warmth.nz
hydronic underfloor heating & cooling

BEST COMFORT | LOWEST COST

HOW DOES WARMTH.NZ APPROACH YOUR UNDERFLOOR SYSTEM DESIGN, INSTALLATION AND SERVICE?

HOME DESIGN EVALUATION

- Every home is unique. Even the same house design, in different locations, and in different climatic aspects, will perform differently and uniquely in both comfort and energy performance.
- We evaluate your home design and site placement across several important factors including: orientation of the home, ratio of exterior walls to enclosed space, height of ceilings, rooms with full height window walls, floor coverings, other factors that can affect either comfort or energy loss (two interrelated items that also impact separately). Two storey houses are evaluated on an expanded scale.
- We then calculate the energy needs for successfully running hydronic radiant underfloor for your home. Our goal is to provide the comfort that will maximize the enjoyment of your new home for years to come, all while providing you the lowest running costs of any available system.
- These low running costs combined with a moderate capital cost demonstrably yield the lowest overall ten year costs we know of.

DESIGN APPROACH

- Our Hydronic Radiant Systems are built around heat pump powered warm water with design water temperatures reaching 30 - 35°C, with slab target temperatures of 20 - 25°C. This is very self-regulating since the greatest heat transfer from the water in the pipes will occur in the areas where the slab is coolest, without other control intervention.
- This self-regulating nature also means it is impossible that our system will contribute to creating hot spots.
- All systems are designed to have an even flow of water everywhere.
- In areas where there is direct solar gain on a hard surface slab, excess heat in these areas may be picked up by the slab and transferred to the water if the slab temperature exceeds the water temperature. This then may re-distribute that heat to cooler parts of the house, reducing the need for heat from the heat pump.
- The goals of our technical design biases are to provide you the most stable and unobtrusive comfort experience for your family, i.e. the most even and effective comfort for your family's enjoyment of their activities in your new home.

ENERGY STORAGE IN A CONCRETE SLAB

- A standard concrete slab can store significant amounts of energy. In round figures 1kWhr per square metre, or perhaps 20 hours of continuous running of a heat pump. Each day the heat pump has to replace the energy leaving the house, it does not heat it up from cold. The result is a stable house temperature with low running costs.

PIPE PLACEMENT IN THE SLAB

As a general rule we prefer to lay the floor pipe directly onto the polystyrene insulation using plastic staples.

  - Firstly, this preserves the structural integrity of the steel mesh reinforcement. Structural engineering advice from our consultants is that nothing other than the steel mesh should be in the top third of the slab.

  - Secondly the bottom-of-the-slab placement also reduces other construction damage or interference with the pipe works. Overall, it also means a straightforward process for the builders.

  - Thirdly it is much quicker and therefore costs less.

CONTROLS

- Your system comes complete with a fully programmable wired or wireless thermostat.

- Our system is designed to load heat into the slab through the daylight hours when the air source for the heat pump is at its highest temperatures. This is when the heat pump can operate at its highest operating efficiency.

- However, some customers set their systems to take advantage of night rates. Some of the variables on running approach include how the occupants use the house, i.e. are people there all day, etc.

- We design the system to be able to deliver the necessary heat energy to the slab in an eight-hour period on a typical winter day with ambient air temperature of 7°C. On colder days, the heat pump will need to run for longer.

- Our basic designs don't use buffer tanks, however we may offer other system set ups that require them.

- We install the pipes typically at 150mm to 200mm spacing. We install in the counterflow arrangement which is recognized as providing the most even temperature distribution in each room.

- MAXRaft ® is a fully insulated slab system that is thermally broken around the entire slab including the edges. Without edge insulation there will be a cold strip along every outside wall, and the running costs may be higher.

- Cornerstone "Thermaflor"© is another fully insulated slab system. It was designed to complement the Cornerstone Structural Insulated Panel system. It provides an insulated edge beam with a complete ground cover to ensure full insulation integrity.

- RibRaft®, and other "Waffle" slabs are also good systems to install our systems in since they are completely in tune with the storage of energy in concrete concept; the additional thermal mass of such slabs results in a more stable temperature in the house. Again, edge insulation will reduce running costs and improve comfort. RibRaft® HotEdge® and InsulFound are two examples of this.

