

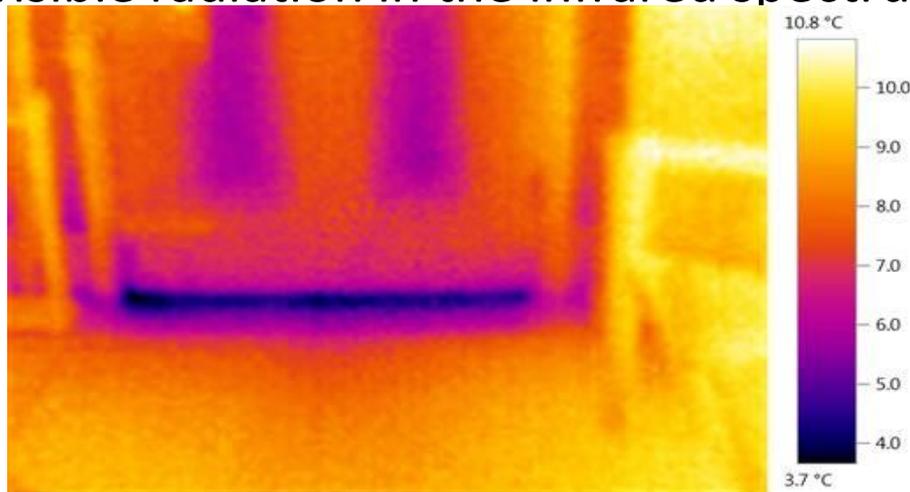


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Thermal Imaging Camera Training Course

The Basics

A thermal imaging camera displays the temperature of objects by converting non-visible radiation in the infrared spectrum to something we can see:



In this example taken from the inside of a house (colour palette) blue represents 'cold', red 'hot'. The image shows cold air (4C – see scale on right) coming under the door, and radiating through the thin panel inserts.

Remember: seeing blue from the inside of a house or red from the outside of a house is bad!



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Optimum Weather Conditions

The following weather conditions are generally recommended by camera manufacturers:

