Building warmth and comfort in Westbury Park

WEST OF ENGLAND Combined Authority

Retrofit West

About the author

Rob Benington first lived in Bristol in 1968; he moved away to study Town and Country Planning and Environmental Impact Assessment and to work with environmental consultancies and local authorities in a variety of policy and sustainability roles. In 2001, he moved back and used his experience of home energy conservation to undertake many DIY improvements. He started work as a surveyor with the CHEESE Project CIC in 2019 and now plays a leading role in training new surveyors.

Rob is happy for you to contact him with feedback about anything in this document. All ideas, comments and experiences are welcome. You can email Rob at **vo2max@hotmail.co.uk**

Acknowledgements

Hopefully, this report will help and inspire those wanting to improve their homes. It would not have been possible without financial support from the Retrofit West accelerator programme. The CHEESE Project CIC, especially Mike Andrews, Managing Director, Joshua Mudie, Treasurer, and Tracey Kovacs, Development Co-ordinator have all been really helpful and supportive throughout the project. Thanks to you all. Thanks to all those living on St Albans Road and Devonshire Road who were surveyed, or who contributed to the project in other ways.

Special thanks go to Jon Lane for designing the cover and to Christian Meylan for the great work on the curtain-performance graphics.

Jeff Bishop will be known to many in the area and his publication on the history of Westbury Park provided much interesting context. If you are interested in reading into the detail of the areas origins, the booklet is available from the reference section of Bristol lending library on College Green.

Reference: Jeff Bishop and Jeff Hurran, *The Making of Westbury Park.* Westbury Park Community Association.

Disclaimer

Every building is unique. Before taking any action based on information in this report, expert advice should be sought.

Date of publication

Contents

1. Victorian houses in Westbury Park

1.1 The cluster project

Devonshire Road and St Albans Road were selected for study because of the similarity in age and construction of the buildings on these two streets. Funding from Retrofit West's Community Group Retrofit Accelerator programme enabled the project to go ahead. During November and December 2024, at least one leaflet promoting the project was posted to all the eligible houses and some cold calling took place. As surveys were completed, residents were encouraged to tell their local WhatsApp groups what they thought of it and this helped to promote the opportunity.

11 thermal surveys from the two streets were analysed to identify the common causes of heat-loss. The results are presented in this report, which has been shared with all residents in the cluster.

The aim of the project is primarily to reduce energy wastage and thereby tackle one of the causes of climate change. As residents become more aware of how their homes are losing and gaining heat, they will be more able to take action to reduce both their winter fuel bills and improve comfort levels as summers become hotter and hotter.

A fan is set into the door frame during the survey.

1.2 The CHEESE Project C.I.C.

An internal thermal survey is the perfect starting point for retrofit because it identifies all the thermal weaknesses - the points at which heat is lost and gained through the 'thermal envelope' of the building. CHEESE (Cold Homes Energy Efficiency Survey Experts) is a multi-award-winning not-for-profit Community Interest Company (C.I.C) that has been combating fuel-poverty and reducing carbon footprints since 2014. CHEESE has delivered over 1,200 surveys in Bristol, Bath and South Gloucestershire.

Their powerful fans suck draw cold air in through all the gaps in the building. Using a bespoke Heatview® thermal camera with software designed by their own technical experts and working with residents, they examine air movement and see into the structure of the building to reveal where heat escapes when the fan is not there. Surveyors give information to clients about what they might do to address the issues that are found.

For the Westbuty Park cluster project, CHEESE agreed to reduce their charges, meaning participants only had to pay a £25 booking fee for their thermal survey.

www.cheeseproject.co.uk

A CHEESE survey in progress.

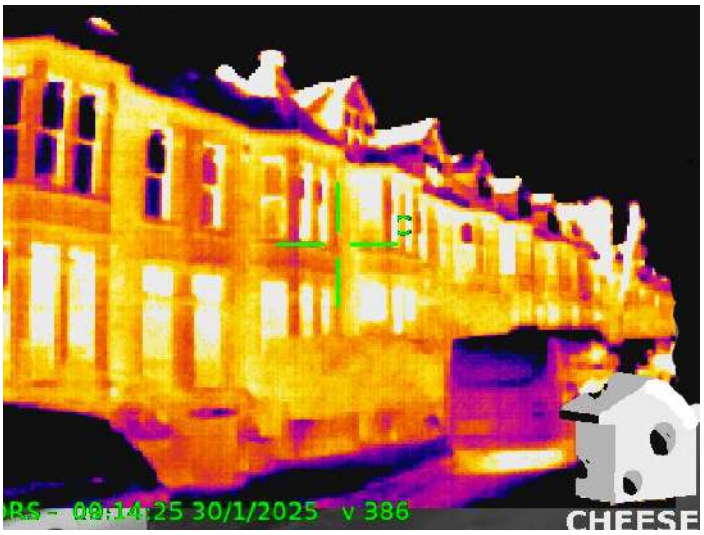
1.1 Houses on Devonshire Road and St. Albans Road

Extensive plans for the St Albans Estate that incorporated St Albans Road and Devonshire Road were laid in 1898 by Fredrick Shrove, Architect and Surveyor, on behalf of the landowners, Hankins and Heyward. Land on the two streets was sold to developers in plots of varying size, with the developer of each plot able to create their own minor variations on the theme established in the original plans. 11 different builders worked on St Albans Road alone. Most of the building was complete by 1907, with houses typically selling for around £450.

The 'L' shaped plan of the terraced houses have a thin rear extension to the square-shaped main body of the home, conceived to maximise floor area, enable light penetration and minimise the frontal area of the building so more homes could be built within each plot. Each builder embellished their work with extras and fancy details such as the use of carved stone, stained glass and decorative fireplaces, door knobs and mouldings, but from a thermal perspective, the most significant variation is probably the use of the attic, which in some homes was planned from the outset to be used as a bedroom.

Despite the variation in appearances, as built, the thermal efficiency of each style of home would have been similar due to the conformity of construction materials and techniques of the time. Fireplaces, solid walls, suspended floors and single glazed windows all create significant opportunities for heat-loss that were treated with the methods available; porch doors, pelmets, curtains and carpets. Modern improvements - double glazing, kitchen extensions, loft conversions, gas central heating and polished floorboards for example - have their own thermal characteristics and each building's use of energy is a combination of the old and new features.

This report is based on information from the Victorian/ Edwardian houses on Devonshire Road and St Albans Road, but much of it is likely to be relevant to other domestic property of this age.



Q To what extent do houses that look the same share the same thermal characteristics?

Showing the blocks of homes built by different builders on St Albans Road

A To find out, a sample of homes had thermal surveys carried out by the CHEESE Project CIC and the results are presented in this report.

2. Summary of the thermal findings

Eleven homes from 126 in-scope homes were surveyed. The main findings are:

- Insulated suspended floors are uncommon but there are examples of well-insulated floors amongst the sample;
- Draughty fireplaces are very common. Awareness of Chimney Sheep and Chimney Balloons is high, but the way they were fitted often left air-gaps that need attention;
- Every home has a draughty letterbox;
- No home consistently uses energy efficient window coverings, with curtains usually being the wrong length;
- Every home has uninsulated single-skin walls;
- Draughts from under the skirting boards are universal;

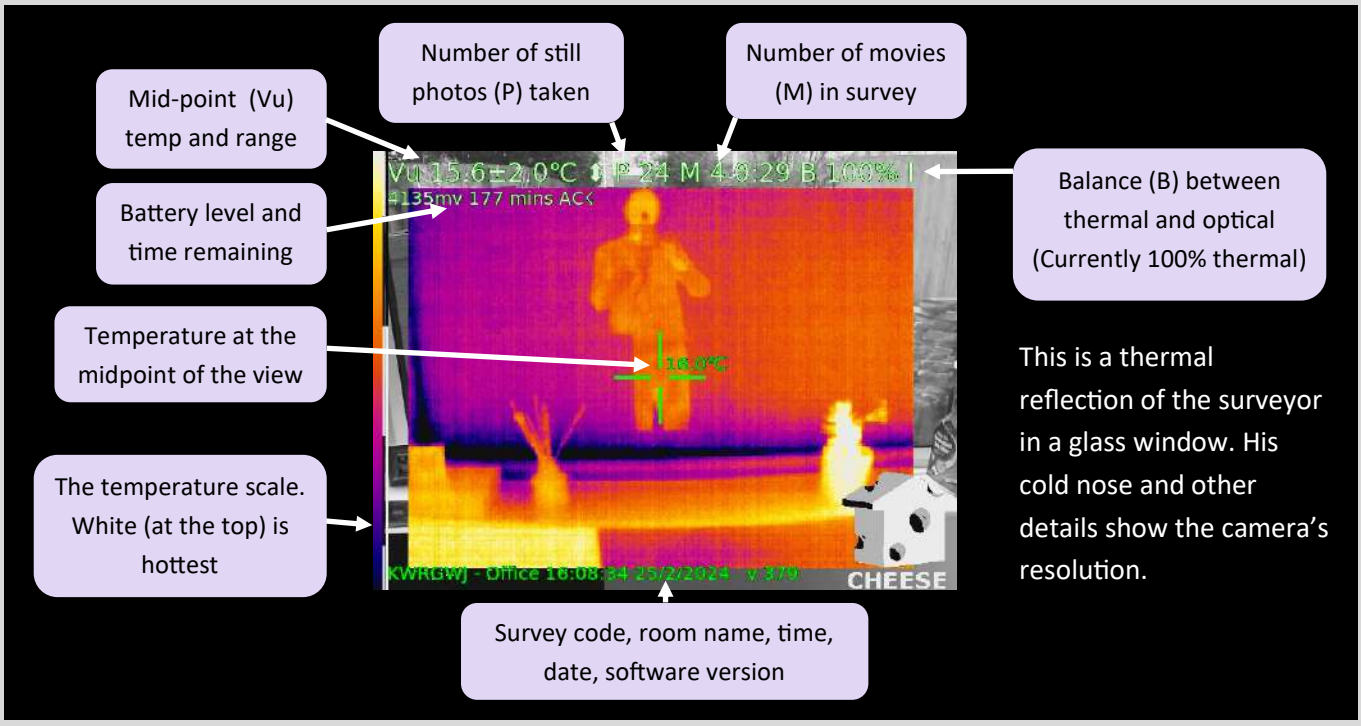
Descriptor	Meaning
UNIVERSAL	Present in all (100%) of the homes surveyed
COMMON	Present in 50—99% of homes in the sample
OCCASIONAL	Present in less than half (50%) of the homes

- Single-glazing over the front door is common, but some have encapsulated the original stained glass to preserve the beauty and keep more heat in;
- Every house has reflective radiator panels missing where they would be of benefit,

and

- Hardly anybody knows how much energy they use.