EQUIPMENT TECHNOLOGY

- We import and install carefully selected equipment particularly suited for New Zealand climatic conditions. We provide a five-year warranty for all our heat pumps/systems.
- We are importers of high-performance high-quality SPRSUN Heat Pumps from China. Our selection is the product of many years of evaluative search.
- The heart of any heat pump is the compressor. Smaller SPRSUN units use Panasonic or Mitsubishi compressors, larger units have Copeland Scrolls.
- Our heat pumps are designed and specified with all the necessary componentry and refrigerant to operate effectively down to -20°C if required. At the present time all units use R410a refrigerant, in the future this will be replaced with R32.
- All SPRSUN heat pumps are over 4:1 efficient when measured at 7 degrees ambient temperature producing 35 degrees water. This means for every 1kWhr of energy consumed at least 4kWhrs go into the slab.
- We import and use a special 1216 (12mm internal diameter, 16mm external diameter) PERT pipe with a UV barrier for when jobsite work is interrupted with pipe exposed. (PERT pipe is polyethylene with raised temperature resistance with an expected life of a few hundred years). Another advantage of PERT pipe is that it can be recycled, therefore waste is reduced.
- Every jobsite installation is pressurized and monitored throughout the build project as to identify any construction anomaly. Any damage situation is repaired with no net deterioration or lasting damage to the installation. If damage occurs to a floor pipe, please let us know ASAP – and we will make repairs in a timely manner.

NOTE ABOUT HEAT PUMP TECHNOLOGY FOR UNDERFLOOR

- Heat pump technology in underfloor heating is completely different from boiler technology and boiler or radiator design thinking.
- A heat pump gradually raises the temperature of the water and the slab from its “setback” temperature up to the target temperature, say from 18°C back up to 23°C by slightly increasing the temperature in the water with each circuit. This is the job of the system each day; to replace the slab losses in order to bring it back up to the target temperature.
- We believe the best heat pump for your underfloor system in your house, is the smallest one that will input heat into the slab over about eight hours of peak daylight/temps, thus running the smoothest, quietest, and longest at high efficiency. Oversized heat pumps are of little benefit to an underfloor system. Although they cost no more to run, they do cost more to buy.
- We believe in a comprehensive approach that balances capital costs with running costs.

LONG LIFE – MINIMAL MAINTENANCE

- For many years we have not used any ferrous materials in our underfloor systems. Even the circulating pumps have bronze or stainless-steel bodies. Put simply this means there is nothing to rust – hence in our systems there are no filters to clean, no water treatment to maintain, no annual maintenance. The only item to check is the air pressure in the expansion vessel every year or two, with a bicycle pump. (The pressure in them tends to reduce with age).

DESIGN SPECS SUMMARY

In-Slab Water Distribution Pipes

- 12mm ID x 16mm OD PERT UV barrier pipe.
- UV protection coating for build interruption where exposed pipes could deteriorate in sunlight.
- Laid at the bottom of the slab stapled directly to the insulation.
- Laid at 150mm to 200mm centres.
- Pipe runs are limited to less than 120 metres for flow and pressure drop considerations.
- Laid in the Counterflow methodology for the most even heat distribution in each room/area.
- Most slab installers require 35mm concrete coverage above the pipes. With 100mm typical slabs, coverage over our pipes is well exceeding the requirements.
- Bottom of slab Installation position means the mesh is not forced down out of its load zone in the top 1/3rd of the slab.
- This method also eliminates a compressible item (the pipes) interfering with the concrete bond around the mesh itself.
- Eliminates any issue with pipes floating at pour time.

Feeder Pipes

- Feeder pipes between the heat pump and the manifold in the interior are typically laid in or beneath the slab prior to slab pour.
- Alternatively, in some situations, the feeder pipes are run in walls and overhead in attic space or in between joists for second floors.
- These feeder pipes are insulated 25mm or 32mm PEX-Al-PEX pipe. Standard PEX pipe with an aluminium core.

