

Thermoslab Underfloor Heating

In Slab Heating Cable

Installation Guide

Please read these instructions carefully and in full before installation.

Hardwire Installation should be carried out by a qualified electrician.

Please ensure the warranty form on page 19 is completed and handed to the homeowner to enable warranty registration.

Thank you for your purchase

Thank you for choosing a Thermogroup product. Our commitment to simple, honest, on-time quality service ensures that we are here to help throughout every stage of your project from idea to installation and, most importantly, after sales support.

This document will provide a step-by-step guide to a perfect installation as well as details on the warranty and how to get technical support should you need it.

To ensure a safe, hassle-free installation to be proud of, please take the time to read this guide in full before you start. We've taken the time to highlight potential pitfalls and common errors to avoid and get the job done!

Thermoslab is covered by a lifetime warranty, subject to terms and conditions. Be sure to keep the receipt as proof of purchase, this will be required to validate your Lifetime warranty.

Please complete the Customer Handover section on page 15 in full so that your customer has all the information they need to complete the online warranty form and register their Thermoslab Lifetime Warranty.

If you have any questions about your Thermoslab Underfloor Heating or any of our other products call our technical support team on 1300 989 464. We will do our best to find a solution and will always give that little bit extra...

Thanks again for choosing a Thermogroup product.

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Products Checklist



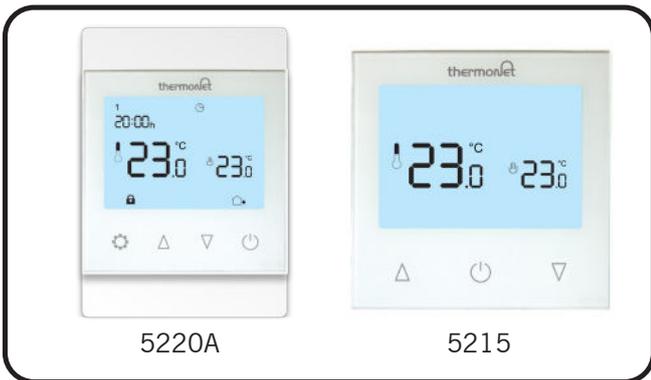
Thermoslab in slab heating cable

Thermoslab is a brilliantly versatile, robust 7mm thick underfloor heating cable designed for use in the slab. Install the cable in the concrete slab of new builds to create an energy efficient thermal mass under your floor.



Cable ties

Cable ties are used to secure the heating cable to the reinforcing mesh. Allow approx. 3 cable ties to every one metre of heating cable. Concrete mesh ties can also be used however you need to ensure no sharp ends damage or penetrate the cable.



Thermostat

Thermoslab heating will take some time to heat up the slab however will then turn the slab into a thermal heat mass and slowly release this heat. Due to this, it is recommended that the slab heating is run during off-peak electricity times.

If you connect the slab heating to an off-peak electricity meter you will need to connect this to a manual thermostat so temperature settings are maintained when the power turns off and on.

If you connect the slab heating to a time of use meter it is recommended to use a fully programmable thermostat and the set the program to run during off-peak times.



Floor sensor and flexible conduit

The floor sensor is a small probe that is designed to be installed at the same level as the underfloor heating to measure the accurate floor temperature. This is designed to be housed in the flexible conduit provided to allow for replacement if required.

Please note: These components are located in the thermostat box beneath the thermostat. The floor sensor is coiled on the inside of the flexible conduit.

Installation Do's & Don'ts



You must ensure that all the yellow heating cable and the entire cold tail connection (the join between the heating element and the black power supply lead) is fully encapsulated in the slab.



Please ensure that the end termination (the join at the end of the heating cable) is also fully encapsulated in the slab.



The system is 240Volts and all electrical connections must be carried out by a licensed electrician in accordance with AS3009 and all current local regulations. This may require the electrician to complete a Certificate of Compliance for the installation and in some states the electrician may be required to install or oversee the installation of the heating cable and do tests prior to the floor covering being laid.