Interpreting Heatview© thermal images



Relatively cold

Relatively warm

The images in this publication are generated by Heatview© software operating on thermal cameras custom-built for use by The CHEESE Project C.I.C. Other thermal cameras are available for purchase, hire and loan, but without an extractor fan to reveal hidden draughts, the results are unlikely to be as comprehensive. Trustpilot reviews show how much clients value a surveyor trained and experienced in interpreting the thermal images. **www.trustpilot.com/review/cheeseproject.co.uk**

Summary table

Not every thermal finding is listed above. The findings listed are those that provide opportunities for improvement. Some homes have had works carried out to improve insulation and draughtproofing; these are not listed below but are referred to in the discussions on the following pages.

Feature	Frequency	Notes
Chapter 3: Loft		
3.0 Cold loft hatches	7/11 (64%)	Can be extremely draughty in converted lofts.
3.1 Draughty eave access hatches	3/4 (75%)	Hatches were totally obscured in one house.
3.2 Thin / irregular loft insulation (no loft conversion)	6/7 (86%)	Four homes had loft conversions.
3.3 Holes in ceilings	7/11(64%)	Usually only small, but most homes have many of them.
3.4 Poor insulation in bay-window roof	5/11 (45%)	
Chapter 4: Single glazed windows		
4.0 Ineffective draughtproofing	5/11 (45%)	Single-glazed windows are becoming less-and-less common.
4.1 No secondary glazing on single panes	8/11 (73%)	This includes glass over front doors.
Chapter 5. uPVC windows and doors		
5.0 Window frame draughts	5/11 (45%)	
5.1 Failed rubber seals	6/11 (55%)	Cause draughts that can lead to unnecessary window replacement.
5.2 Thin uPVC doors	3/11 (38%)	
5.3 Inefficient window coverings	11/11(100%)	A huge opportunity for improvement in every house.
5.4 Trickle ventilators	3/11 (27%)	
Chapter 6: Pipework problems		
6.0 Draughty waste pipes	8/11 (73%)	
6.1 Uninsulated pipework	8/11 (73%)	
6.2 Ventilation fans	7/11 (64%)	
Chapter 7. Draughty fireplaces		
7.0 Draughty fireplaces	10/11 (91%)	
Chapter 8: Heat losses from the hallway		
8.0 Inefficient front doors	10/11 (91%)	Much can be done to improve classic timber doors.
8.1 Draughty letterboxes	11/11 (100%)	Having a big hole in the front door is optional.
8.2 Inefficient porch door	11/11 (100%)	Good inner ‘porch’ doors bring big thermal benefits.
8.3 Holes in the floor	11/11 (100%)	Includes floorboards, around pipes and under skirting.
Chapter 9: Floors		
9.1 Uninsulated and draughty floors	10/11 (91%)	Most floors are still uninsulated and somewhat draughty.
9.2 Skirting board drafts	11/11 (100%)	
9.3 Uninsulated concrete floors	4/11 (36%)	
Chapter 10: Cold external walls	11/11(100%)	Present in all homes in the sample.

Do you use a lot of fuel?

Most people don't know how much energy they use each year. Many assume their annual KWHs are on their bills or on an 'app', but then can't find them. Some figures in the table below are estimates obtained from **energy.comparethemarket.com** which provides consumption data for most homes in the UK.

Many factors affect fuel consumption and each household will use energy differently. The consumption of people living in varies significantly and shows that what we each do makes a difference.

Kilowatt hours per year	GAS (kWh)	ELECTRICITY (kWh)
Average per house	14194	2780
Highest consumption (house) (From estimated readings)	29420	4028
Lowest consumption (house)	9803	1900
Annual average per adult	5110	889
Highest annual use per adult	14710	1550
Lowest annual use per adult	2803	502

Some commentators describe home energy as 'invisible'; we tend to focus on things we plug in or switch on, even though 'hidden' uses like water and space heating consume much more power. Not knowing know how much energy is being used is a problem; it makes managing costs and consumption more difficult because the biggest uses may be hidden, especially where dual-fuel contracts obscure the split between gas and electricity use.

The warmer, wetter winters and hotter, drier summers with the increased frequency of the intense weather events we are now experiencing are exactly what climate scientists predicted would result from failure to reduce greenhouse gas emissions. Powering homes accounts for c.13% of the UK's greenhouse gas emissions, (ONS, Mar 24) but potentially a larger proportion of our own personal liabilities. Improving draughtproofing and insulation is certainly one of the best ways for most homeowners to reduce their carbon pollution, given the extra comfort and financial benefits that will be achieved at the same time.

Top tips

Every thermal survey reveals areas of heat loss that homeowners are unaware of and helps to prioritise ways to keep warmer and cut bills.

The information in this report should make it possible for most owners to make some improvements without having a survey carried out, based on the common thermal characteristics of the buildings. A visual check for common findings will probably identify many simple actions that will make a difference. It is important to attend to the small jobs - which on their own may seem insignificant - because the cumulative effect of small improvements will equate to filling a sizeable 'hole'.

The following tips are drawn from the findings of the sample surveys. You can find many other lists of generic energy-saving tips on the internet, for example the Centre for Sustainable Energy's fact sheets about insulation and ventilation: **www.cse.org.uk/resource/home-energy-fact-sheets/**

- Find out how many kWhs of energy you are using
- Make sure the loft hatch and eave access hatches are properly insulated and draft proofed
- Check rockwool loft insulation is at the recommended minimum depth of 270mm and top-up if necessary
- Check cupboard ceilings for holes left when water tanks were removed and where cables run down from the loft
- Check your rubber seals and/or get windows serviced
- Improve the thermal properties of your blinds, curtains and shutters
- Check that backdraught prevention on ventilation fans is present and working
- Block up draughty fireplaces during the winter

and

- Fill-in letterboxes and replace with an external, wall-mounted, lockable box

3. Lofts and ceilings

3.0 Cold loft hatches COMMON

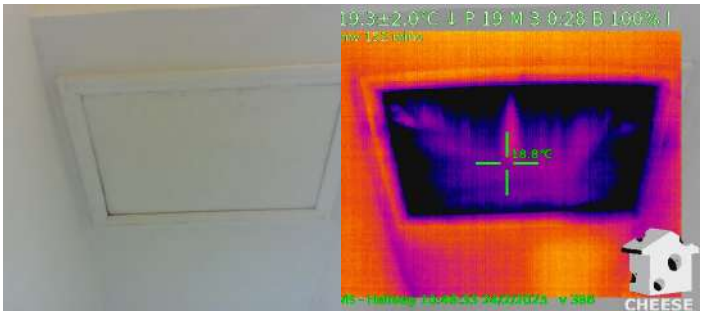
The thermal qualities of loft hatches in the homes surveyed varied from reasonable to very poor.

To improve thermal efficiency, the traditional loft hatch (usually just a board of ply or solid wood) benefits from having a layer of insulation attached directly to it on the loft side. About half have some, but its often too thin to be making much difference. PIR (often referred to by one brand name 'Celotex') is easy to glue to the hatch with PVA adhesive. Offcuts are often found in skips. The thicker the insulation the better - 100mm is good - roughly equivalent to 200mm of rockwool loft insulation. Alternatives to PIR include polystyrene, wood -fibre products and rockwool insulation.

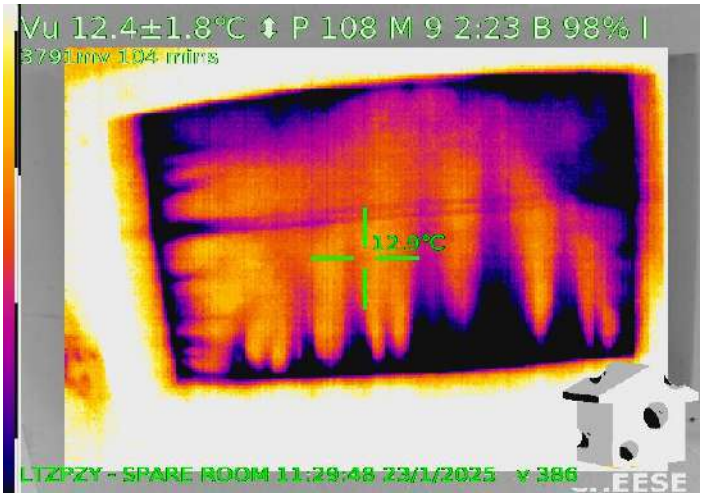
Loft ladders can restrict the depth of insulation that can be attached to parts of the hatch, but insulation is usually easy to cut to shape and there is often room for at least 50mm.

Draughtproofing loft hatches is very important. Cold air falls (it is less dense than warm air) through any gaps and on downwards, cooling the house. When indoor temperatures are high enough, hot air rises through any gaps and escapes, lowering the air pressure inside the house. This draws colder air in at the bottom of the house. This is called the Stack Effect. It makes houses operate like a chimney. Opening loft hatches in hot weather helps cool houses down.