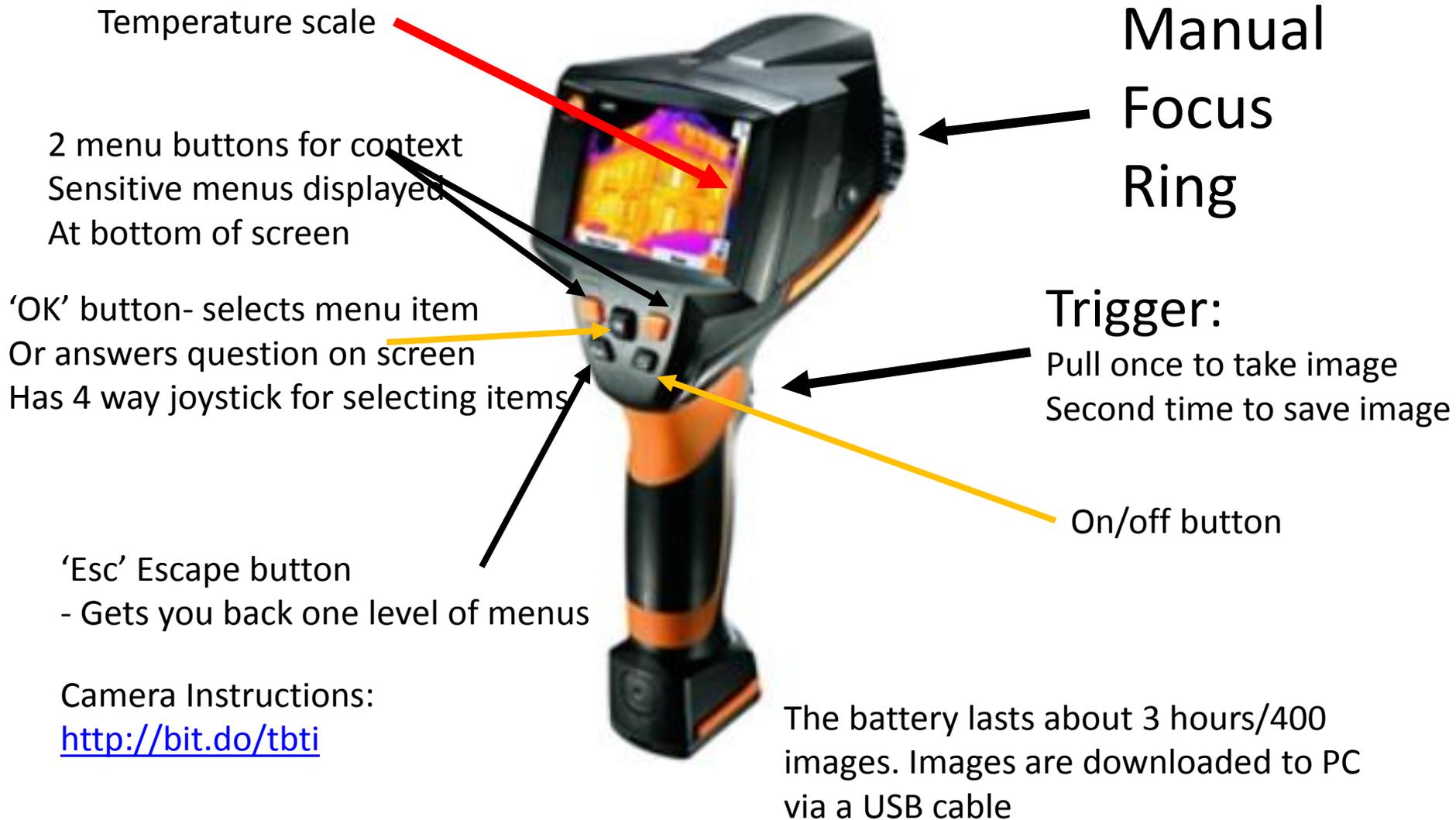
- Temperature difference between inside and outside of property > 15C
 - This typically means an outside temperature of < 5C
 - And, an inside temperature of 20C+, and the **heating should have been on for about 2 hours beforehand** so temperatures even out in the property
- Wind speed < 12 mph for external photography
 - This avoids hot air leaking out of the building being blown away too quickly
 - There may however be some benefit of high winds for internal work as it might increase draughts
- No rain, for external photography
 - First of all you should assume the camera is not waterproof
 - Secondly damp surfaces tend to distort the results
- Lack of recent sun for external photography, hence evenings are best
 - Sun heats up stone/brick surfaces giving false results