Do's

- ✔ Ensure the electrical circuit is protected by a suitably rated RCD and complies with local regulations
- ✔ Ensure the sensor conduit is positioned between 2 runs of heating cable in a representative area of the floor
- ✔ Make sure all the heating cable and cold tail connections are fully encased in the slab layer
- ✔ Take care to ensure all electrical work complies with AS3009 and current local electrical regulations
- ✔ Locate the thermostat in accordance with the current guidelines
- ✔ Read this document in conjunction with instructions for associated accessories (e.g. thermostats)
- ✔ Ensure test procedures A, B, C & D are carried out, this is essential for completion of the warranty
- ✔ Install sensor conduit in accordance with the instructions on page 9 to facilitate the replacement of the sensor probe if required
- ✔ Protect the heating cable during installation, as this is when it is most prone to damage
- ✔ Keep foot traffic to a minimum
- ✔ Install a suitably rated contactor/snubber if required
- ✔ Take care not to cut or nick the heating element
- ✔ Keep cables 100mm away from walls and permanent fixtures
- ✔ Space cables 200mm apart, using the mesh spacing, for optimum results
- ✔ Wire multiple cables in parallel to the thermostat
- ✔ Ensure that the combined tog rating of all the products in the floor buildup above the heated slab is less than 2.5

Don'ts

- ✘ Cut or shorten the yellow cable under any circumstances! This will cause a faulty circuit and potential fire hazard
- ✘ Place the cold tail connection in the conduit. The entire connection needs to be fully encased in the slab
- ✘ Position temperature sensor near pipes, external doorways or other temperature influencers
- ✘ Lay insulation on top of the underfloor heating (UFH). Insulation on top of UFH will reflect all the heat emitted back into the substrate
- ✘ Wire multiple cables in series to the thermostat
- ✘ Turn on system until the slab, screed and adhesives are fully cured
- ✘ Leave boxes or furniture on heated flooring
- ✘ Strain, kink or bend the cold tail or end termination at any point
- ✘ Allow the heating cables to touch or cross over each other
- ✘ Allow excessive traffic of any kind over the cable
- ✘ Place tools or anything heavy over the cable
- ✘ Place any product over the floor covering that has a tog rating higher than 2.5
- ✘ Place bean bags, cushions or fixed furniture over the heated floor covering
- ✘ Turn on the heating cable while it is rolled up or before it has been covered by the concrete slab layer
- ✘ Proceed with installation if the tested resistance is not within -5% to 10% of the stated resistance
- ✘ Run cables directly through expansion/construction joints. Use separate cables either side of the joint
- ✘ Space the cables closer than 125mm

If you are unsure or need any help, please call our team on 1300 989 464

Installation Summary



1. Plan out the installation

Determine the location of the thermostat and floor sensor, calculate the available floor space (excluding under floor mounted fixtures) and check that you have a suitable sized cable. Check you have all the required components. See details on page 4.



2. Rough in prior to slab pour

Install two 20mm conduits with sweeping bends at the thermostat / floor sensor position. Insert the supplied flexible conduit into the one conduit and out into the floor. Insert the floor sensor probe into the flexible conduit. See more details on page 9.



3. Conduct test no. 1

Test the floor heating as per details on page 8 and record the results on page 15.



4. Lay out the Thermoslab cable

Run the heating cable back and forth throughout the area and fix in position at the end of each run. **NEVER CUT THE YELLOW CABLE.**



5. Secure heating cables in place

Once all cables are correctly spaced go back and secure cable to the mesh at regular intervals.



6. Conduct test no. 2

Test the floor heating as per details on page 8 and record the results on page 15.