Many draughtproofing products are available to buy, but most rely on the weight of the hatch to compress them and block out the air. They work much better if a fastener (like the ones pictured which are also used on wooden sash windows) is used to clamp the hatch down, forcing the gaps closed and creating a tight seal. The fastener pictured has a screw fitting, so the tightness can be easily adjusted.



A draughty and uninsulated hatch on Devonshire Road



This hatch from St Albans Road is probably insulated, but is very draughty.

Clamping hatches closed helps stop draughts

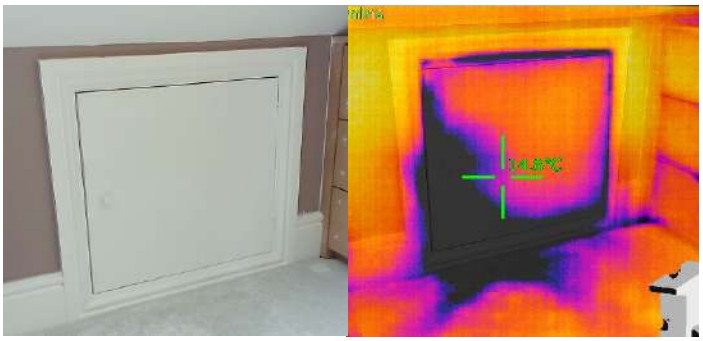
A well-insulated loft hatch with 100mm of Celotex PIR

3.1 Draughty eave access hatches

COMMON

Eave access-hatches are often found in converted lofts. The space behind the hatch is often designed to be ventilated and the eaves should not be blocked up. The hatches are usually large enough to crawl through and are rarely properly draught-proofed or insulated. Without proper treatment, many hatches allow an extraordinary amount of air to pass through them.

Access-hatches should be treated in the same way as loft hatches, with airtight seals blocking out the draughts and with as much insulation as possible attached to the rear of the hatch itself. Particular attention needs to be given to the lock or catch mechanism so the hatch clamps firmly shut and makes the draughtproofing effective.



Most eave access hatch doors are very draughty

A good example of insulation (but not draughtproofing)

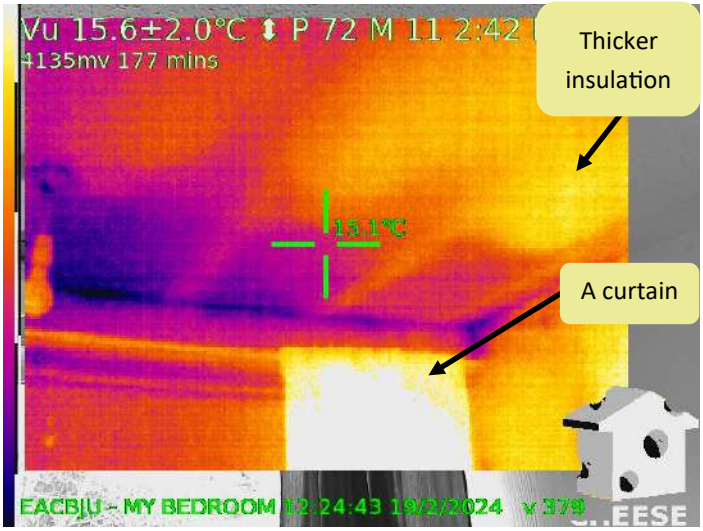
3.2 Thin / irregular insulation

COMMON

86% of un-converted lofts did not have the recommended minimum depth of rockwool insulation across the whole ceiling. The minimum has steadily increased: installing it may be a fit-and-forget job and if done years ago to the standards of the time, adding more now is likely to be worthwhile. Loft conversions are insulated in a different way.

The minimum depth of rockwool loft insulation to meet current building regulations is 270mm or 10.5 inches

And of course placing boxes on top of rockwool squashes it and reduces its usefulness. Boarding also limits the depth, but ways around both problems exist. Sometimes shelves can be added to the walls and used for storage, or loft stilts raise the floor and create space for insulation. Rockwool is not the only material that can be used: better products do not have to be as deep to get the same benefit, but tend to be more expensive. Wood-fibre products or PIR (made by Celotex, Kingspan and many others) may be good to use, possibly just where space is limited under boarding or in the eaves to keep material costs down.



Patchy, inconsistent loft insulation

Cold eaves where the insulation is too thin

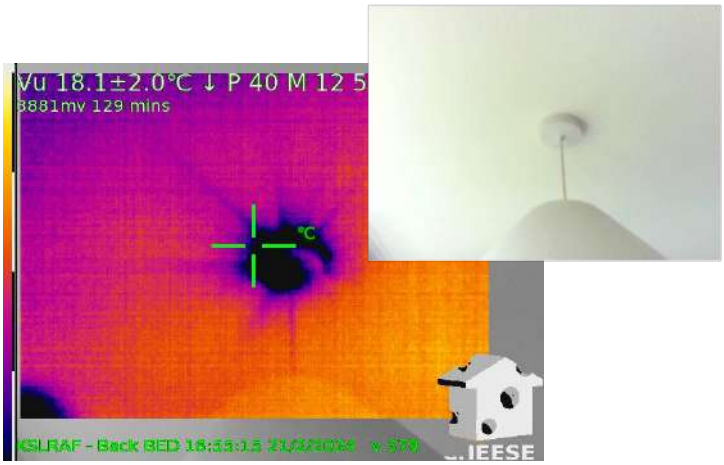
3.3 Holes in ceilings

COMMON

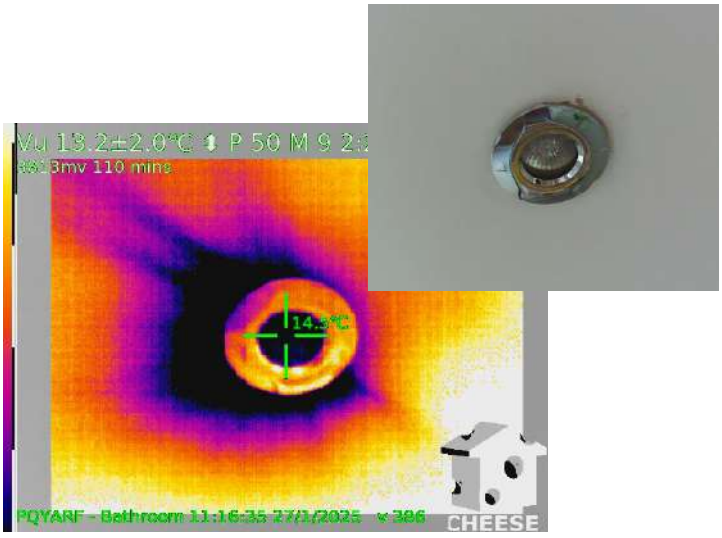
Most of the surveyed homes have holes in the ceilings, where heat escapes and cold air finds its way into the house from the loft. They are often hidden behind ceiling roses for light fittings and in cupboards where the ceilings are not usually visible. Routes for electric cables (light pendants and light switches), ventilation fans, downlighters and plumbing pipework all allow heat to escape around them if not draughtproofed.

Usually holes around the cables can be filled in, but care is needed around electrical cables which should not be thermally insulated. Powder fillers or electrical tape should be OK. On the top floor, filling and sealing holes can sometimes best be done from the loft.

Downlighters (or spotlights) can be very draughty, with air coming both through the light around the bulb and from under the surround. There are many discussions online about how to solve the problem. Ingress Protection (IP) rated downlighters are usually much more efficient, and are required in wet areas for safety reasons. Some have an air-tight seal between the shroud and the bulb and a fitting that tightly clamps the bulb to the plasterboard of the ceiling. Many different designs are available.



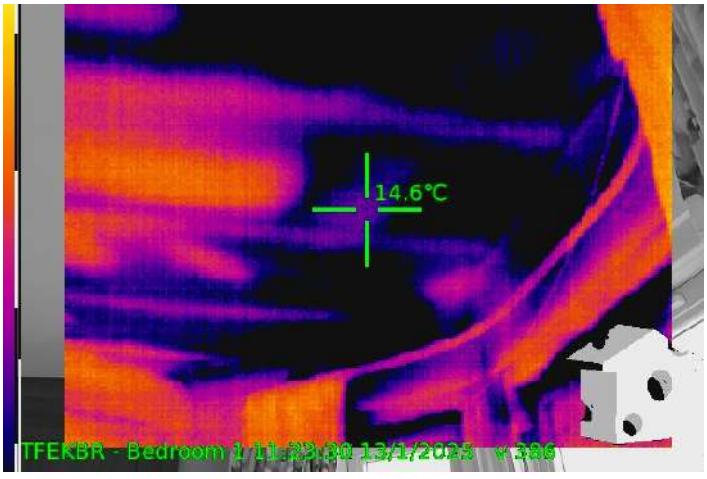
A typically draughty light pendant



Draughty downlighter

3.4 Poor insulation in bay window roofs

OCCASIONAL

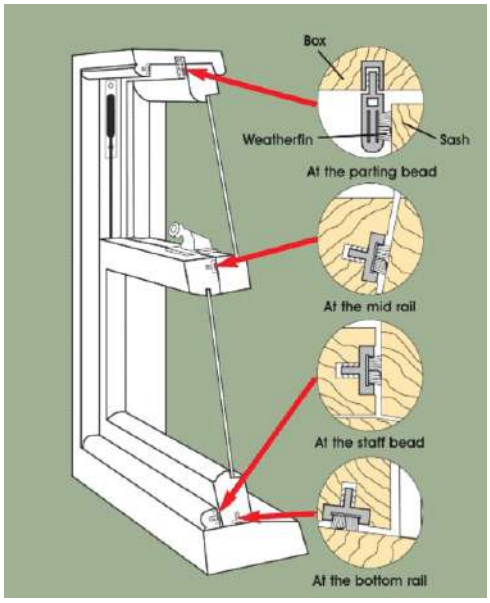


Where present, roof space above bay windows can be difficult to access and insulation is often irregular or missing entirely. This is a problem if there is not a habitable room above because all the heat is lost to the outside. Fitting insulation is best done from the outside when the tiles are removed from this part of the roof, but it is possible to remove the bay ceiling and insulate from below. However, if the original lath and plaster ceilings are in situ, this destructive and messy route is probably best avoided. This approach is easier with a plasterboard ceiling.

