



Thermal imaging camera for energy efficient home audit

What would I use FLIR ONE for?

Thermal imaging makes the otherwise invisible world of heat energy visible to your eyes. Everything around you either emits or reflects heat energy. For example, with FLIR ONE, when you look around a room in your home, you can see where doors and windows are not well insulated. You might see a wall switch is slightly warm that could indicate a pending problem or overloaded circuit.

Draughts

Draughts are one of the biggest issues in older buildings. Air can escape from your home, requiring you to over use your heaters or air conditioners. This increases energy bills and also contributes to an uncomfortable home and can cause other health issues.

Use the thermal imaging camera to identify draughts. After you have sealed the draught, take another photo to determine if the fix has been effective.

What will a draught look like?

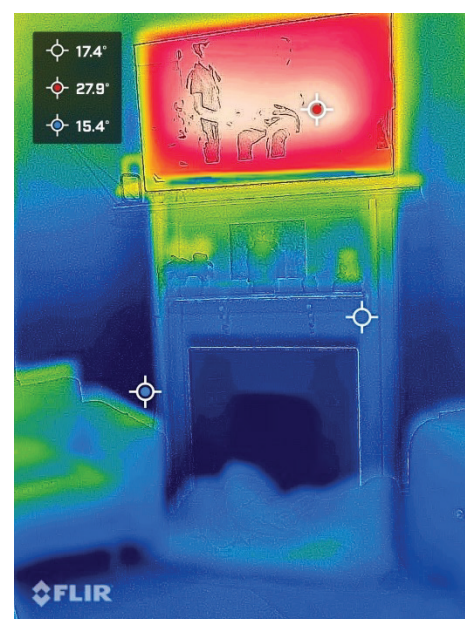
To tell if there is a draught, hold the camera up and observe if there are vastly different temperatures coming from chimneys and fire places, external doors, windows, vents, floorboards and skirting boards. The temperature difference will appear in different colour bands.

How to reduce draughts

Chimneys and fire places

When the chimney or fire place is not in use, cover the opening securely to stop air flow. There are many products on the market that can be used to block a draught such as chimney pillow/balloon, draught guards or a chimney damper.

If the fire place is never used, you could consider permanently blocking or removing it, however, removing can be very costly.



Further resources

Energy Cut – the 10 Step Guide to Cutting Energy Bills by Jon Dee (co-founder of Planet Ark and host of Smart Money)

Be Energy Smart: Winter Heating Guide 2023 by the Government of South Australia's Energy Advisory Service

Sustainability and the Old Australian House: A Handbook by Andrew D. Marsh

Thermal Comfort at Home. A guide for older South Australians by the University of Adelaide (2021)

External door

There are a few sections on doors that can let in draughts—keyhole, letterbox, gap at the bottom, and around the edges.

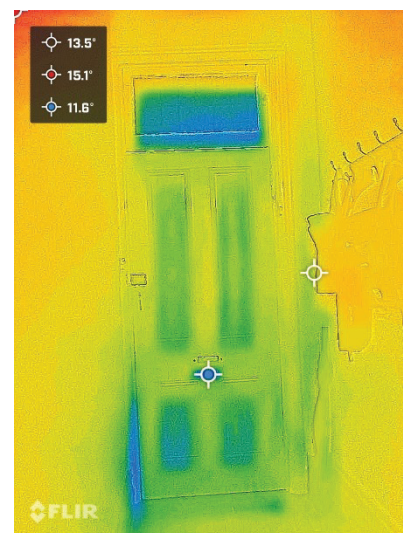
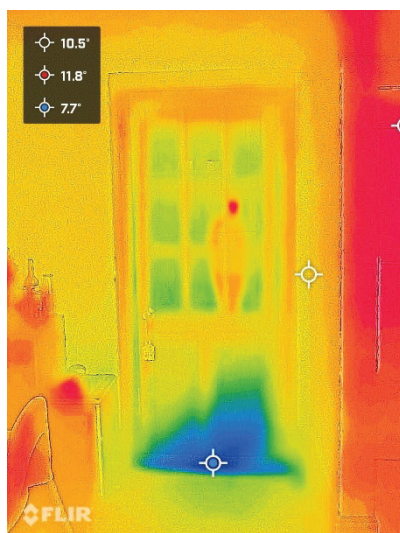
You can buy purpose-made covers for keyholes and flaps and brushes for your letterbox that are reasonably cheap and easy to fit.