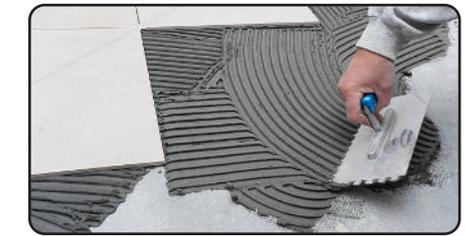
7. Pour the slab

Take images of the installed cables. Cover the heating cables with a concrete slab. It is recommended for the electrician to be constantly monitoring the resistance of the cable during the concrete pour. See more details on page 12.



8. Conduct test no. 3

Test the floor heating as per details on page 8 and record the results on page 15 once the slab has been poured.



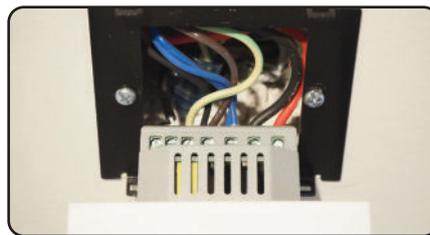
9. Installing the floor finish

The floor covering can now be installed. For soft floor finishes check with the flooring manufacturer that it is suitable for use with underfloor heating.



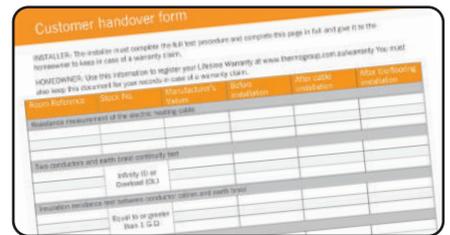
10. Conduct test no. 4

Test the floor heating as per details on page 8 and record the results on page 15 prior to wiring up the thermostat.



11. Wire up the Thermostat

Wire up and mount the thermostat according to the wiring diagram and installation details in the thermostat instruction guide.



12. Complete the customer handover form

Ensure the details are complete on the customer handover form (page 15) and pass this onto the client for online warranty registration.

Install Checklist

Before you start

- Read and understand the installation guide in full
- Read and understand the test procedure
- Install two 20mm conduits with sweeping bends (for the cold tail and floor sensor) from the thermostat position into the floor
- Feed the supplied flexible conduit down one of the conduits and out onto the reinforcing mesh
- Use a contactor/snubber if required
- Calculate available floor space and double check the cable is the correct size for the room based on 200mm spacing

Installing the Thermoslab heating cable

- Test the resistance of the heating cable and record results - Test A
- Leave a gap of 100mm between the cable and the walls
- Check the cold tail will reach the thermostat position
- Push the sensor probe to the end of the conduit
- Keep the cap in the end of the floor sensor conduit
- Feed the cold tail up the conduit to the thermostat position
- Ensure the cold tail connection is not in the conduit
- Lay out the heating cable at 200mm spacing on the reinforcing mesh
- Secure cables to the mesh using cable ties
- Test the resistance of the heating cable and record results - Test B
- Take photographs of the completed install
- Pour the concrete slab
- Test the resistance of the heating cable and record results - Test C

After finishing the floor

- Test the resistance of the heating cable and record results - Test D
- Wire up the thermostat to a RCD
- Connect wiring in accordance with the relevant wiring diagram
- Complete and sign the customer handover form
- Give the customer a completed copy of the customer handover form
- Give the customer a copy of the proof of purchase
- Give the customer a copy of the thermostat instructions
- Wait until the slab, screeds and adhesives are fully cured before turning the floor heating on

Important Testing Procedure

Thermoslab heating cables must be properly tested before installing. To ensure no damage has occurred, the cables need to be tested again after the floor heating has been installed, while the slab is being poured, after the slab is poured and before wire up of the thermostat. To perform these tests, you will need a multimeter and a meggar. Results of the tests need to be recorded on the customer handover form (page 15) in order to complete the warranty registration.



Heating cable resistance test

Connect a multimeter, set for resistance measurement between the live and neutral power leads. Record the results on page 15. If the measured resistance falls outside a tolerance of -5% to +10% it may mean the cable is damaged or the multimeter is not set correctly.

