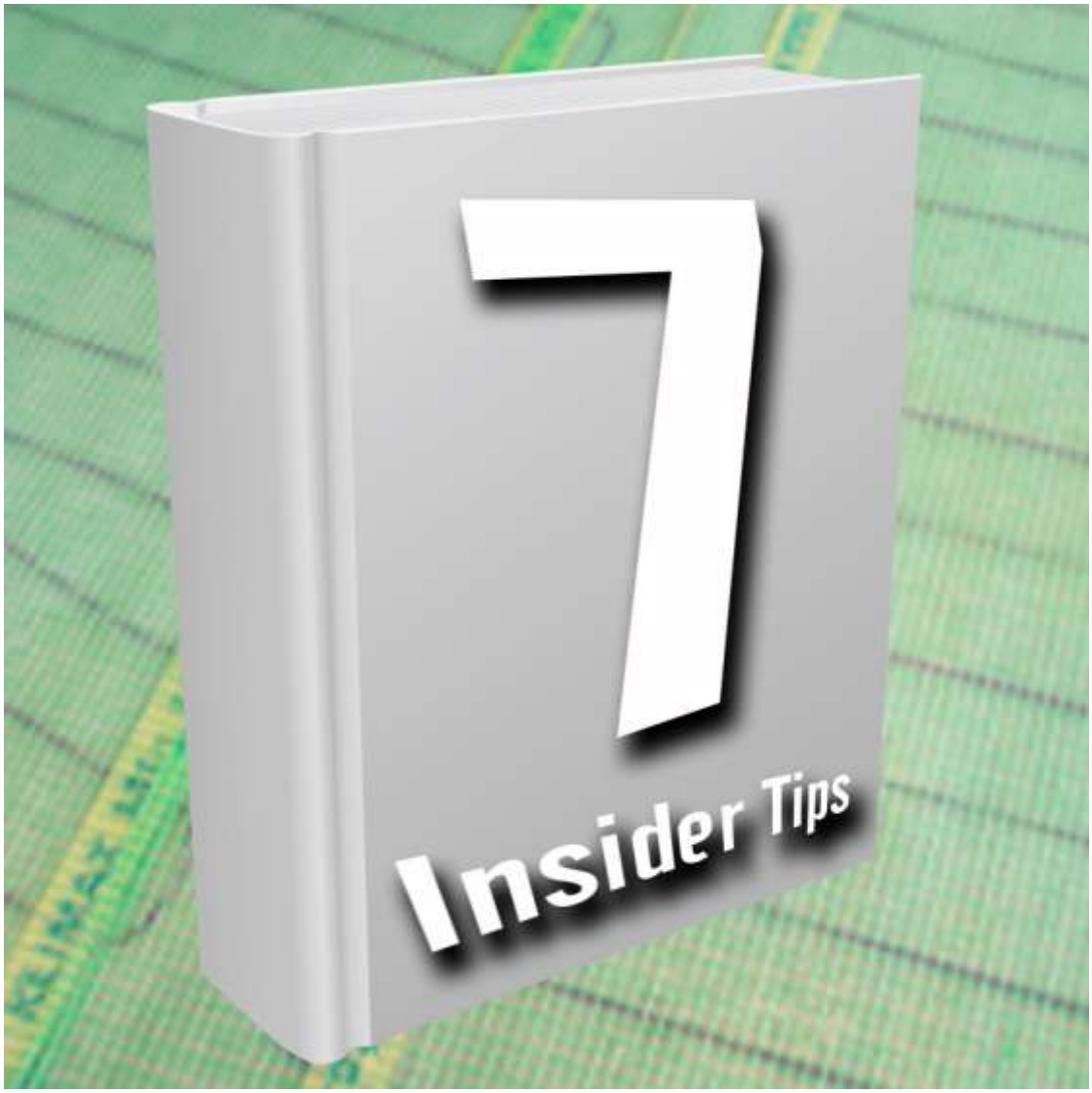

7 Insider Tips You Must Know Before Buying Electric Underfloor Heating

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1. Where to place insulation for electric under floor heating

The fact you are reading this means you are probably well up on floor construction and building regs. But some of the physics involved with heat transfer and the like is not widely understood and this leads to some contradictions in the building regs.

There's no doubt that modern buildings are far better insulated than old ones, and that includes what goes into floor construction.