4. Single-glazed windows

Where they remain, single-glazed sash windows are usually the worst thermal feature of the house. They are very draughty and have very low resistance to heat passing through them. A lot can be done to improve their performance at relatively low cost while preserving their charm: effective draughtproofing and secondary-glazing solutions are available.

73% of homes had some single glazing (usually over the front door), but only two homes still had timber sash windows.



4.0 Ineffective draughtproofing

OCCASIONAL

Where timber sash windows remain, 100% were draughty. Brushes can be rebated into the frames of the sashes and beads with brushes installed can also be used. These reduce the air coming around the frames a lot, and stop the windows rattling in the wind. But over time they can get squashed flat, and paint may clog them and stop them working well. Some maintenance is required, but happily the staff beads are relatively easy to replace. Replacing the brushes in the frames is more involved because it can require removing the window.

4.1 No secondary glazing

COMMON

There are many companies who provide secondary-glazing services to suit all styles of windows; each has their own approach and it is necessary to shop around to find the solution that will work best for you and your windows.

But DIY approaches can work well. Acrylic plastic is often used. Perspex is a brand of acrylic. There are many on-line companies offering the same material cut to size. Acrylic sheets can be screwed to the wooden frames, attached with double-sided or magnetic tape or held in place with a product called 'Liteglaze glazing strip'. Using magnetic tape or 'Liteglaze' can improve the whole window, cutting out draughts and dramatically reducing condensation while still allowing easy opening when the acrylic is removed in the summer. Effectiveness depends on the airtightness of the seal between the acrylic and the window frame, (not so much the thickness of the plastic). There are videos on You Tube of DIY'ers making these improvements.

Acrylic is an improvement on the thin, cling-film style sheet - often applied using hair dryers - which can work very well, but are not as durable.

'Liteglaze' glazing strip.

Magnetic tape used to fix acrylic plastic

5. uPVC windows and doors

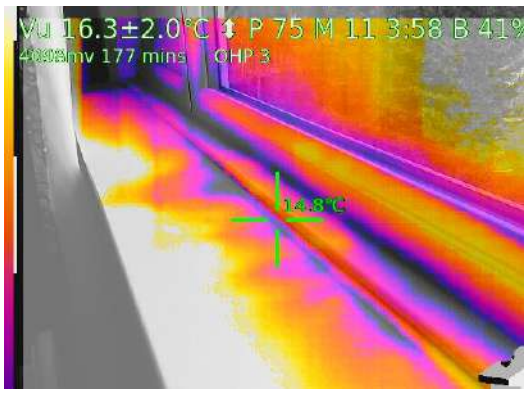
5.0 Window-frame draughts OCCASIONAL

Strips of plastic called window trims, or cloaking profiles, are often used to tidy up the installation of uPVC windows. They make it quick and easy to hide cracks and holes between the window frame and the wall that were left when the frames were installed. They are usually held in place with double-sided adhesive tape or blobs of adhesive and finished with silicone sealant, so are quite easy to remove. This exposes any holes they are covering and allows them to be filled. Once any holes are filled and wall painted they don't have to be replaced. It might be worth checking behind them if you are suspicious and your windows are a few years old.

Alternatively, without removing the plastic, filling any gaps between the plastic trim and the wall with silicone sealant can prevent draughts.

Windows installed after 2022 should be compliant with the new building regulations. As well as making the glass panels and frames more energy efficient (meaning new windows should allow less heat-loss in winter and heat-gain in summer), the new regulations tighten-up on the approved method of installation, meaning fewer gaps between the frames and walls. But there will inevitably be some variation in the quality of workmanship.

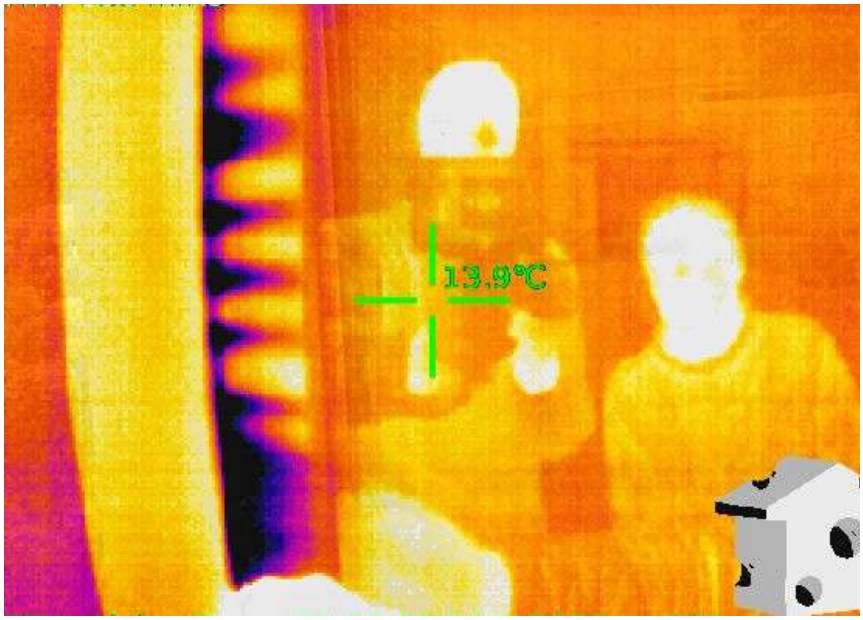
Pulling back the window trim reveals the holes lurking beneath



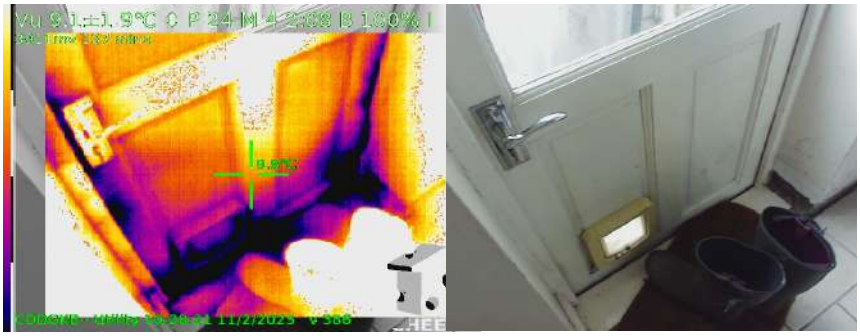
Draughts around cloaking profiles

Gap between frame and masonry

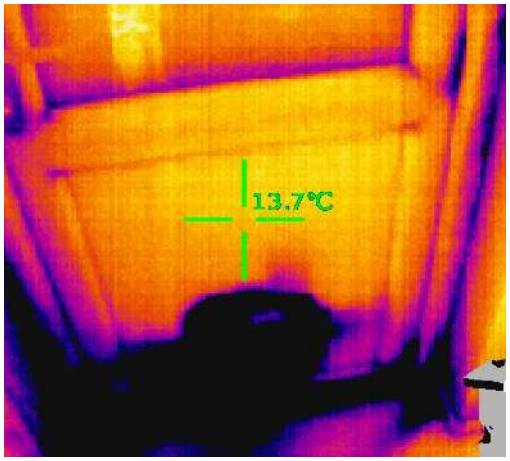
Expanding foam is used to fill gaps



A failed bubble gasket creates the tell-tale draught pattern as surveyor and client watch on.



Draughty cat flap and cold door.



Another draughty door and cat flap

5.1 Failed rubber seals

COMMON

uPVC windows and doors use rubber seals, (also known as bubble-gaskets), to seal the gaps between opening windows and the frames. After 15 years or so, the rubber starts to deteriorate due to exposure to ultraviolet light and repeated heating and cooling. Eventually they lose their flexibility - and with it their ability to seal the gaps - and windows and doors can become draughty. If gaskets don't feel soft and flexible anymore, or if the rubber is cracked or damaged, simply replacing the gasket may solve the problem.

17/20 (85%) of surveyed homes had some gasket issues. Gaskets are usually quite easy to replace, (YouTube has videos showing how), but the design of the gasket can vary with the design of the frame, so it is best to get a sample pack from online retailers or local glazing companies. These will help you to identify the correct gasket.

Adjustment of the hinges and fixings may also become necessary after years of opening and closing.

5.2 Thin uPVC doors

OCCASIONAL

Particularly common in kitchens and extensions, thin plastic doors are not very efficient. As well as having poor thermal resistance compared to walls, weaknesses in the gaskets or the hinge alignment will let in cold air.

Improvements include fitting heavy curtains and lining door panels with acrylic plastic sheet to create an insulating pocket which can be filled with double-sided foil (or similar) to add extra insulation.

Cat flaps are usually very draughty. Surprisingly, some people have cat flaps, but no cat. When no longer needed, they can be covered over or filled in.