Continuity between earth and conductors

The conductor cables are separated from the earth cable by an insulator. Verify that there is no contact between the earth and the conductors by connecting a multimeter, set to continuity between the earth and both conductors. Record results on page 15.



Insulation resistance test

This test will detect very small holes in the insulating layer that separates the conductors from the earth. These small holes are not usually detected by the continuity test because they are not necessarily short circuits.

Connect a meggar calibrated to 500V to one of the conductor cables and the earth. If there is no current leakage, the insulation resistance between the power leads and earth must be equal to or greater than 200M Ω . Repeat for the 2nd conductor cable. Record results on page 15.



Floor temperature sensor testing

Connect a multimeter to the two conductors of the floor temperature sensor probe. Measure the resistance at room temperature. The resistance of the sensor should be 10K Ω at 25°C. Record results on page 15.

The ambient temperature will affect the resistance readings of the floor heating cable and the floor sensor. If the ambient temperature is lower, the measured resistance will be higher than the stated resistance and if the ambient temperature is higher, the measured resistance will be lower than the stated resistance.



Scan here to view the video showing how to perform a full testing procedure

If you are unsure about any of the tests or results, please contact technical support on 1300 989 464 before proceeding

Thermoslab Installation



Rough in two conduits to house the cold tail and the flexible conduit and floor sensor

Plan your installation

The heating cable is installed on top of the standard reinforcing mesh.

Measure the available floor area of the slab excluding fixtures and walls and check that the cable you have is suitable for the area before starting to install. The Thermoslab cable is ideally run along the mesh at the 200mm spacing. To check the sizing, calculate the square metres and multiply this by five and this should equal the linear metres of the cable.

Example calculation:

Heated area: $4\text{m} \times 2.5\text{m} = 10\text{m}^2$
Total output: $10\text{m}^2 \times 5\text{LM} = 50\text{LM}$
Stock number: Stock No. 3145 = 50LM (1500W)

The above formula will calculate the exact linear metres of cable required for 200mm spacing. Then select the closest linear metre cable available. You will then need to calculate the exact cable spacing required for the installation using the formula below.

$$\frac{\text{Available floor space (m}^2\text{)} \times 100}{\text{Kit length (m)}} = \text{Cable spacing (cm)}$$

The thermostats have a max load of 16amps. Calculate the overall draw of your heating cable(s) and if this is over 16amps ensure that a suitably rated contactor and snubber are wired into the circuit by a qualified electrician.

If you have more than one cable for the area, plan out how you will run each cable as each cold tail needs to start at the conduit point and be wired in parallel to the thermostat.

Determine the location of the thermostat and floor sensor as this will generally be where you would start running your heating cables from. Then rough in two conduits at this point; this would be up the centre of a wall location so that the cold tail and floor sensor flexible conduit can be fed up the conduits and wired into the Thermostat. One conduit will house the flexible conduit for the floor sensor. Push the floor sensor down the flexible conduit right to the end and ensure that the cap is fitted in the end of the conduit securely. Push the flexible conduit down the 20mm conduit and out into a representative area of the heated slab and secure in place. Make a sweeping bend in the floor sensor conduit so the sensor can be removed and new one inserted should it ever fail. Secondly fit a conduit that will take the cold tail from the slab to the thermostat position.

The sensor probe can be shortened or lengthened. If you need to cut the sensor probe you must only cut the end with the exposed wires not the end with the plastic end cap. The sensor can be extended to a maximum of 50m, using a twin core 1mm flex.

The cold tail can also be shortened or lengthened. Cold tails can be extended using a twin core and earth electrical flex, suitably sized to take the load of the underfloor heating system.



Test the resistance (using instructions on page 8) of the heating cable prior to starting the installation. Compare the tested resistance to the correct resistance of the cable and ensure this is within -5Ω to $+10\Omega$. Record the result on the customer handover form (page 15).