Building regs now stipulate that a concrete floor slab be insulated to attain a U-value of at least 0.22. This can be achieved using 70mm rigid foam flooring slabs but it's usual to upgrade to 100mm to account for future requirements.

The slabs can be laid beneath the concrete, above it or in a combination of the two.

The trouble with this approach is that it doesn't warn you how the builder's choice of where the insulation goes will affect the response time of your heating, and hence the costs of running it.

First a couple of facts about concrete:

1. Concrete has a high heat capacity. By this we mean it has a high energy content per volume which suggests it can be used to store heat.

   But heat cannot be stored.

   Energy 'flows' wherever there is a 'potential difference' and this applies as much to heat as to other forms of energy.

2. Concrete transfers heat fairly well (a fairly high heat transfer factor). And, of course, modern insulation materials transfer heat only very slowly (very low heat transfer factor).

So all this suggests that putting the insulation beneath the concrete is fine as the slab will heat up and easily hold a set temperature with the insulation largely preventing the flow of heat down into the (cooler) ground.

BUT because of the concrete's high heat capacity it takes a HUGE amount of energy to heat it up.

Your aim with your electric underfloor heating system is to get the floor temperature up as quickly as possible so it becomes a comfortable source of radiant heat. Around 15 - 20 minutes is about right.

So if you go to the kitchen to make a cup of tea at 6.30 a.m. each morning you'll set the timer to switch the heating on at around 6.10 a.m. No more hunting in the dark for your slippers!

Once up to temperature the electrical energy drawn by the system falls right back and is economical in use.

Now imagine if your heating is placed directly on a thick concrete slab. This will typically be several degrees cooler than the floor temperature you want.

When the heater comes on it will start to heat the concrete, drawing maximum electrical energy to produce its peak output. And this may go on for hours and hours before the slab is fully up to temperature - if indeed it ever gets there.

Your electricity meter will be spinning like crazy and you'll be stood stirring your tea wondering why your feet are cold!

Of course, when the heating is switched off the heat will continue to radiate from the concrete for some time (and flow slowly through the insulation below) but it's unlikely you will feel the benefit. You'll either be using another room by then or will have gone out for the day.

So I hope this makes it clear that ideally you want the insulation ABOVE the concrete and immediately UNDERNEATH the heater.

All the heater energy should go into warming the thin floor covering, not the thick concrete slab.

This will give you a responsive system that is quickly up to temperature and is economical to use.

Unfortunately it's easier for builders to do it the other way round – 100mm insulation under 150mm of concrete is typical - so it is likely you will need to lay your own insulation on top of the concrete or floor screed.

But don't despair. This is easy to do and makes a huge difference to the performance of your system.

2. A guide to available floor space

You don't want to lay electric under floor heating where you won't get the full benefit of the radiant heat generated. This is mainly so you don't buy a bigger kit than you need to - and saves you money! - but also for practical operational reasons.

Think of standing in full sunlight then moving into the shade. In the shade you don't feel the benefit of the sun's radiant heat. Whether you feel warm or cold is entirely down to the ambient air temperature around you.

It's the same with electric under floor heating. Laying electric under floor heating under a bath, or a run of kitchen cupboards, for example, is pointless as the radiant heat energy will be blocked (shaded) and absorbed by the fitting.

There's a further practical point that experience has taught us. However careful they may be, there is always a chance that a plumber or kitchen fitter will drill into the floor and damage your heating system if it's laid in the floor under where they are working. That’s just the way it is!

So when planning your heating it's important to keep in mind where immovable fittings are going to be placed on the floor and to avoid laying you electric under floor heating in these areas. Plan only to lay your electric under floor heating in the remaining available floor space.

Coldbuster heating strips are designed for easy laying and the element can be separated from the backing strip and repositioned around tight objects like a WC or basin pedestal. When you do this you should measure the regular spacing of the element on the heating strip and make sure this minimum

spacing is maintained whenever a length of element is freed from the strip and run close to another section of element.

Continuing the theme that you only want the heating where you'll benefit from it, there's no need to take the heater up close to the walls. It's unlikely that you spend much time close to the wall - we all like a bit of space don't we - so don't bother to heat it.

There's the practical point that the floor/ wall junction is often a 'cold bridge'. This means a heater placed too close to the wall will use more energy than is strictly necessary to maintain a comfortable temperature in the room.

Keep away from the walls and don't worry if your heater only covers 70 - 80% of the available floor area.