5.3 Inefficient window coverings

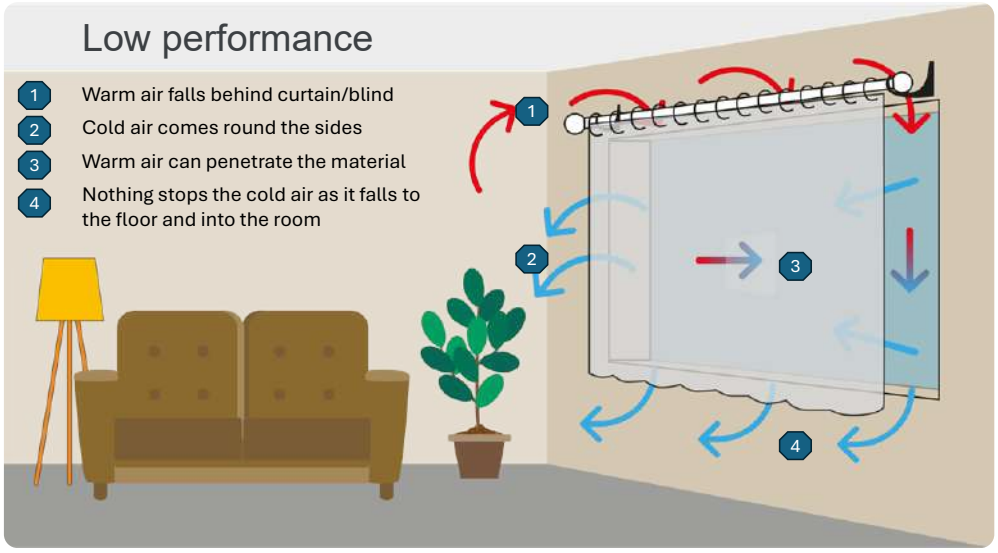
UNIVERSAL

Not one surveyed home had thermally effective window coverings on all the windows - a huge lost opportunity. A thermally efficient window covering (be it a blind, curtain or shutter) will control both heat-loss in winter and heat gain in summer and will have:

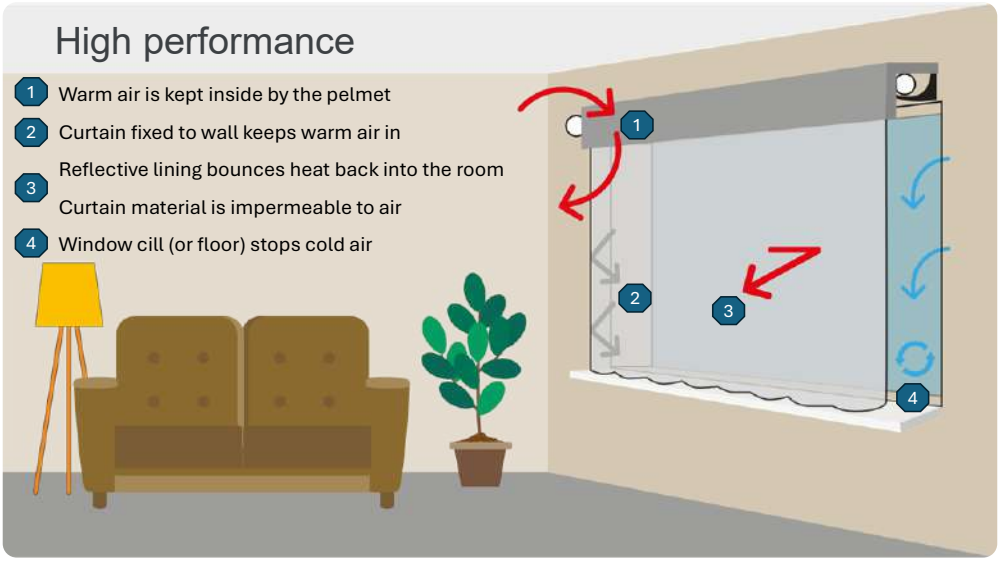
A thermal image of cold air coming round the edge of a curtain

1. Tight seals. Attaching them to the wall or window frame so air cannot pass around the sides, perhaps with Velcro or magnetic tape, can improve performance of double glazing by 19%, (Fitton, R. et al, (2017). Curtains should rest firmly on the window cill or the floor to prevent cold air coming out underneath their lowest edge. Pelmets stop warm air escaping down the back of curtains and cold draughts getting in over the top and are useful if it is impossible to get the curtain close enough to the ceiling.

2. Pockets of air. Still-air is an insulator. Just like layers of clothes, multi-layered structures trap more air, so using inter-linings will improve heat retention. The folds in curtains trap air naturally - so make sure they are wide enough to create deep pleats. Some blinds have a honeycomb structure that creates this effect.



3. Resistance to air. Some shutter and venetian blinds are weak in this regard because of the gaps between the slats. If daylight is visible through the material, it is likely to be permeable to air. Material with a higher thread count (TPI) will be denser and so more resistant to air penetration. If the TPI of a material is not available, weight can be a useful proxy. This is measured in grams per square meter, (gsm). Aim for 300gsm or more.



4. Resistance to the movement of heat. Wool and velvet have better insulating properties due to their higher density. Additional insulating layers or 'thermal liners' made from foam, polyester or fleece will improve warmth.

5. Reflective surfaces. Reflective thermal curtain linings are available which bounce heat back indoors. Some blinds can be highly reflective.

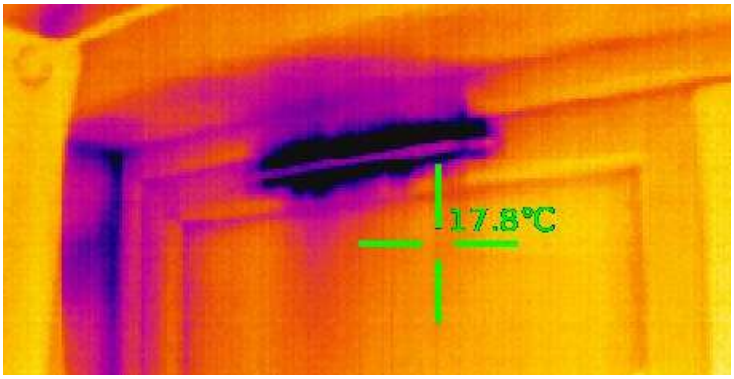
5.4 Trickle ventilators

OCCASIONAL

A recent change to building regulations now requires ventilation to meet certain standards and not to be reduced when windows are replaced. Background or trickle ventilators in windows and doors are becoming more common as a way of meeting this standard. Unfortunately, most let in cold air, whether or not they are 'closed'. Some are more air tight, but air can come in along their edges where the ventilator meets the frame. But only 3/11 homes (27%) had any trickle ventilators, probably because the windows have not been replaced for some time.

The regulations are there to maintain healthy indoor air quality; this is important and can be achieved in various ways. Demand for fresh air depends on occupancy levels and behaviour and many homes currently do not have or need trickle ventilators. Taping them closed may be an option in some cases, but care should be taken to maintain an adequate supply of fresh air from controllable sources of ventilation.

An example of a trickle or background ventilator



This trickle ventilator is closed, but the air is coming in around it, along its edges.

What's an EPC got to do with it?

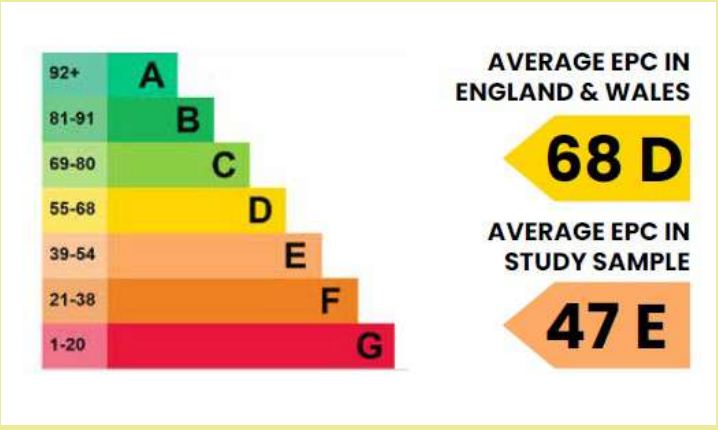
Energy Performance Certificates (EPCs) provide an indication of the energy efficiency of a property, typically issued upon construction, sale, or rental. EPCs inform homeowners, tenants and prospective buyers about energy performance and they have some useful information about how the house is built and include recommendations for improvements.

However, EPCs may not always provide homeowners with an accurate impression of their home's energy consumption because they:

- are based on standard assumptions about occupancy, heating patterns and usage, which may not reflect individual household behaviours or specific features of the property;
- rely on visual inspections rather than comprehensive energy audits, potentially overlooking nuances in building construction that can significantly impact energy performance, and
- except in new houses they do not thoroughly address draughts and air leakage, which can significantly affect energy consumption and comfort levels.

The average EPC for dwellings in England and Wales is 68— or 'D', (2023). EPCs are available for six of the 11 homes producing an average of 47 - a mid 'E' score, worse than the national average. The highest score achieved was 66, the lowest, 21.

YOU CAN TAKE A LOOK AT YOUR EPC AT:
WWW.GOV.UK/FIND-ENERGY-CERTIFICATE



Draughts v ventilation

According to the Energy Savings Trust :

> *"Draught-proofing is one of the cheapest and most effective ways to save energy – and money – in any type of building. Controlled ventilation helps reduce condensation and damp, by letting fresh air in when needed. However, draughts are uncontrolled: they let in too much cold air and waste too much heat".*
>
> *www.energysavingtrust.org.uk/advice/draught-proofing*

All buildings need ventilation, but most have too much, or it's in the wrong places. The most modern and energy-efficient Passivhaus designs (passive houses) are effectively built within giant plastic bags, the idea being to cut out every draught. Great care is taken to make sure there is nowhere for air to leak inside. Some companies help make buildings more airtight by blowing a pressurised mist of plastic inside. As it finds its way to the outside, it sets hard, sealing small cracks and gaps and dramatically improving air tightness.

Draughts are neither healthy nor necessary. But controllable ventilation is essential. Requirements are set out in *Building Regulation Approved Document 'F': Ventilation*.

Passive houses are so efficient they don't require any heating in addition to that derived directly from the sun and that produced by cooking, lighting and from body heat. Fresh air is introduced through an energy-efficient system of Mechanical Ventilation with Heat Recovery (MVHR) which warms the cooler, fresh air being brought in with the heat from the warm, moist air that is being expelled. While extractor fans are effective for removing moisture and odours, they don't recover heat, leading to potential heat loss and higher heating bills, especially in colder climates. Small MVHR fans are available and are designed to replace the old-fashioned extractor fans found in many of our kitchens and bathrooms.

