



TIMOLEON DATA SHEET TI9013

Are all Underfloor Heating Systems the same?

Timoleon demonstrates that choosing the right underfloor heating system can save up to 30% on running costs.. Underfloor heating can be successfully installed into many different floor constructions from concrete screed to acoustic timber battens. But is it reasonable to presume that all these different constructions perform in the same way? The performance of an underfloor heating system depends on two factors, the physical construction or dimensioning of the system and the temperature difference between the water used and the room.

Temperature - The rate of heat transfer is dependent on the temperature gradient between the underfloor heating system and the room, the bigger the difference the bigger the transfer of energy. So when the water temperature and the air temperature are the same there will be no heat transfer. As the floor begins to warm up so heat begins to move between the underfloor heating pipe and the room.

The speed at which the heat is transferred is dependent on the construction of the floor and the design of the underfloor heating system within it.

Construction – The physical construction determines the characteristics of the underfloor heating system. The pipe centres, the type of floor, the floor finish, where the pipe is installed, the type of pipe all have bearing on the heat output of the floor. Fundamentally all these factors either aid or limit the flow of heat from the pipe to the floor surface, for example, the more resistant the floor finish the lower the heat output, the closer the pipe centres the higher the output, and the more conductive the floor construction more heat will be transferred.

HOW DO DIFFERENT UNDERFLOOR HEATING SYSTEMS PERFORM?

Timoleon has tested several dry construction underfloor heating systems such as those used in batten, suspended and floating floors to understand how warm the water needs to be to generate enough heat to overcome the average new-build heat loss.

Our investigation, conducted at the independent test chamber at BSRIA, showed that the water temperatures needed by an underfloor heating system to produce enough power to heat a new build home varied depending on the type of system. As the temperature of the water produced by a boiler or heat pump dictates its efficiency it is important to run the system with the lowest possible water temperature.

The examples below demonstrate the water temperature needed by several dry construction underfloor heating systems to produce 50W/m2 (this being the average heat loss for a new build house with an outside air temperature of -3oC external).

By knowing what water temperature is needed we can understand the COP that the heat pump will run at and from this the annual running cost for an average house. The data illustrates that using the Timoleon Toron flooring system can save 30% on running costs compared to oversized radiators and other underfloor heating systems.

Heating System	Flow water temperature needed	Heat Pump* (COP)	Annual Consumption ¹ (kWh)	Energy saved against radiators (kWh)	Potential running cost saving per year	Potential CO ₂ saving per year	
Oversized Radiators ²	55°C	2.80	4733	0	0	0	0%
Pipe installed in airspace between battens with insulation laid below	55°C	2.80	4733	0	0	0	0%
Rigid Aluminum diffuser plates between joists with insulation below	49°C	3.22	4115	618	£75	599kg	13%
Timoleon FoilBoard Panels	48°C	3.29	4028	705	£85	684kg	15%
Timoleon Toron Flooring System	41°C	3.98	3329	1404	£168	1,361kg	30%

¹The running cost is based on a 4 bedroom 200m² property with a heat load of 13,253kWh.

²The radiator system needs to be oversized by 230% to work with a 50oC mean water temperature compared to the conventional 80°C

³The output of any underfloor heating system will change depending on the floor finish

⁴Heat pump data provided by Vaillant GeoThermo GSHP 10kW (EN14511/ EN255)

AND IF I HAVE AN OLDER HOUSE WITH A HIGHER HEAT LOSS?

Importantly underfloor heating products that are designed to be used with low water temperatures will also provide extra output when used with conventional high temperature heat sources such as condensing boilers. This makes these products better suited for overcoming higher heat losses experienced with older buildings.