Thermoslab Installation

Install the heating cables

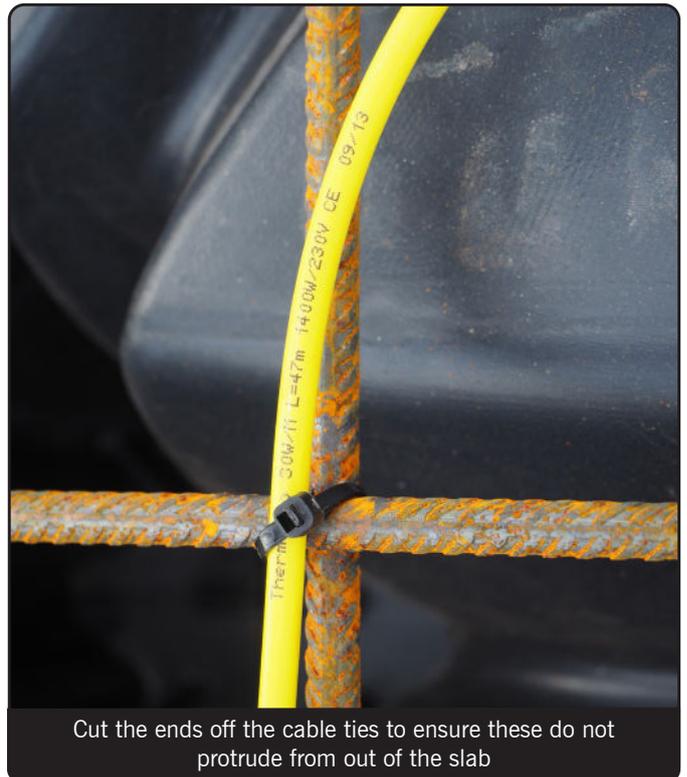


Feed the cold tail up the conduit and start running the heating cable from this position. Feed the flexible conduit for the floor sensor down the second conduit and install between two heating cables in a representative area of the floor.

Mark out the floor plan including walls, cupboards and other fixtures. Now begin laying your cable ideally starting from the conduit position. Feed the cold tail up the second 20mm conduit to the thermostat position. No yellow cable or the cold tail connection can go into the conduit however as much of the black cold tail as needed can be in the slab. Secure the cold tail and the start of the yellow heating cable to the mesh using cable ties. Now reel out your cable to the end of the first run and loosely secure it there with a cable tie. Run the cable throughout the area, temporarily securing this at the end of each run and making sure the cable is straight and reasonably tight without straining it. Continue this pattern up and down the mesh at the 200mm spacing. As you get close to the end of the cable, run out the remaining cable to see how it is going to space out to the end of the room as you may need to space the last runs a bit closer or further apart to make the cable fit exactly.

Thermoslab Installation

Secure the cables in position



Once all the cable is laid out across the room, go back and tie off the cables at regular intervals (approx. 400mm intervals) to ensure cables are neat, held in place and protected. Do not have cables loose, dropping or too close to one another. Cut off the ends of the cable ties or ensure the tails are facing downwards so these do not protrude out of the slab. The heating cable is a single ended product so there is no additional cold tail to return.