Controllable ventilation is very important for all sorts of reasons, but most homes are just too draughty and let in more air than is necessary.

c. 15% of heat loss is caused by draughts

A small MVHR extractor fan suitable for one room.

6. Pipework problems

6.0 Draughty waste pipes COMMON

An unsealed waste pipe

Hole around a toilet waste

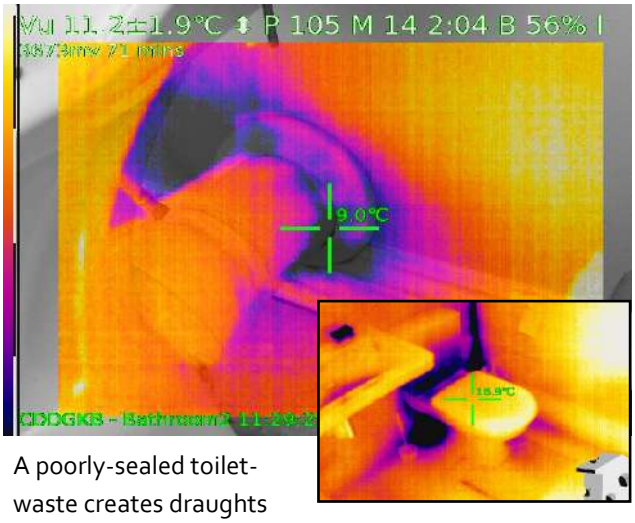
When pipework penetrates walls and is not sealed properly, or when time degrades the sealant that has been applied, cold air can enter the house around the pipework. Often, pipework is hidden behind boxing, under floorboards or behind cupboards and the cold air sometimes emerges a considerable distance from the pipe itself, making finding the source of the draughts more difficult – unless you know what to look for. Blocking one such source of air ingress can sort out many separate cold spots. Draughts may appear around bath panels, under kitchen units, under skirting boards, around toilet flushes that are set into wooden boxing and of course around the waste pipes themselves.

A visual check from outside is often the best way to see if this might be a problem that can be solved with mastic or silicone sealants. But if external access is difficult, or if the pipes are some distance away (making it difficult to see the tiny cracks in sealant that occur over time), the source of the cold can usually be reached and filled from indoors.

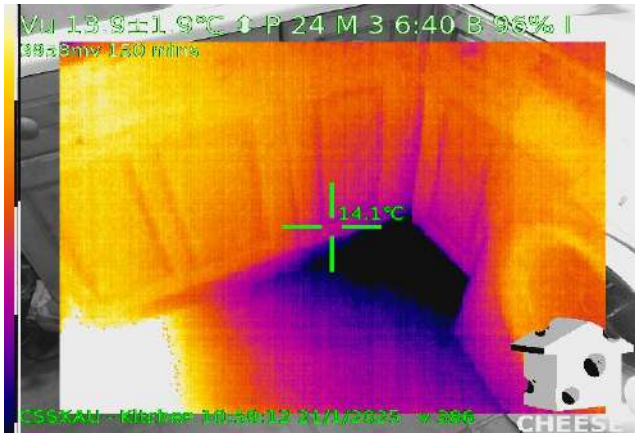
6.1 Uninsulated pipework COMMON

Central heating and hot water pipes run through the floors and walls. Usually they are missing the pipe lagging that is used to keep the water hot and the heat-trails often show exactly where the plumbers have found it easiest to install the pipe runs. Not all the heat lost from uninsulated pipes is wasted because some stays in the building, just not where it is most wanted.

It is not always necessary to lift long lengths of floorboard to insulate the pipes. Wherever possible, pipes are laid so they don't have to be drilled through joists, meaning grey foam pipe insulation can sometimes be 'fed' onto pipes for some meters from a small point of access.

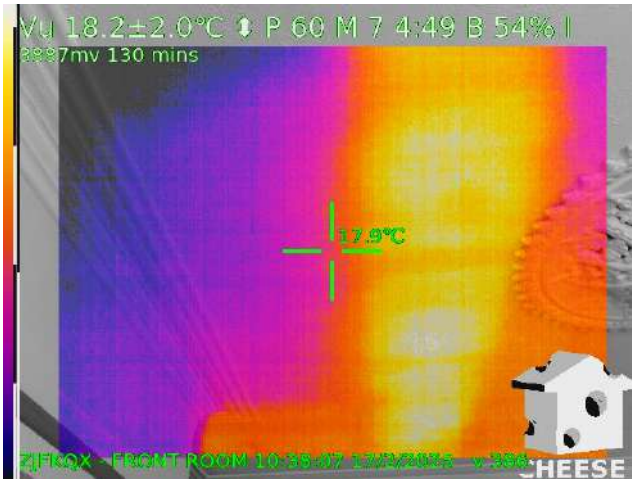


A poorly-sealed toilet-waste creates draughts



How waste pipe draughts can appear in a kitchen

Expanding foam seals pipe holes and floor edges



Waste heat from uninsulated central heating pipes visible in a ceiling

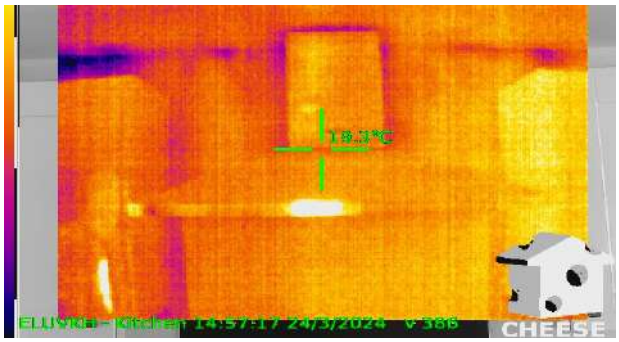
6.2 Ventilation fans

COMMON

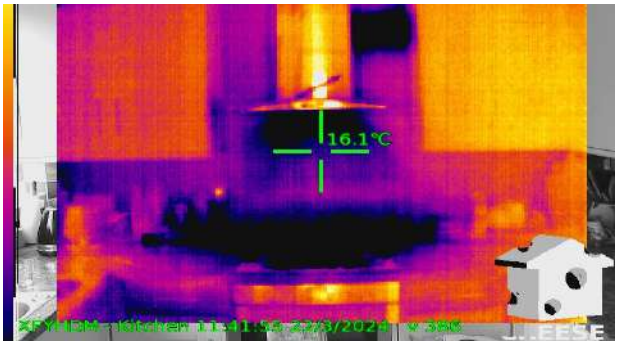
Ventilation penetrations are another common source of air leakage. Typical examples include cooker hoods, extractor fans and boiler flues.

Cooker hoods

Cooker hoods work in one of two ways; some circulate air internally, trapping grease and other particles in a filter. Others have a fan blowing air out of the house through a hole in the wall and can be very draughty if there is nothing to stop backdraught when the fan is not working. The photos are both of hoods with a hole in the wall for the exhaust; one shows air pouring in and cooling the hob below. The other has a shutter that you can hear clunk shut when the hood is switched off. Hoods can often be changed from external extraction to internal filtration, in which case the hole in the wall can be filled, cutting out the draughts. Many homes have no cooker hood at all.



A hood with an effective closure in the flue



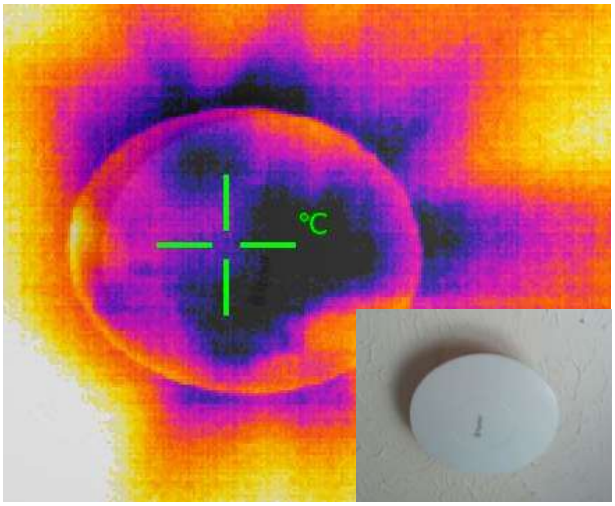
Ineffective closure lets in cold air, cooling the cooker

Extractor fans

Ventilation fans, whether in windows, walls or ceilings, also create air leakage if the devices intended to stop backdraught are not fitted, or are not working properly. Sometimes the louvres on the outside wall are missing entirely, have got blocked with leaves or moss, or lack lubrication and are not moving freely enough to close tightly and stop draughts or haver been replaced by grilles that cannot close.

In-flue baffles can also work well.

Ventilation fans may have been required by building regulations, but they may no longer be needed if the number of people living in the house has reduced or if enough air is infiltrating from elsewhere. It may be possible to remove or temporarily cover them for greater warmth. To test, tape a plastic bag over the fan to see what effect any changes would have.



An extractor fan with poor backdraught prevention

The most energy efficient ventilation fans have heat exchangers in them and they use the heat in the expelled air to warm the fresh air that is sucked into the house. Such MVHR fans are more expensive but are more efficient.