For any gaps, you can buy brushes, door seals or special strips that fit around the edges from a hardware store. Double check that your door closes properly and there are no faults where air could creep in. Door seals are easy to stick on

as they are adhesive backed. They also help to block out bugs, dust and sound!

For an easy fix or for tricky doors consider a door snake to block out draughts at the bottom of the door.

Left image shows under door draught and right images shows draft from indoor letter box flap, draught on the left of the door frame and cold from above door window. Note blue is colder temperature and red warmer temperature.





Library resources

Be Energy Smart: Home Energy Toolkit. The Home Energy Toolkits contain tools and information to help you find out how energy is used in your home and what you can do to make simple savings in energy consumption.

Windows

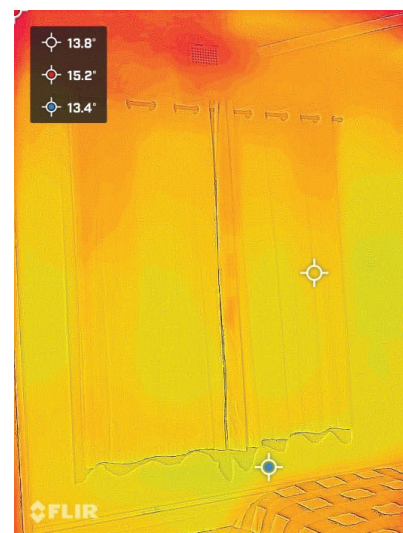
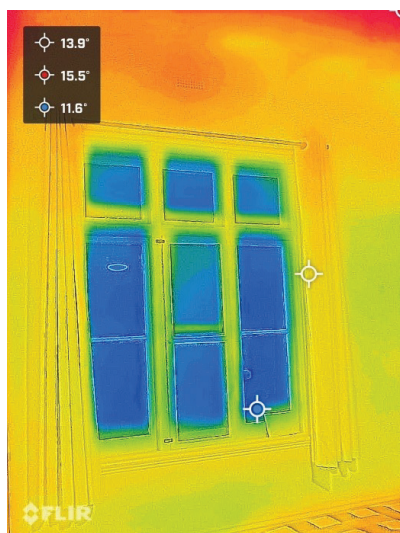
Winter - During the day ensure curtains and blinds are open to allow the winter sun into the home. In the evening and nights close curtains and blinds to block out cold air coming into the home. Fit self-adhesive weather sealing strips to windows to block draughts.

In extreme cases or when a window needs to be replaced, consider purchasing energy-efficient windows such as double glazing and the appropriate frames.

Summer - Install block out or heavy curtains and blinds, At the start of a hot day close blinds or curtains to block out direct sunlight.

Install awnings on north facing windows to block out direct sunlight in summer. Plant deciduous trees north and west of your home, the tree will shade your home in summer but allow winter sun through when deciduous.

Maintain your windows and window frames, wooden frames can rot or warp creating gaps. Use putty or filler to block any holes. Older houses may require caulking or weather stripping.



Facts

Your home can lose up to 40% of its heat through windows, leading to an increase in heating costs. It can also gain up to 87% of its heat through windows, leading to an increase in cooling costs.

By properly insulating and draught-proofing, you can reduce winter heating costs by up to 70%

Vents

You may find that draughts are coming in through vents in your house.

Usually seen in older brick homes are fixed ceiling and wall vents. These were used when gas and kerosene lights / heaters were first introduced, for un-flued gas heaters, open fire and or in “hot and steamy” areas such as bathrooms, laundry and kitchens to allow good ventilation.

If these vents are disused, e.g. old gas heaters, open fires or central heating boilers have been removed and or exhausted fans installed, the vents are now a draught problem and can be blocked.

A low-cost fix is to cut a piece of cardboard to the size of the vent, back it with bubble wrap and tape it to the vent. A thick piece of plastic could also be used or a vent cover.



For a more permanent solution, remove the vent and replaster the area, or fill vent holes with polyurethane foam. Or replace with a closeable vent.

Vents into the ceiling, such as extraction fans, can be covered with an exhaust fan cover. Otherwise, self-sealing extraction fans or covers have flaps that open when the fan is running and close when the fan is off, reducing air loss.