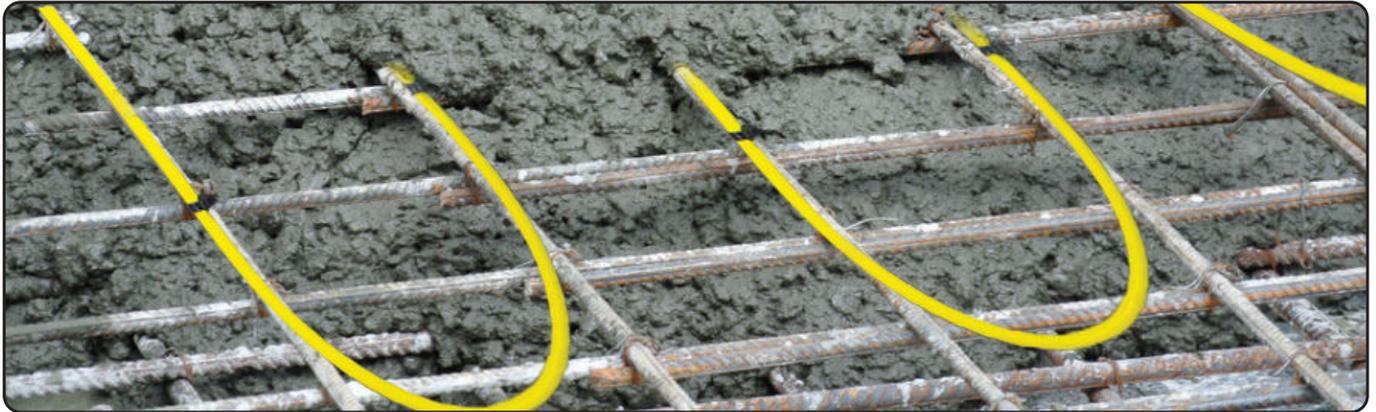
Take photos of the completed installation for warranty purposes.



Test the resistance (using instructions on page 8) of the heating cable once installed. Compare the tested resistance to the correct resistance of the cable and ensure this is within -5Ω to $+ 10\Omega$. Record the result on the customer hand over form (page 15).

Thermoslab Installation

Pouring the slab



Roll up the cold tails and floor sensor cables that are protruding from your conduits so they are neat and out of the way of the contractors. We recommend that a qualified electrician is on site while the concrete is being poured to be constantly monitoring the resistance of the cable so any damage can be picked up immediately.

Make sure the concreters are aware of the heating cable and ask them to take care with their shovels not to dig into or damage the cables whilst spreading the concrete. Mostly concrete that is pumped or chuted in is not an issue however extra care needs to be taken when concrete is barrowed in. Wheelbarrowing causes damage to cables and if barrowing is the only choice it needs to be over planks that are not against the mesh but supported by blocks underneath and the wheelbarrows must be tipped on the planks and not on the mesh.



Once the slab is complete, test the resistance (using instructions on page 8) of the heating cable once the floor covering is laid. Compare the tested resistance to the correct resistance of the cable and ensure this is within -5Ω to $+10\Omega$. Record the result on the customer hand over form (page 15).

Final test and wire up the Thermostat



Test the resistance (using instructions on page 8) of the heating cable prior to wiring up the thermostat. Compare the tested resistance to the correct resistance of the cable and ensure this is within -5Ω to $+10\Omega$. Record the result on the customer hand over form (page 15).

The thermostat must be installed by a qualified electrician in accordance with AS3009 and the current local electrical regulations. The installation and wiring of each thermostat model are different. Consult the instruction guide supplied with the thermostat for the wiring diagram and installation details. When wiring up multiple cables to a single thermostat ensure the cables are wired in parallel.

Each zone (or thermostat) needs to be connected to a single phase mains supply via an RCD. The RCD rating is dependent on the overall load of the system.

Check the thermostat installation guide for maximum switching loads. If the system load exceeds the maximum load of the thermostat a suitably rated contactor will need to be installed.



Scan here to view the video on how to wire up the thermostat

Complete the customer handover form

Once the installation is complete the installer needs to ensure the customer handover form (page 15) is complete. This completed form, along with photo(s) of the layout of the heating cable and a proof of purchase needs to be presented to the end user/homeowner to allow for the completion of the lifetime warranty activation. A warranty will not be granted unless this information has been completed in full and submitted via the online form – www.thermogroup.com.au/warranty. The homeowner needs to keep a copy of the handover form in case of a warranty claim.

Operation & FAQ'S

To allow for the slab, screed and tile adhesive to fully cure you must wait two weeks, unless otherwise stated by the adhesive/screed manufacturer, before turning on the underfloor heating system.