Boiler flues

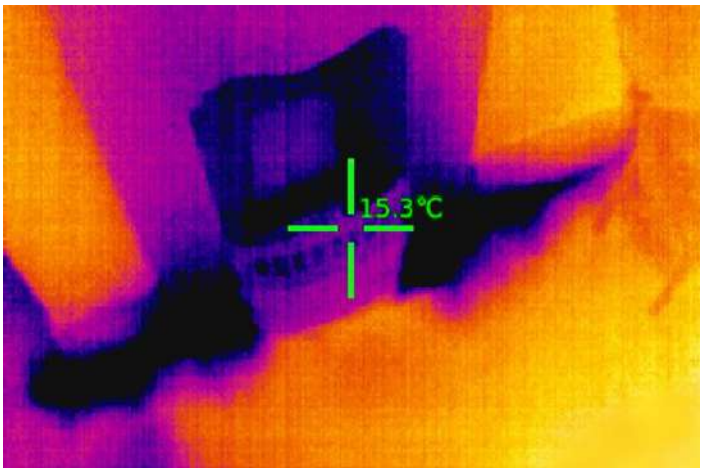
Gaps between boiler flues and the wall should be sealed with mortar (a mix of sand and cement) to prevent exhaust gases and cold air coming back into the house. There is usually a thin plastic shroud around the flue at the wall which hides the gap, but it is not designed to be airtight and is mostly there for appearances.

The gap behind the white shroud on a boiler flue

7. Draughty fireplaces

COMMON

An unused fireplace with no draughtproofing



Thermal survey reveals significant heat losses

Fireplaces are designed to be draughty and many homes in the area have retained these beautiful original features. But unless attention is paid to them, they can very effectively cool the room they are in by drawing warm air out of the house. This is replaced by cold air forced by atmospheric pressure wherever the house has gaps in its air-tightness.

Some fireplaces have metal shutters that can help slow air movement, and these can work quite well, but owners are often unaware of their presence or function.

Commercial products (Chimney Sheep and Chimney Balloons) are available to cut out fireplace draughts by blocking the chimney in the same way as the metal shutters are intended to, but home-made alternatives using a plastic bag stuffed with old clothes or a cushion can be just as effective if carefully fitted. A tight fit between the chimney and the plastic bag is essential; sometimes it can help to use tape around the edges.

Fireplace Blankets provide another alternative that can also work well in fireplaces and to temporarily seal eave access-hatches- and possibly hearths with wood burning stoves.

It is advisable to remove draughtproofing in the spring to allow any moisture in the chimney to evaporate during the warmer weather. Capped chimneys have less rain falling into them than open chimneys, but because brick is permeable to water vapour, warm moist air from inside can create moisture in the chimney when it passes through the bricks of the chimney breast and comes into contact with cooler parts of the chimney flue.

COMMERCIAL PRODUCTS

A Fireplace Blanket

Chimney Sheep

An inflatable Chimney Balloon

8. Heat losses from the hallway

8.0 Inefficient front doors

COMMON

Where they remain, the beautiful timber front doors add traditional character to the homes, but they are not good thermal insulators compared to modern replacements. The rectangular timber panels are only a few millimetres thick and appear to offer very little resistance to the loss of heat from the building. Attaching a layer of mdf, plywood or hardboard (for example) over the thin panels on the inside will create an insulating layer of air if the seal around the edges is air-tight. The void that is created can be insulated.

Where present, single glass panels over the front doors can be encapsulated. This means enclosing the glass within a double glazed unit, which greatly improves thermal insulation. A low-cost DIY alternative uses optically-clear acrylic plastic sheet cut to size by online companies and provides benefits at lower cost. Creating an air-tight seal around the edge is important because the depth of still-air has more thermal effect than the thickness of the plastic itself.

Poorly draught-proofed doors were remarkably common in the homes that were surveyed. In some cases, the age of the door and how they change in shape during the year makes things more difficult, as do poorly fitted doors with uneven gaps on each side. But improvements can usually be made with simple materials such as self-adhesive foam tape, fitted so the door compresses it when it is closed.

An external thermal image of timber front doors on St Albans Road show heat pouring out of them.

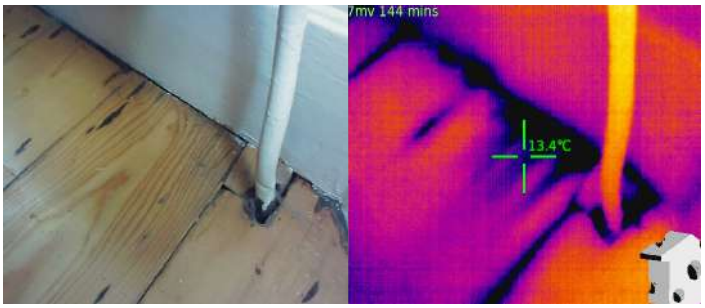
Most front doors have big holes in them!

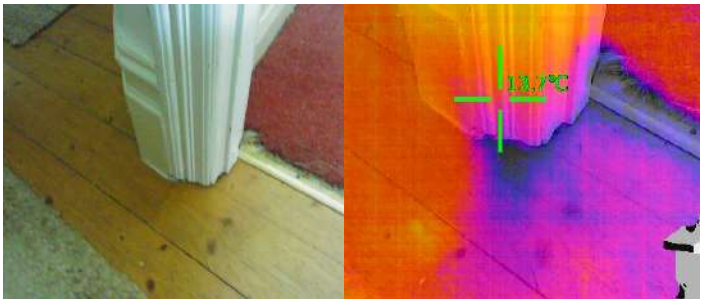
8.1 Holes in the floor

UNIVERSAL

As well as draughty floor and skirtingboards, things to look out for include holes around radiator and gas pipes. These are usually unsealed and, if the air bricks keeping the underfloor dry are open and working well, they will be letting in cold air and letting heat escape.

The cupboards under the stairs were more difficult to survey (because they are usually full of stuff!) but often draughts can be felt coming around the doors. The cold air may come in around electrical cables or pipework coming up from the floor or between the boards themselves. A carpet or lino covering (if sealed at the edges with carpet tape) is a simple fix.



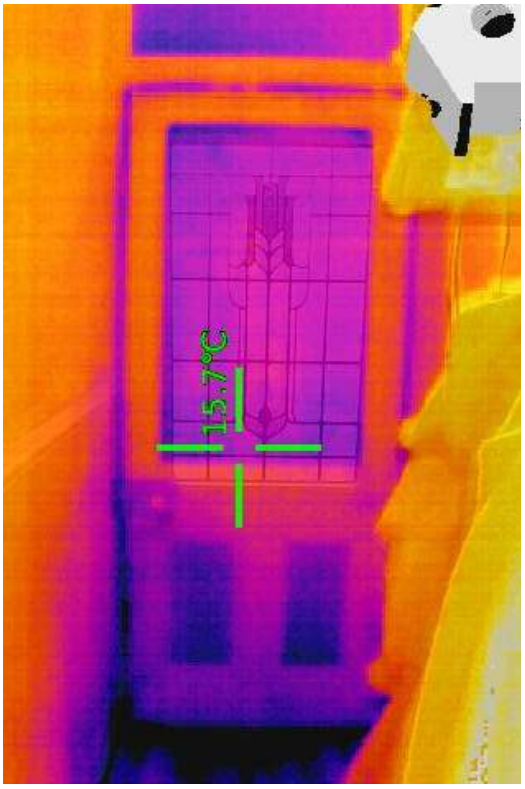


8.2 Inefficient porch door UNIVERSAL

The porch door can be quite effective in keeping heat away from the cold, leaky front doors. Sometimes they are removed, but it was good to see that all the surveyed homes still had them in place.

However, none were working as well as they could do. The better draught-proofed and insulated the internal door is, the more heat it will retain. Basic draughtproofing, adding 'layers' of acrylic plastic over the glass, and / or wood panels over the wooden parts of the door, will enhance its ability to keep the hall warm.

The image (bottom right) shows the difference a good internal door can make in keeping the hallway warm. But this means less heat gets to the back of the living room wall in the porch which cools the living room slightly. Adding insulation to this part of the wall in the porch will make a small difference.



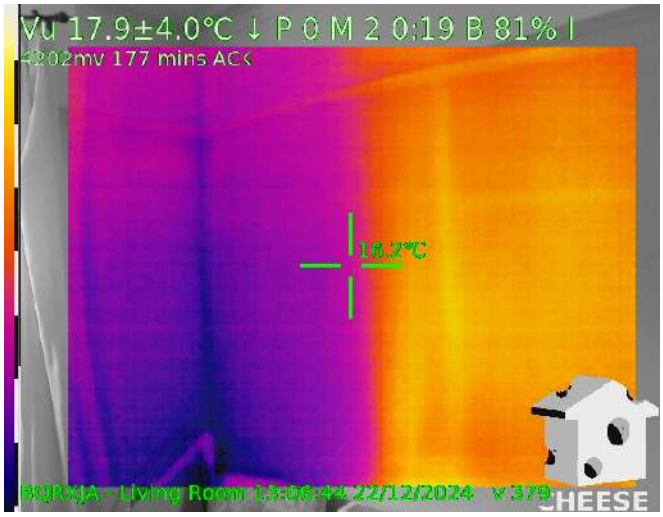
Draughty porch door with thin (cold) panels.

8.3 Letterboxes UNIVERSAL

Filling-in letter boxes and replacing them with externally mounted post-boxes will reduce heat-loss and make the house warmer. Brush draft excluders don't work when the mail is not pushed all the way through and the brushes are held open. High-quality cast-iron boxes (pictured on the right) are available, but there are many different lower-cost designs. Alternatives becoming popular include lockable parcel delivery boxes which occasionally appear in the front gardens of the area.

Examples of wall-mounted letter boxes


Daylight around the front door means draughts



Looking at the hall wall from inside the sitting-room, the temperature difference shows where the internal porch door is stopping heat escaping.