The best way to look at it is that with the money you save, by buying a smaller heater, you can spend extra on insulation! If you do that, you'll have the perfect solution.

3. Why more power can save you money

It may seem strange - but it's a fact - that more powerful underfloor heating systems can be cheaper to run that less powerful ones. It's all to do with **warm up time**.

Full power is drawn by the heating element only during the warm up phase. Once the floor is up to temperature the controls cycle the heating on and off to maintain the set temperature. At this time energy usage falls back to a background level.

Typically, over a 24 hour period, where the heating is set to come on and off a couple of times, the amount of energy consumed is dominated by the length of time spent in the warm up phase on full power.

By having the shortest warm up times, more powerful systems can be cheaper to run.

If you install a system with too low power output or your insulation is not adequate it is possible that the correct operating temperature is never achieved and the system is drawing full power the whole time it is on.

You have been warned!

Work out your heat loss as best you can – use our handy calculator on the website - and **choose a heater with a power output roughly double the expected heat loss**. This way you get the benefits of a quick warm up but the heater is not so powerful that it will be cycling on and off too fast.

4. Why heating a small room can be more difficult than heating a large room.

It's all about the size of your heater (which is governed by the available floor area) relative to the overall size of the room.

To illustrate this, you might have a small room 2m x 2m where the available floor space is only 1m2 (a bathroom?). So the ratio of available floor space to overall room size is 2:1.

In a much larger room, say 3m x 4m with available floor space 8m2 (a living room with fitted cupboards down one wall?), the relative sizes are 12:8. This is equivalent to 1.5:1. So you can see how the heater in the small room needs to work significantly harder in the small room for the same comfort level.

This is a huge simplification, and there are other factors that need consideration in choosing your system including insulation levels, window sizes and types, and external or internal walls. But you can start to see why the relationship between available floor space and overall room size is an important consideration when designing your system.

The effect of all this is that it restricts your choice of floor covering in small rooms (or rooms with high heat loss - but that's the subject of another post).

Only the highest output heaters are recommended as a primary heating source for small rooms, restricting floor coverings to ceramic, stone, or porcelain tiles.

Vinyl, laminate or wood coverings require lower output heaters to avoid damaging the flooring (110W/m2 for Wood and Laminate, 130W/m2 for Vinyl) and so are generally only suitable in larger rooms where the available floor space is close to the overall room size.

So do your calculations carefully and recognise that in some situations you may be forced to choose a particular type of floor covering – possibly not your first choice.

5. 13 amp loading

Have you given due consideration to how you will connect the heating system to the mains? Do you know the requirements of the heater you have chosen and do you have a spare circuit that will handle the load?

If in any doubt about either of these questions you should get the advice of a qualified electrician (mine's called Ross, but others are available) before you start your installation.

Just by way of background, have you ever thought how we came to have the 13 amp ring main system we have here in the UK?

We are all familiar with the simple 13 amp plug that comes attached to electrical appliances these days. In normal use you just plug into the socket on the wall and have little concern for the load you are placing on the electrical circuit (aka ring main) in your house.

Similarly if we went to our local electrical store to buy a room heater we'd expect the most powerful heaters to be rated at 3kW. There just aren't any on the market rated higher. Why is this?

A new British Standard, BS 1363, was introduced in 1947 and, ever since, homes have been built and updated to this specification.

The ring circuit was devised during a time of copper shortage to allow two 3 kW heaters to be used in any two locations and to allow some power to small appliances, and to keep total copper use low. It has stayed the most common circuit configuration in the UK and it remains that heaters are designed within the 3kW constraint. (source. Wikipedia – thanks!).

And this applies to your electric underfloor heater.

It's a simple calculation to multiply the 'power output per m2' by the size of your heater mat to see how close you come to the 3kW limit.

For example a Coldbuster TileWarm under-tile heater is rated at 160W/m2, and so a 5m2 installation would consume a nominal 800Watts, comfortably within the 3000Watts limit.

For practical purposes we would recommend limiting a 160W/m2 application to 15 m2, or 2400Watts (2.4kW). If you need to go above this size your heater should be connected to its own dedicated circuit.

As always, consult a qualified electrician and make electrical safety your top priority.

6. When to specify a remote thermostat

Modern wireless technology means it's possible to site the thermostat sensor away from the programmer/ controller without any connecting leads or cables.

Why might you want to do this?

Typically your programmer/controller will be close to where your heater connects with the ring main. But this may not be an ideal location for the thermostat sensor.