When turning the floor heating on for the first time, we recommend setting the floor temperature at approx. 18°C and building up by 1°C per day until the desired temperature is reached.

What should I do if I have left-over heating cable?

You should always measure the room accurately and choose a system that covers the available heating area. If you do have extra cable you can reduce the spacing between the runs of cable (min. spacing 125mm) or run it around the edge of the room.

What happens if it goes wrong or breaks under my floor?

There are no moving parts to an electric underfloor heating system and cable failures are extremely rare, if installed correctly. A damaged cable can usually be located and repaired with minimal disruption.

Can you walk on the installed heating cables before the slab is poured?

Whilst the cable is durable and will handle foot traffic we recommend reducing walking on unfinished floor surfaces to a minimum as a precaution. Avoid putting heavy objects or sharp edges (such as shovels or wheelbarrows) down on the cable.

Can I cut the heating cable if I have excess?

No - never. Cutting the heating cable will alter the resistance and cause the element to overheat. If you cut the cable by accident, please call our technical helpline on 1300 989 464 for assistance. Cutting the element will void the warranty.

How long will it take for the floor to heat up?

Every situation is different due to the insulation value of the building, type of flooring used and the level of insulation in the home. The first time you turn the heating system on it will take longer to heat up. An In slab system will usually take several days to heat up the entire slab.

Does the floor sensor have to be installed in the conduit?

We recommend the use of a conduit for the floor sensor so that in the event of a floor sensor failing or the thermostat being upgraded, the floor sensor can be replaced without damaging the floor covering. If this is not possible, we recommend installing a second floor sensor as a spare.

Can I join two or more heating cables to fit a larger area?

No, the heating cables cannot be joined together however two or more can be connected in parallel to one thermostat. When connecting multiple cables you need to ensure that the total load does not exceed the max load of your thermostat.

If the load does exceed the load of the thermostat a suitably rated contactor will need to be installed.

Can I turn the heating on to make sure it heats up before the slab is poured?

No. The heating cable needs to be enclosed in a cement layer to help spread the heat. Turning on the heating before the cement layer is applied will cause the cable to overheat and burn out. The heating cable needs to be tested by a qualified electrician to ensure no damage has occurred during installation.

See testing details on page 8.

Warranty Terms & Conditions

The Thermogroup Lifetime Warranty guarantees Thermoslab Underfloor Heating to remain free from defects in workmanship and materials under normal use and maintenance, and is guaranteed to remain in full working order subject to the conditions and limitations below:

Thermoslab Underfloor Heating is guaranteed for the Lifetime of the floor covering under which it is originally fitted subject to the following conditions. Please pay attention to the exclusions listed at the end of this warranty statement.

Thermogroup Lifetime Warranty applies:

1. Only if the product is registered, and the registration information is received and documented by Thermogroup, within 60days after install. You can register your product by completing the form online at www.thermogroup.com.au/warranty. Proof of purchase must be presented to make a claim, so please ensure that you keep a copy of both your invoice and purchase receipt in a safe place. Such invoice/receipt should clearly state the model that has been purchased and be in legible condition so as to aid in identifying the system.

2. Only if the Thermoslab Underfloor Heating has been properly earthed and protected by a Residual Current Device (RCD) at all times.

This warranty does not cover any thermostats as these are covered by a separate 3 year warranty from the date of purchase.

All Thermogroup warranties become void if the floor covering under which the Thermoslab Underfloor Heating is originally fitted, is damaged, lifted, replaced, repaired or covered with additional layers of flooring. The Thermogroup Lifetime Warranty does not cover accidental damage, including but not limited to damage caused to the cable by lifting, replacing or repairing the original covering.

The warranty period starts on the date of purchase, but the registration is only confirmed when the online warranty form has been complete and the registration details are submitted to the online warranty database in full, checked by Thermogroup and written confirmation is issued. Should it be required, Thermogroup will arrange for the underfloor heating loose wire element to be repaired or (at the discretion of Thermogroup) have parts replaced free of charge. If a fault is proved to be a manufacturing defect, Thermogroup will make good the floor covering to the original condition.