9. Floors

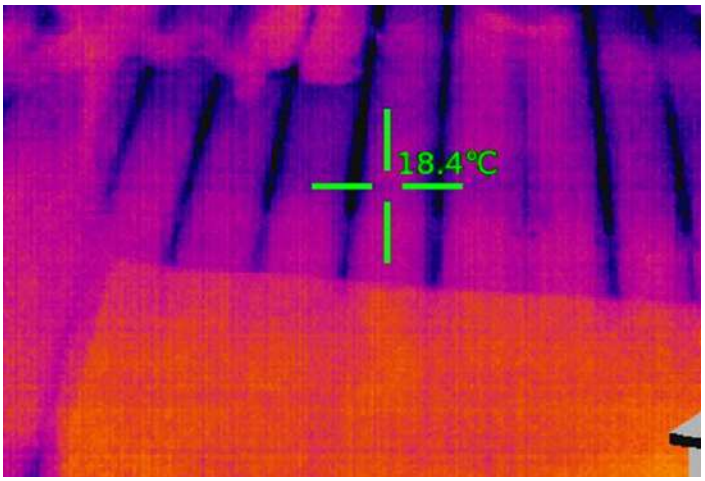
9.0 Draughty and uninsulated suspended timber floors

COMMON

Air bricks in the walls are essential for ventilating the sub-floor to avoid damp destroying the joists, but insulation can be installed between the joists, keeping ventilation in the sub-floor, where it is needed. Boards of insulation can be pressed between the joists, or loose -fill insulation can be supported with nets or sheets of plastic hung over the joists. A vapour control membrane (a sheet of plastic, shown in green in the photos on the right) may be rolled over the insulation and joists and sealed at the edges to stop warm moist air from the room finding its way into any gaps between the wooden joists and the insulation. This is especially important if non-breathable insulation is used. The photos are of work being undertaken on a DIY basis by home-owners, but there are some technicalities to this work and expert advice should be sought.

With the carpets removed, draughty floorboards can be improved. Options include: mixing resin with sawdust from the boards and trowelling it into the gaps (best done when the floor is being polished); fitting thin slivers of timber into the gaps; using V-shaped plastic strips pressed into the gaps, and filling the gaps with a flexible sealant like clear silicone.

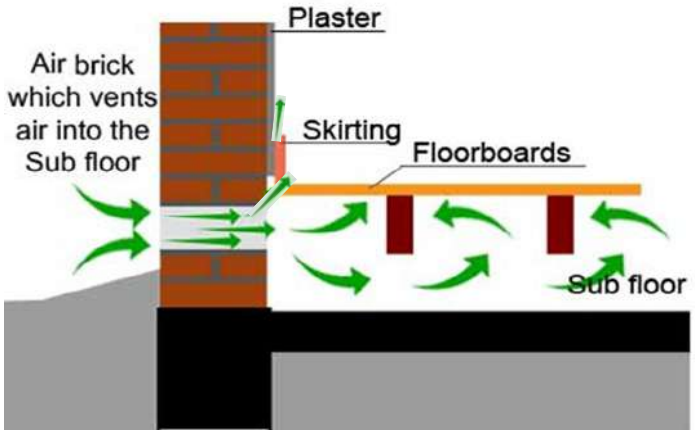
The easiest way to insulate and draughtproof suspended floors is to use heavy carpet and underlay, which is what the original owners are likely to have done as soon as carpet became affordable for them.



A rug reduces the draughts from unsealed floorboards

Insulation laid on blue plastic sheet placed over the joists, with a green vapour control layer

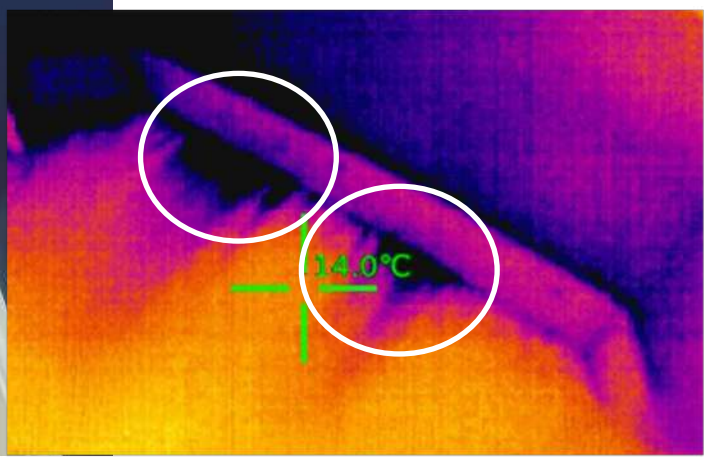
Insulation being press-fit between joists



www.finwood.uk/img/cms/Using-air-brick-to-vents-the-sub-floor.jpg

9.1 Skirting-board draughts

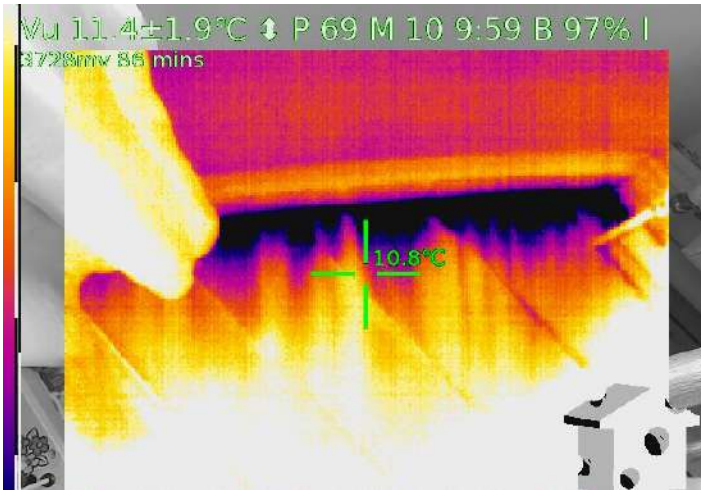
UNIVERSAL



The surface of the floor has been very effectively draught-proofed, but in places the edges are not properly sealed.

The floor in the photo above has been professionally draught-proofed; no air is coming up through the surface at all. But the gap between the skirting board and the floor has not been sealed. Unless this space is treated, cold patches occur even if the carpet remains in place and the floorboard gaps have been filled.

It is best to use a flexible filler (a mastic like silicone sealant for example) because the floor will move slightly and the sealant needs to be flexible. Scotia beading (also known as floor trim) can also be used, but both sides of the bead need to be fixed to the floor and skirting to create an airtight seal, i.e. not just with pins.



Another example of skirting board draughts

9.2 Uninsulated concrete floor

OCCASIONAL

About a third of the surveyed homes (36%) had some concrete flooring. Concrete is usually found in the kitchens and utility rooms at the back of the house. Modern concrete floors contain a layer of at least 100mm of insulation, but older, uninsulated floors act as a 'heat sink', pulling warmth out of the house and making the floor feel relatively cold to the touch.

Digging up and relaying the floor is a challenging task, and laying warmer floor-surfacing materials on top may be a more practical option. There are many materials that can help, including fibre board, foam felt and foil underlays. Cork tiles are a low cost, natural product which is easy to use and durable. Carpet or carpet tiles and insulated laminate will also help to keep feet feeling warmer.

A new, varnished cork floor

10. Cold external walls

UNIVERSAL

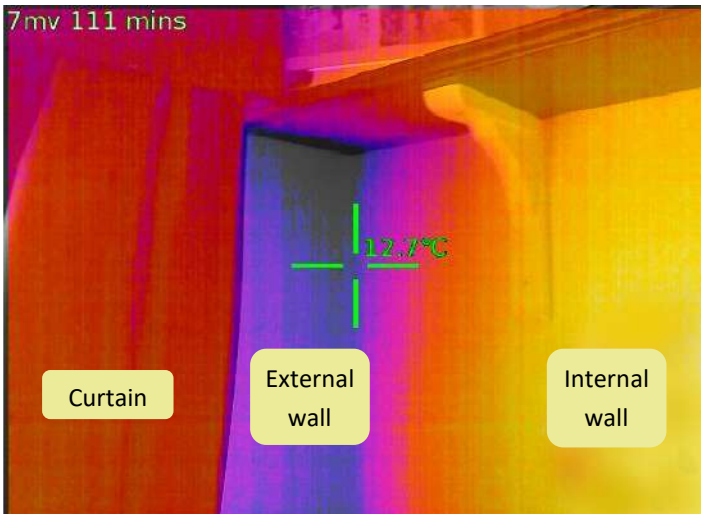
Cavity walls began appearing as standard around 1930; before that most houses were built with a single leaf of brick or stone, known as a solid wall. The external appearance varies with the different finishings that were used; for example, thin stone finishings covered brick to create a more prestigious finish for some properties. In terraced houses, the amount of external wall is relatively small—windows occupy the majority of the surface area and improvements to them should be prioritised. But solid walls' poor thermal properties can make a significant difference to some rooms, especially where two or more walls are exposed.

Internal wall insulation: There are places where internal wall insulation makes good sense. The external walls of first-floor bedrooms and bathrooms can be insulated using insulation-backed plasterboard, or breathable insulation such as woollen batts, or boards made from wood-fibre. Insulating walls is DIY-able, but advice should be sought on how to assess and manage the risk of condensation appearing on or in the wall after it is insulated.

A couple of surveys found the mortar in the party walls of converted loft spaces to be of poor quality, allowing air from the unconverted, unheated loft space of the neighbours house to enter the upper bedroom. Repointing the brickwork, or plastering the wall before adding insulation will make it more airtight and is likely to improve comfort in the loft in some cases.

External wall insulation: Retaining the frontal external appearance of these characterful buildings will be top priority for most people, but some owners said they were considering external wall insulation on some of the back walls. Insulation companies will have their own recommendations and their advice should be sought. Check they are covered by the Solid Wall Insulation Guarantee Agency's 25 year guarantee.

Solid brick walls let heat escape 2.5 times faster than insulated cavity walls.
(Building Research Establishment, 2014).



Thermal image showing temperature contrast between internal and external walls

The colder part of the wall is above the roof line of the kitchen

25%

of our home's heat is lost through the roof

86%

of home energy is from fossil fuels

Let's make your home more efficient

At Retrofit West, we are dedicated to providing free, independent advice to homeowners like you so you can make informed decisions, reduce energy costs and have a healthier home.

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