However, you don't want to block up vents that are actually used. For example, extractor fans in the bathroom or kitchen will help reduce moisture build-up, airbricks help keep wooden floors and beams dry, and trickle vents are often used in modern windows to allow fresh air into a room.

DraftStoppa - self-sealing cover for ceiling exhaust fan



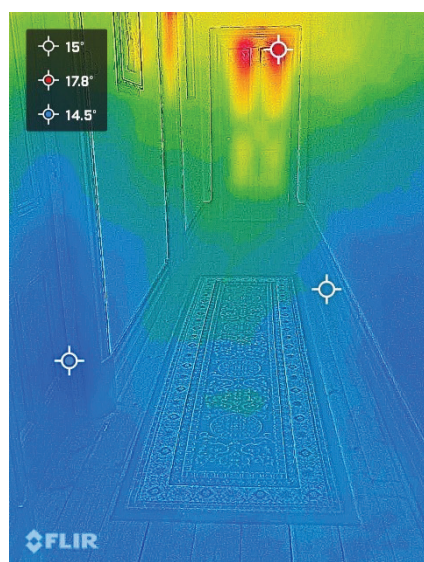
Colour spectrum

The default colour is “iron”. There is also an option for a “red alarm” and a “blue alarm” these colour spectrums will focus on finding the hottest (red) or the coldest (blue) objective in view which can help identify leaks.

Floorboards or skirting boards

It might not be somewhere you immediately think of, but both floorboards and skirting boards can let in draughts.

Floorboards aren’t as much of an issue if you have flooring on top, but are still worth dealing with to fully prevent draughts. You can use sealant to fill in gaps around skirting, whilst silicone-based filler is preferable for floorboards to allow for movement in the boards.

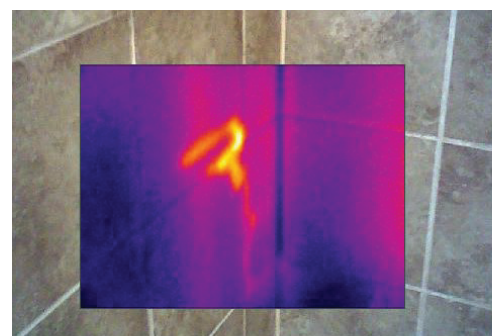


Underfloor insulation is also an option if the house has a crawl space that allows installation.

Alternatively use rugs or mats on bare floorboards to reduce air loss through cracks and gaps in the floor.

Leaks in ceilings and walls

The thermal camera can detect areas in your ceiling or walls where pipes may be leaking. Turn on the hot water, you should see the hot water in the pipe behind the wall. If there are temperature differences not in the expected areas, you may have a leaking pipe requiring further investigation. Do the same for the cold-water pipe.





The energy rating label

The energy star rating is regulated by the Australian Government, has been around for over 30 years.

Use it to compare the energy efficiency and running costs of different appliances.

The more stars the more savings.

To find out more visiting energyrating.gov.au.

Appliances

In a warm home, take a snapshot using the FLIRE ONE of your fridge door seal to reveal if cold air is escaping the fridge due to a damaged or worn door seal. If there is cold air escaping from your fridge door, the seal needs to be replaced. Additionally, if the back of your fridge is really hot, ensure it is cleaned regularly and has good air ventilation at the back. The harder your fridge works the more electricity it uses.



Appliance such as computers and laptops emit heat even when sitting on standby. On a warm day this additional heat source is adding to the room temperature. If the thermal camera shows appliances are emitting heat, ensure they are switched off, not just on stand-by.

Insulation

Taking images of the ceiling and walls will identify if the surface is all the same temperature or if there are gaps in your insulation. To give you an idea of the temperature difference, start by taking an image of the manhole to your ceiling. Generally, the manhole cover is not insulated, showing a difference in temperature. If your ceiling cavity is not insulated, the temperature will appear to look similar to the manhole. If insulation is present, then the temperature will be different. If there is a temperature difference, consider insulating your ceiling and walls.



