Insulating Older Buildings

Historic buildings were typically built using materials to hand, with solid walls of stone or brick bound with a lime or earth mortar. Without a cavity, as the mortar was porous the walls were simply made as thick as necessary to stop water coming through. Lack of insulation and poor thermal properties of the materials themselves meant they retained very little heat, and even with insulated doors, windows and ceilings fitted, older properties are still noticeably colder than more modern buildings.

While insulating the walls of a historic building will make it significantly warmer and reduce heating costs, it is important to use the right materials - For a porous (breathable) solid wall any coating you apply must be breathable or your walls will become saturated.

Why Use Roundtower?

Modern closed-cell systems are very good insulators but often have poor fire-retardant properties and have been designed specifically for cavity-wall construction. As they are impervious they will trap moisture within a solid wall and ultimately cause severe damage or even failure.

Insulating plasters are therefore the most appropriate overall, but again not all renders are created equal – many contain cements and/or polymers that are inappropriate for historic buildings, or contain vermiculite or perlite which crushes and packs flat when rendering which reduces thermal properties.

Roundtower Insulating Plaster has been designed specifically for building conservation work, is made with pure Natural Hydraulic Lime and is highly breathable, conservation friendly, and fully compatible with historic masonry. It contains a specialist expanded aggregate that maintains its structural integrity when applied and will not crush or pack flat.

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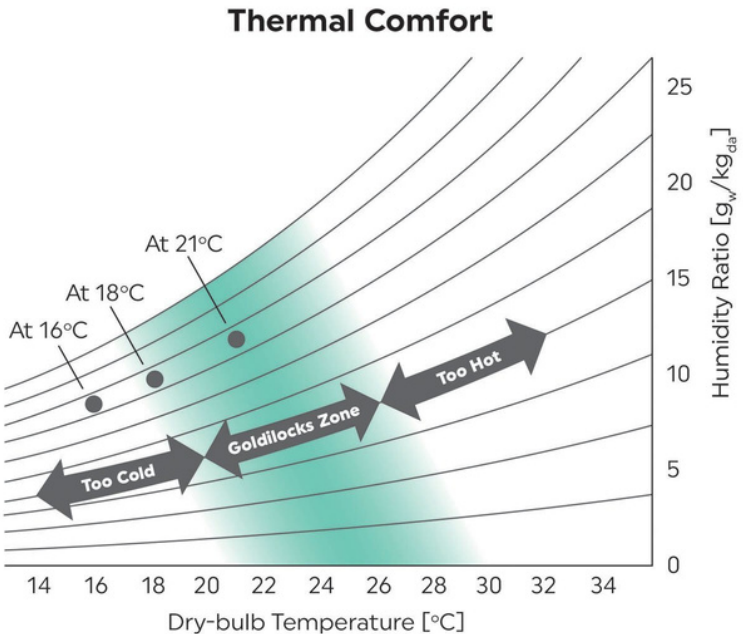
Roundtower Insulating Plaster can be applied at up to 25mm per pass without the need for a stipple coat in most cases, and onto a good background a plasterer can lay up 40mm as a single coat in two passes applied green on green.

It can also be applied as part of a boarded system, using Celenit wood-wool boards as a render carrier to double the level of insulation. As they are mineralised, Celenit boards have a Class B rating (will char but cannot catch fire), and will not crumble or rot when wet.

Thermal Comfort and the benefits of insulation

There is a real need to improve the efficiency of our homes, as around one fifth of the total energy consumption is used towards space heating. The benefits of doing so, however, go well beyond the purely financial.



- It improves the thermal comfort of your home, reducing temperature fluctuation and temperature variation between heated and unheated parts of the house
- With older buildings in particular, applying a breathable insulating render also reduces humidity, mould and condensation.
- And finally it reduces your heating bills and allows you to increase the temperature at which you can afford to keep your house.

Thermal Comfort Thermal Comfort is a standardised measure used by heating engineers, based on at least 8 out of 10 surveyed occupants being satisfied.

Measured under the standards ASHRAE-55 or EN- 15251, for a home environment it is predominantly dependent on four main factors - activity levels and clothing, room temperature and the temperature of the walls themselves.

Activity levels and clothing levels are highly personal and adaptive, and the biggest impact insulation will have on thermal comfort obviously is on the room temperature (what you set the thermostat to) and the temperature of the walls themselves.

