor's new Smatrix control system will reduce the amount of manual work.

– The goal is to take the control system into use in summer 2016. The control centre will be programmed during the installation, which will also include a change of regulators. I am eager to try the solution as I am sure it will add comfort.

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