But, if you are doing imaging inside the house, external temperatures as high as 12C are good enough for reasonable results



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Using a Testo 875-1 camera





False Positives and high emissivity surfaces

- **'False positives'** – are parts of an image which show potential problems but aren't real problems, so for example corners of rooms might show as being cold and potentially a problem, but can be just cold still air sitting in the corner of the room which convection currents from the heating system have not heated. It is sometimes difficult to tell the difference between these and 'thermal bridging'. This is why we ask home owners to get their homes up to temperature 2 hours before the survey to let temperatures even out
- **'High emissivity surfaces'** – are surfaces like glass and metals which reflect in the infrared spectrum and act as 'mirrors'. So for example if you look at windows from outside a house typically the colour temperature you see is that of the reflection from the window and not the actual glass temperature – so for example upper storey windows might look very cold, whereas in fact they are just reflecting the temperature of the night sky. Theoretically if you had lots of time you can avoid problems by covering these surfaces in tape which stops the reflections, but we have not come across anyone who does this!



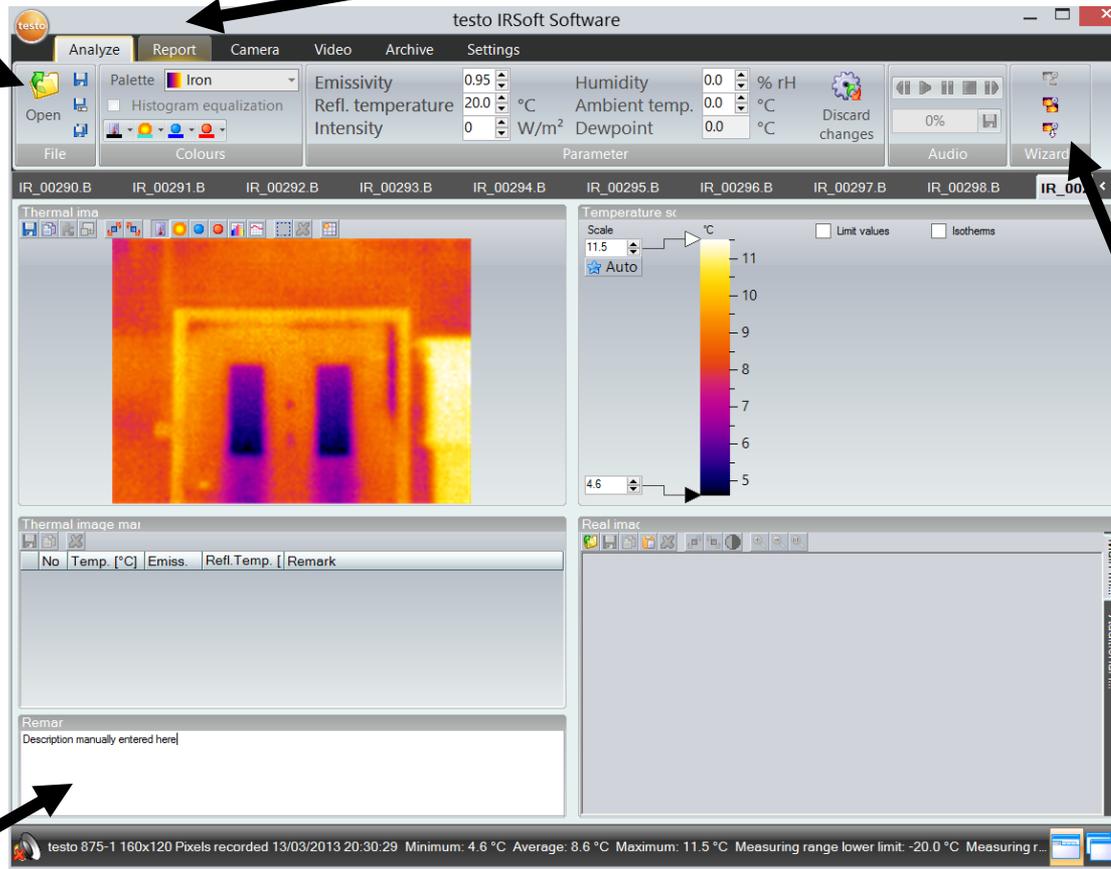
Testo IRSoft Imaging Processing Software

- Used for producing reports (pdf)
- Converting TI image format to jpegs
- PC only software
- Super resolution: doubles image resolution by taking multiple photos and merging them

IRSoft

3. Report Wizard

1. Click Open to Multiple select images



2. Annotate Individual images For report

4. Batch export/ Convert jpegs

Surveys

- **Book use of camera online:** no more than 4 days booking at a time
- **Organising the survey:**
 - Agree a time with householder, plus contingency arrangements for warm weather
 - Ask householder for directions if house is difficult to find in the dark
 - Ensure all rooms in home up to temperature (20C+) 2 hours before survey
- **Beforehand:** ensure camera is charged, let someone know where you are going if you don't know the homeowner or take a friend
- **Take:** camera, mobile phone, paper, pen, torch, digital camera
- **During:** get home owner to follow you around the home watching the camera's video, take photos when you see something interesting. Work your way through the home systematically e.g. bottom to top
- **After:** Produce a report and jpegs for home owner, email them
- **After:** Complete TB's survey evaluation forms (1 for surveyor, 1 for home owner)
- **After:** delete images from camera



