

HEATING A HEART OF STONE

Brian Sensecall of UHMA* explains how underfloor heating can make a perfect partner for stone floors

Julius Caesar would have expected, at the very least, a comfortable Hypocaust heated floor under his feet and a luxurious hot bath after tramping for leagues along the Appian Way to Rome.

Surprisingly, although the actual means of heating the floor may have changed, the underfloor heating system of today offers the same benefits and creates the same feeling of sublime comfort as those of 2000 years ago

Stone tiles, marble, flagstones, pavements and mosaics were all common floor finishes at that time. They were valued by home (and palace) owners for their beauty and by engineers for their high thermal conductivity, which enables warmth from the heated sub-floor to be transferred swiftly to the floor surface then onward into the room above.

After a technology gap of virtually 1500 years, in which the only source of home comfort was the open fire, the underfloor heating system returned to favour around 1900. Underfloor heating was used for a surprising number of great public and private buildings of the Edwardian and later eras, but the mid 60's spawned the cheap steel panel radiator and underfloor heating retreated back into the shadows in the face of a price war it could never win.

The dawn of the 21st Century, however, has brought stark new reality – the urgent need to save energy and reduce carbon emission levels to combat the menace of Global Warming. Efficiency rather than lowest possible capital cost is now the priority and the market for underfloor heating has seen a dramatic and continuing rise.

While the difference in running costs between competing systems may often be not much more than 10-15%, it is the attraction of a 30% better distribution of heat within the room that now matters most. The radiant heat from a warm floor favours the occupant first, before all else. The convected heat must first pass the occupant on its lazy rise to the ceiling. Heating the room upwards rather than downwards means no layer of hot air under the ceiling, no draughts, no dirt, and no maintenance.

So, what have we learned about heating stone floors that the Roman's did not know? Not that much really, except that modern technology has given us the ability to improve the product. Diamond Stone Cutting, Resin Adhesives, Cement, and Fibre reinforcement provided a means of standardising product quality and means of mass production.

Stone in the form of Marble, Slabs, Flagstones or Tiles, have high thermal conductivity, which ensures that warmth from the hidden heating system can transfer easily through to the surface.

As one might expect, granite, the densest of rocks, can conduct a massive 100 Watts/°C through a 20mm thick layer, while slate and marble are not far behind with about 75-80 Watts/°C, followed by limestone and sandstone in the region of 65-75 Watts/°C. Ceramic tiles or Conglomerate stone products obey the same laws and produce similar performances.

The thickness of stone does affect the eventual heat output, but not the heating effect. Increased thickness affects the thermal mass of the floor and thus its ability to change temperature quickly. This factor needs to be taken into consideration when determining how to control the underfloor heating system - installing a simple electronic weather sensor controller, will promote a remarkably stable temperature condition.

It is true to say that a very thick stone finish, perhaps 75mm thick can be supported by a rather thin heat conducting layer e.g. 45mm of sand/cement or 30mm of Polymer Aided screed bedding where space or room height is at a premium.

Possibly the most frequently asked question is 'should we separate the finish from the screed' and the most appropriate answer to that is YES – if the stone and bedding layer is thicker than 20mm. The inclusion of a polythene or building paper interface, will allow the stone to expand and contract completely independently of the heated screed below. Another crucial factor with very thin stone finish is the joint filler, which in some top quality floors does not exist. In these instances, the thin stone floor must be prevented from cracking by stiffening or thickening the screed below, ensuring that expansion joints are at the correct locations and making certain that the bonding adhesive is slightly flexible.

Lastly, a point to mention, when *any* heated floor system is turned on at the beginning of any heating season, it is important that the floor is operated initially at a low temperature for a few hours before turning up the temperature - to allow time for any extra moisture in the floor finish to be driven off.

****The Underfloor Heating Manufacturers' Association can be contacted on 020 8941 7177***