The greater the heat loss through the walls, the colder the wall itself will be. Insulating your house not only allows you to increase the air temperature, it also keeps the walls themselves warmer – reducing temperature differences across the house and reducing the rate at which your house loses heat.

World Health Organisation guidelines recommend an internal temperature of no less than 16°C, particularly with people with allergies or respiratory problems, and no less than 20°C for the sick, disabled, very young or very old. The generally agreed ideal is 21°C. But while recommendations are all well and good, heating is expensive. Older buildings take considerably more energy to heat than more modern ones, and, as such, are typically kept colder.

Energy Savings

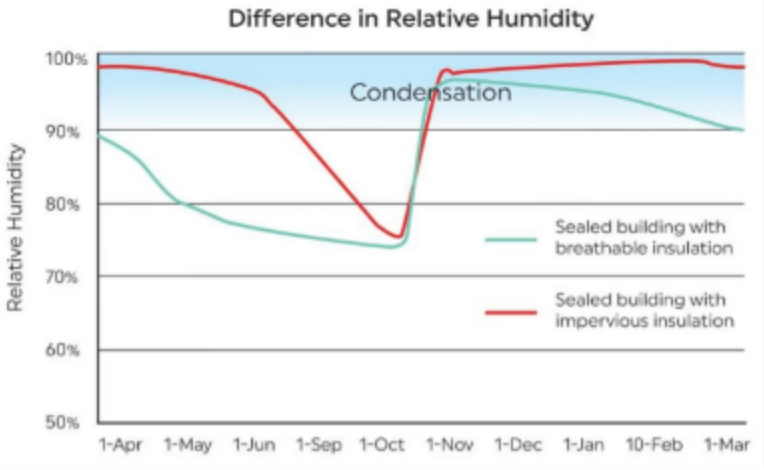
For a typical solid wall construction kept at 18.5°C, applying a single coat of Roundtower Insulating Plaster would allow you to raise the temperature to 21°C for same spend on heating. By applying two coats or a boarded system, energy savings become considerable. Factoring in contractors' costs and tax incentives, a single coat of insulating plaster also costs less to apply than a standard plaster – if you are already planning to plaster the inside of your house, use an insulating plaster.

House - Thermal Comfort and Energy Consumption at 18.5•C					
Thermal Comfort			**Energy Consumption**		
Room Temp	18.5		U Value (W/m2K)	2.10	Based on standardised SAP values for a solid wall
Sensation	Slightly Cool		Annual Energy Consumption (kWHrs)	15,100	Based on heat loss through the walls
En-15251 Category	III	Where I = Most Comfortable	Estimated Annual Heating Cost	£1,125	Based on average rates for oil fired central heating
%people satisfied	86%	3 people in 20 will find this too cold	Annual Carbon Emissions	3,700	Kg CO2 produced per year

	Room Temp	Sensation	EN-15251 Category	% people satisfied	U Value (W/m2K)	Annual Change in emissions (Kg CO 2)	Annual Heating £ Difference	Cost difference to a standard render
Insulated House - Thermal Comfort and Energy Consumption at 18.5 O C								
Single Coat 25mm	18.5	Slightly Cool	III	87%	1.47	640Kg Reduction	£200 saving	£2700 saving
Single Coat 40mm	18.5	Slightly Cool	III	87%	1.25	820Kg Reduction	£250 saving	£150 saving
Two Coat 50mm	18.5	Slightly Cool	III	87%	1.13	920Kg Reduction	£275 saving	£1600 saving
Boarded System	18.5	Slightly Cool	III	87%	0.77	1290Kg Reduction	£400 saving	£7550 saving
Insulated House - Thermal Comfort and Energy Consumption at 21 O C								
Single Coat 25mm	21	Comfortable	I	95%	1.47	120Kg Reduction	£40 saving	£2700 saving
Single Coat 40mm	21	Comfortable	I	95%	1.25	380Kg Reduction	£120 saving	£150 saving
Two Coat 50mm	21	Comfortable	I	95%	1.13	530Kg Reduction	£165 saving	£1600 additional spend
Boarded System	21	Comfortable	I	95%	0.77	1050Kg Reduction	£325 saving	£7550 additional spend

ROUND TOWER

Estimated figures based on an average detached property with solid wall construction, an external wall area of 130m 2 , and oil-fired central heating. Expenditure compared to applying a standard Drymix render internally at 25mm thickness. Figures include VAT and use estimated contractor rates.