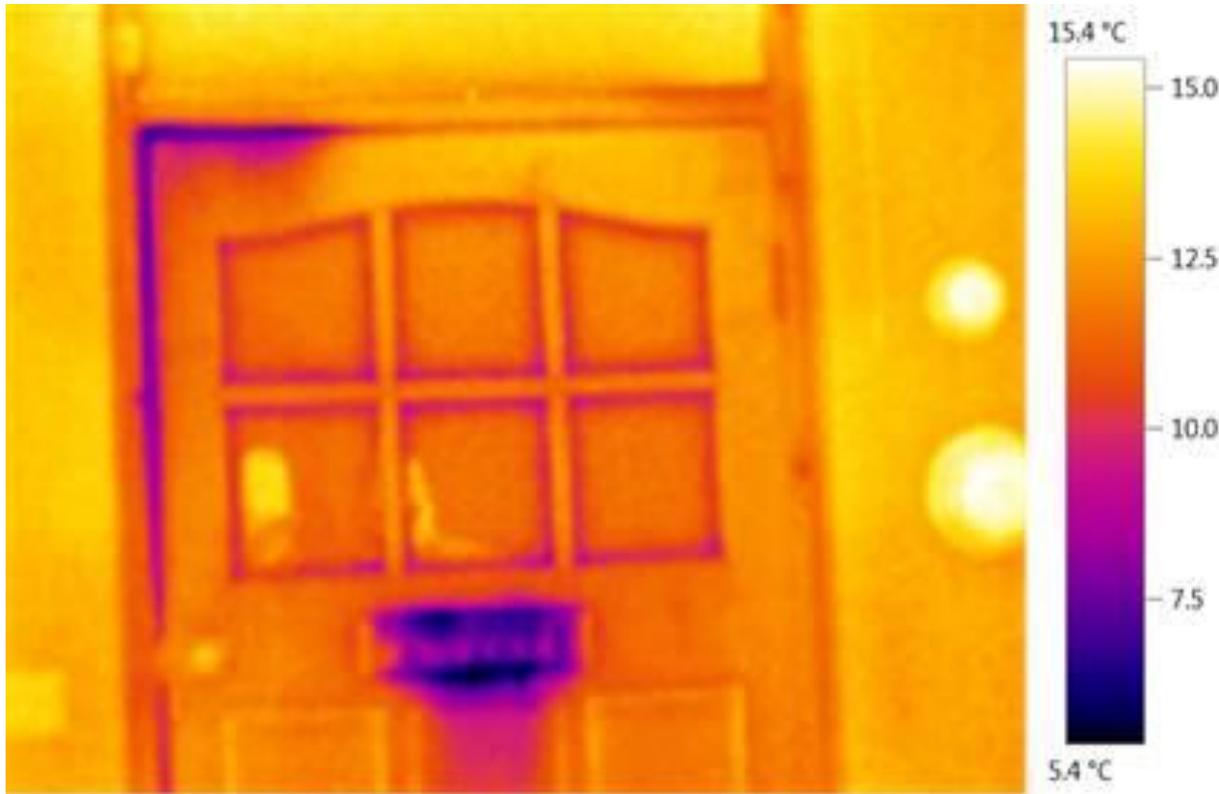
Examples

Common observations:

- Draughts around doors and windows
- Draughts through wooden flooring, below skirting boards
- Un-insulated central heating pipes
- Missing loft insulation
- Uninsulated loft hatches
- Radiators heating outside walls
- No insulation on inside walls of integral garages
- Thermal bridging through window lintels and cills
- [And remind people if you see halogens to replace them with LEDs]