The Thermogroup Lifetime Warranty does not cover damage caused during installation, tiling or installation of any floor covering. Therefore, it is important to adhere strictly to the installation guide provided and follow the full test procedures detailed in this document before, during and after installation. Failure to do so will result in a void warranty. Thermogroup are, in no event, liable for incidental or consequential damages, including but not limited to extra utility charges or damages to property.

Thermogroup are not held accountable for:

1. Damages or repairs as a result of incorrect installation or application.
2. Damages as a result of floods, fires, winds, lightning, accidents, corrosive atmosphere or any other conditions/ situations deemed beyond the control of Thermogroup.
3. Use of un-compatible components or accessories.
4. Products installed outside of Australia.
5. Normal maintenance and care procedures.
6. Parts not supplied or designated by Thermogroup.
7. Damages or repair required as a direct result of any improper maintenance, operation or servicing.
8. Failure to power up or start as a result of inadequate/interruption of electrical service.
9. Changes in the appearance of the product that do not directly affect the performance of the product.

Important Notes:

Any repaired Thermogroup underfloor heating element carries only a 5 year warranty. Repairs that are made to rectify any damage other than manufacturing defects are not covered by the Thermogroup warranty. Damage as a result of miss-use, improper installation, use of improper accessories or adhesives or unsuitable substrate conditions are in no event covered by any Thermogroup warranty.

Our goods and services come with guarantees that cannot be excluded under the Australian Consumer Law. For major failures with the service, you are entitled: to cancel your service contract with us; and to a refund for the unused portion, or to compensation for its reduced value.

You are also entitled to choose a refund or replacement for major failures with goods. If a failure with the goods or a service does not amount to a major failure, you are entitled to have the failure rectified in a reasonable time. If this is not done you are entitled to a refund for the goods and to cancel the contract for the service and obtain a refund of any unused portion. You are also entitled to be compensated for any other reasonably foreseeable loss or damage from a failure in the goods or service.

Customer Handover Form

INSTALLER: The installer must complete the full test procedure and complete this page in full and give it to the homeowner to keep in case of a warranty claim.

HOMEOWNER: Use this information to register your Lifetime Warranty at www.thermogroup.com.au/warranty. You must also keep this document for your records in case of a warranty claim.

Room reference	Stock no. & Batch no.	Manufacturer's values	Before installation (Test A)	After cable installation (Test B)	After slab poured (Test C)	After covering laid (Test D)
Resistance measurement of the electric heating cable						
Two conductors and earth braid continuity test						
	Infinity (I) or Overload (OL)					
Insulation resistance test between conductor cables and earth braid						
	Equal to or greater than 1 G Ω					
Floor temperature sensor test						

Installer Details	
Name:	
Company:	
Email:	
Phone:	
Address:	
Signature:	
Date:	

Technical Specifications

Stock Code	Length (m)	Output (W)	Resistance (Ω)
3138	10	300	176.33
3139	20	600	88.17
3141	30	900	58.78
3142	37	1100	48.09
3145	50	1500	35.27
3147	60	1800	29.39
3148	67	2010	26.32
3152	84	2500	21.16
3155	100	3000	17.63
3156	112	3350	15.79
3158	134	4020	13.16
3160	150	4500	11.76
3161	170	5100	10.37
3163	185	5500	9.56
3164	200	6000	8.82
Thickness			7mm*
Max Temperature			28°C**
Protection Rating			IP67
Warranty			Lifetime on heating cable
Conductor Type			Single Ended
Cold Tail Length			5m

*Cold tail is 10mm thick

**Regulated by a floor sensing thermostat

Actual tested resistance may differ from those listed. Resistances listed above are at 20°C. Allow a tolerance of -5% to +10% of the resistance specified.

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Thermogroup
 That little bit extra...

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