Moisture Buffering and interstital condensation

Closed-cell insulation systems such as expanded polystyrene trap moisture in the building, leading to condensation. In a building without adequate ventilation, interstitial condensation starts to form at an internal relative humidity of over 95%, increasing exponentially as humidity increases - the higher the humidity the worse it gets.

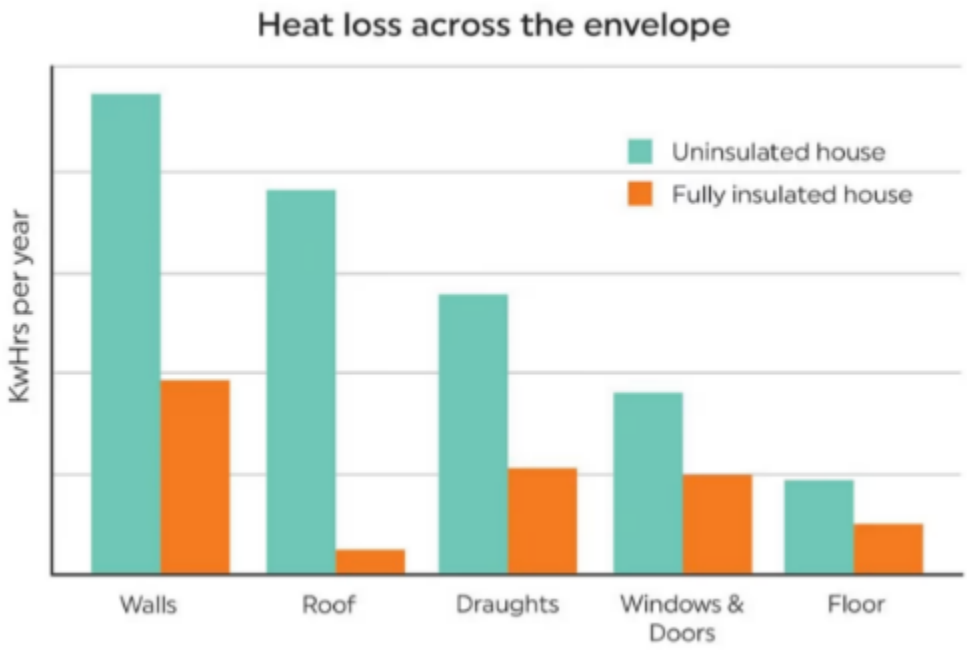
Roundtower Insulating Plaster, which is fully vapour permeable, is able to overcome this problem and reduce both the length of time for which condensation can occur and the severity of any condensation. The insulation is able to absorb and disperse this over time through a process known as buffering. Simply put, it acts in much the same way as a towel by absorbing moisture during peak periods and then slowly drying, allowing it to pass through the wall without causing any build-up.

With expanded polystyrene, the relative humidity internally can be over 95% from October to July, and remains at over 99% for more than half the year. With Insulating Render, relative humidity will still rise above 95% as the weather starts to turn, but then drops rapidly.

Heat loss across a building

Heat loss varies hugely with every building, but as a rough rule of thumb in an uninsulated home 35% percent of heat loss is through the walls, 25% percent is lost through the roof, and the remaining 40% lost through doors, windows, floors and draughts.

Draughts and roof spaces are the easiest to address and should be dealt with first. Replacing old doors and windows is more costly but well worth doing, and if possible it's worth also improving your underfloor insulation. Insulating the walls as well will significantly reduce the overall heat loss, noticeably improving the warmth, comfort and efficiency of your home.



Properties and Specifiication

Composition – 1:3 NHL2 : lightweight aggregate by volume
Thermal Conductivity (independently measured) – 0.123 W/mK (see associated report)
Dry Mortar Density – 610 Kg/m3 Compressive Strength @ 28 Days (dry bar) – 3.60 N/mm2
Vapour Permeability @ 28 Days – 0.71 g/h.m2.mmHg Water Vapour Diffusion Coefficient – 5/20μ (tabulated) Reaction to Fire – Euroclass A1

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