Slab Insulation

- MAXRaft ® - refer to www.MAXRaft.co.nz
    - This system is also thermally broken around the entire slab including the edges.
- Cornerstone “Thermaflor”© -refer to http://cornerstoneecohomes.co.nz/page25.html
    - The system was designed to complement the Cornerstone Structural Insulated Panel system. It provides an insulated edge beam with a complete ground cover to ensure full insulation integrity.
- RibRaft® Foundation System – Refer to publication “Superior Floor Insulation Design Solutions”
    - See Solution 3 and Solution 6 primarily.

- Virtually all RibRaft® Solutions exceed the required Building Code Standard that heated floors shall have an R value exceeding **R1.9 m2 °C/W** standard.

- Standard Slab
  - Floor must meet a total minimum R value of 1.9. E.g. 40mm Expanded Polystyrene (EPS) and a 100 mm slab combined meets this minimum.
  - Client/Builder choice can exceed. Extruded closed cell polystyrene (XPS) is good choice; has higher R value per mm and cannot be penetrated by water.

System Design Sizing

- Typical design spec is 65W per m^2 (adjustments are made for climatic conditions and potential solar gain).
- Estimated system run time for average winter day is 8 hours.
- Buffer available extra run time is 16 hours for coldest periods.

Heat Pump Performance

- The heat pump specified for each home will have a Coefficient of Performance at 7°C ambient outside air producing 35°C water in a range of 4.27:1 up to 5.60:1.

warmth.nz Solar-equivalent Hot Water Systems
Save Over 60% of your HOT WATER COSTS
in Canterbury, Just Like Solar,
for as little as $3,750* installed *(incl. GST)*

YOUR HEAT PUMP POWERED HOT WATER SYSTEM

Heat your hot water fast and efficiently with energy from the sun year-round. A standalone SPRSUN air-to-water heat pump takes the solar energy in the air and heats your hot water.
This system will provide the heating of your Domestic Hot Water using only about 40% the amount of electricity that a standard electric cylinder of the same size would use. In Canterbury it is estimated that your system will perform at a running cost level comparable with Solar Hot Water.

SYSTEM TECHNICAL INFORMATION

- The heart of your system is a standalone air-to-water heat pump unit that sits on the exterior of your home.
- Your heat pump is sized to provide ample kW to quickly heat any size, pressure, and make of hot water cylinder.
- Your plumber will provide and install a standard hot water cylinder that is sized for your requirements. Or we can supply the hot water cylinder, and have it delivered to you free of charge, however it still has to be installed by your plumber.
  We recommend the Peter Cocks Silver Bullet Mains Pressure Cylinders with all our systems. We install your hot water heating system right to that cylinder. This is very cost effective for you.
- Most standard electric cylinders operate with a 3kW element. The output of a hot water heat pump will invariably be greater than this and hence heat the cylinder quicker.
- Your system is designed to operate to produce and store water at 55°C to meet the requirements of Legionella control (ref AS3498).

THE SAVINGS AND "GREENNESS" OF YOUR WARMTH.NZ HOT WATER SYSTEM

- A Solar Thermal hot water system In Canterbury would be expected to save about $630 compared to every $1,000 you would spend on running a conventional electric cylinder. For heat pump systems, the savings number would be expected to be $610 savings.
- With Solar Thermal (tubes) you would expect to pay only $370, and with our heat pump system, only $390.
- The trouble for those choosing direct Solar Thermal is that while our system costs from only $3,750* installed, the estimates for Solar tubes installed costs range from $6,000 to $8,000, i.e. our option costs $2,000 to $4,000 *less* to install. With only a $20 savings differential for Solar Themal the capital cost difference in installation will never reasonably be recovered.
- Typical savings with our system should be about $200 - $250 per person per year versus an electric hot water cylinder.
- (Gas hot water systems save about 20% of costs compared with an electric cylinder)

*Original price is $4,600 (incl. GST), but discounted to $3,750 (using a 3.5 kW heat pump) for In-Slab Heating customers. GST included.
NOTE: The figures used for comparison are only indicative figures and may vary from the actual costs and savings.