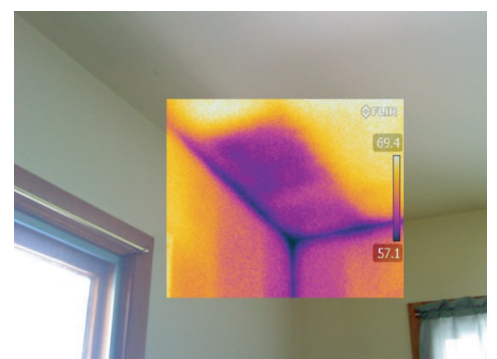
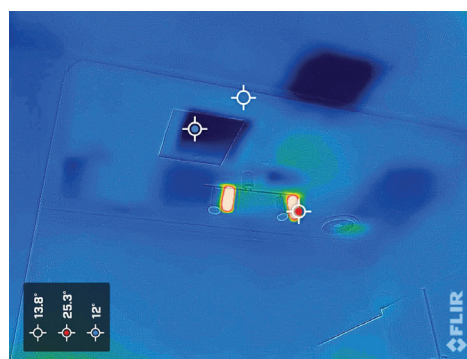
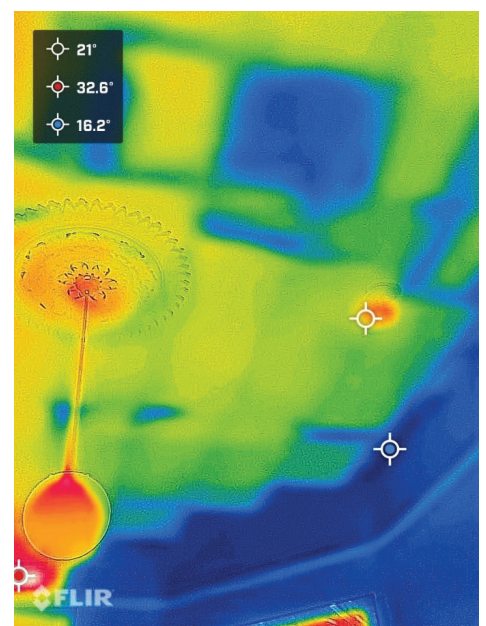
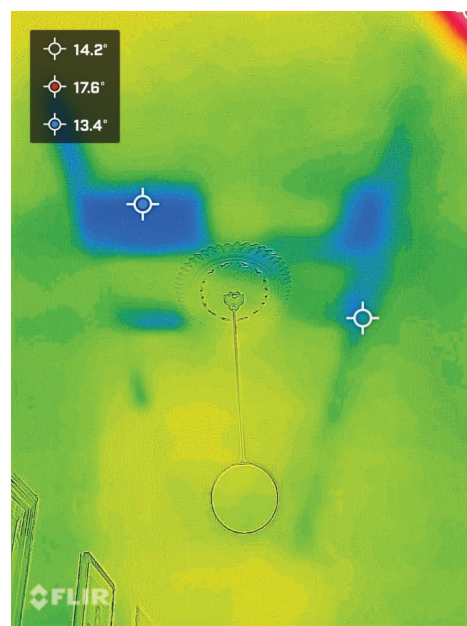
Insulation continued

The following images show gaps in ceiling insulation in various rooms, temperature difference of a man hole cover.

Insulation values

R-values and U-values are measurements used to judge the effectiveness of different types of insulation. They are the insulation equivalent of the energy stars rating on appliances.

For insulation go for highest R-value and for windows go for the lowest U-value.





I've identified the gaps, what next?

Here are some handy resources to help you seal gaps and improve the energy efficiency of your home.

- Bunnings: tips on improving the energy efficiency of your home
bit.ly/bunnings-energy-efficient-home
- Bunnings: how to winter proof your home (seal gaps in your doors and how to use door snakes)
bunnings.com.au/diy-advice/home-improvement/heating-and-cooling/how-to-winterproof-your-home
- Bunnings: how to seal a door (slightly more complicated, requires a screwdriver and screws)
bunnings.com.au/diy-advice/home-improvement/doors-windows/how-to-seal-a-door-
- Bunnings: how to seal a window
bunnings.com.au/diy-advice/home-improvement/doors-windows/how-to-seal-a-window-
- Bunnings: how to identify and fix draughts
bit.ly/bunnings-draughts
- CSIRO: draught proof your house
csiro.au/en/news/All/Articles/2020/April/draught-proof-house
- Sustainability Victoria: draught proofing your home
bit.ly/sustainability-victoria-draught-proof-home