This is particularly true if it's

- on a poorly insulated outside wall
- close to a window
- close to other electrical appliances radiating heat
- a long way from the seating area
- in a bathroom where the electrical connections are outside the room for safety reasons

In these situations, being able to position the thermostat sensor where you want to maintain a consistent comfort level makes sense.

Did you know it's even possible to link a single thermostat sensor to more than one receiver, with each receiver in a different room. This is particularly useful for secondary heating or infrequently used rooms.

7. Not all electric underfloor heating systems are created equal

The quality of underfloor heaters varies tremendously.

Some systems are built down to a price with little regard for performance, robustness during installation, safety and long life. Others apply thoughtful design, come complete with aids to make your installation a success, and use the best materials to ensure a trouble free and economic system.

The cost of the best quality heating system is only a fraction of the total cost of the finished floor so you have to ask yourself whether saving a few pounds on the heater is worth it. The watchword is you only want to fit the heating once, so you should fit the best.

Problems with the heater may mean ruining the floor finish to find the fault.

Poor quality materials may be more prone to premature breakdown and not give you the years of service you were hoping for. And when you know that clever design can make the maximum temperatures self limiting - a great safety factor - you soon learn that you get what you pay for.

Buying the best system will pay you back over time.

Facts:

- Fluoropolymer insulation is more durable than PVC
- Multistrand cables are more flexible and less prone to fatigue failures than single core cable.
- Coaxial cable is easier to lay than twin side-by-side cable

- Thin cable (<1.5mm) has less impact on finished floor height than thicker cable (typically 3mm +)
- Thin cable (<1.5mm) comfortably sits in the tile cement layer or between the foam insulation and the laminate/ engineered wood floor. This means it can truthfully be described as 'Surface Heating' or 'Floor Finish Heating'. Compare this with in screed electric or hydronic underfloor heating.
- 'Surface Heating ' gives the quickest response times for greater comfort and economy.
- ISO 9001 accredited factories produce the most fault free product
- For peace of mind your heater needs to be connected to a continuity alarm throughout the installation process

And then there is the question of warranties.

All heating kits come with a Warranty. But what, exactly, is covered - or, more to the point, not covered? Reach for your glasses on as here comes the small print:

- Lifetime means lifetime of the floor covering
- If a fault develops the company may arrange for the heater to be repaired or parts replaced - but you will have to pay for relaying, replacing or repairing any floor covering or floor.
- The guarantee does not apply if damage is caused during installation.

So it's much better that you get a quality product (best materials, innovative design, ISO 9001 factory) and take advantage of the installation aids that come with it, e.g. a continuity monitor alarm provided FREE.

As a footnote, here at BeWarmer we have a particular bee in our bonnet about so called 'foil' heaters sold to go under laminate or wood floors.

The quality of some is shocking and the design totally inadequate. It really is a case of ‘buyer beware’.

Things to look out for:

Is the element itself earth screened or is the manufacturer relying on the foil to do the screening? This is not a durable method of construction. Foil is not designed for this and may crack or break up over time leaving you with inadequate earthing.

If the foil is on top of the element you have to realise that a reflective side facing up blocks radiation upwards. This is not very clever as you rely on radiation when the floor is not entirely flat and in touch with the heater.

Even if you can't see it, any floating floor will be buckling and curling to some degree and you'll never reach the surface temperature you want. The heater element won't be able to transfer its heat effectively and will switch off to avoid overheating.

So choose a heater that doesn't have a shiny surface facing upwards.

The best heaters have a properly screened, double insulated element. The element will be sandwiched between a shiny foil base layer and a suitably conductive, radiating top layer. The shiny base layer is designed to do its job of stopping radiation downwards while spreading the heat across the floor evenly. The top layer promotes heat upwards through conduction, and, radiation where not in contact with the floor finish.

So that's the final section of **"7 Insider Tips You Must Know Before Buying Electric Underfloor Heating"**. I hope you've found it interesting.

Have you tried the heat loss calculator on the website for your project yet? If not, why not have a go now.

From what you've learned from this PDF you'll be confident in your choice of heater. Your installation will go without a hitch, will be safe, and will give economical service for years and years, and deliver the sort of comfort you only get from radiant heat can deliver.

I wish you all the very best and thanks for reading this far.

Don't hesitate to get in touch if you have any questions and I'll be pleased to help you all I can.

Kind regards

William Haseldine