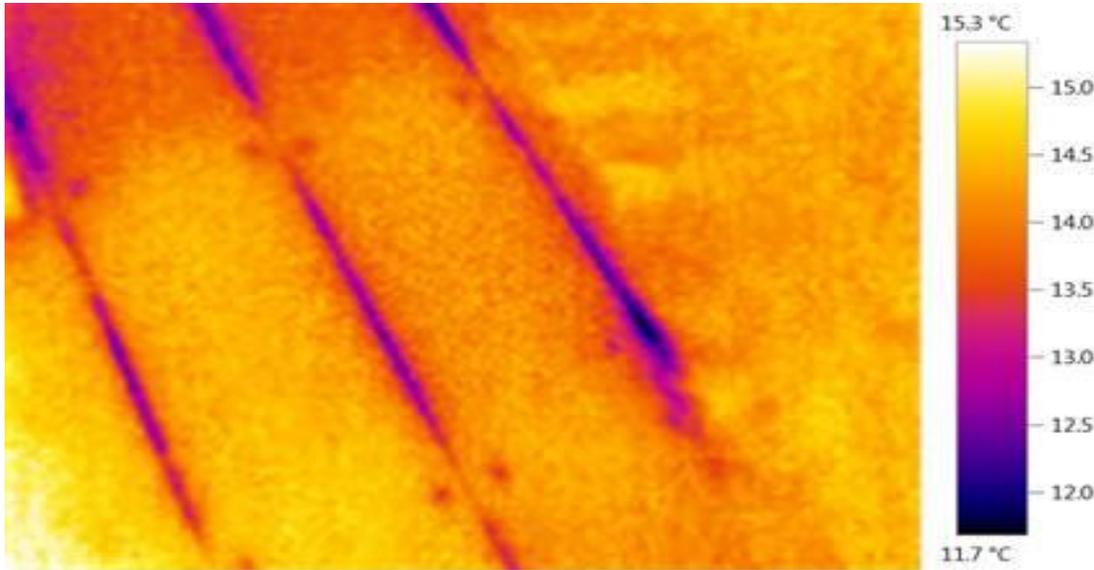
Draughts around windows and doors



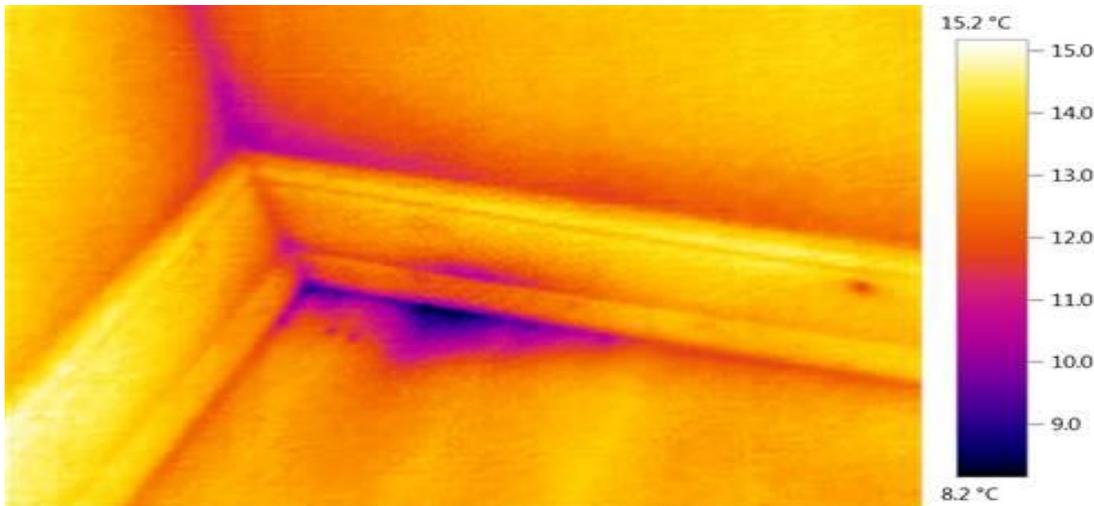
- Top left of door requires draught-proofing
- Letterbox draught excluder would be useful!



Draughts: floor and skirting boards



- Cold air leaking through gaps in floorboards

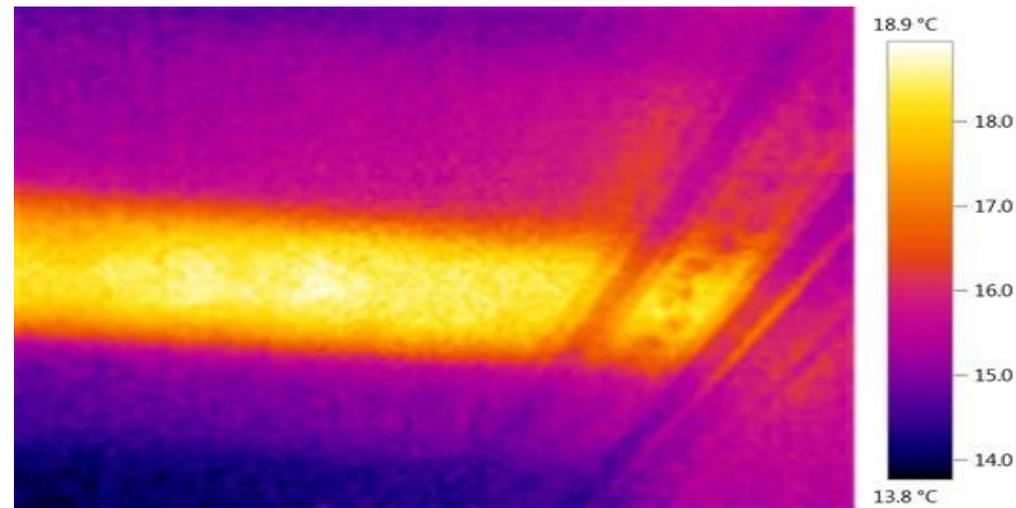
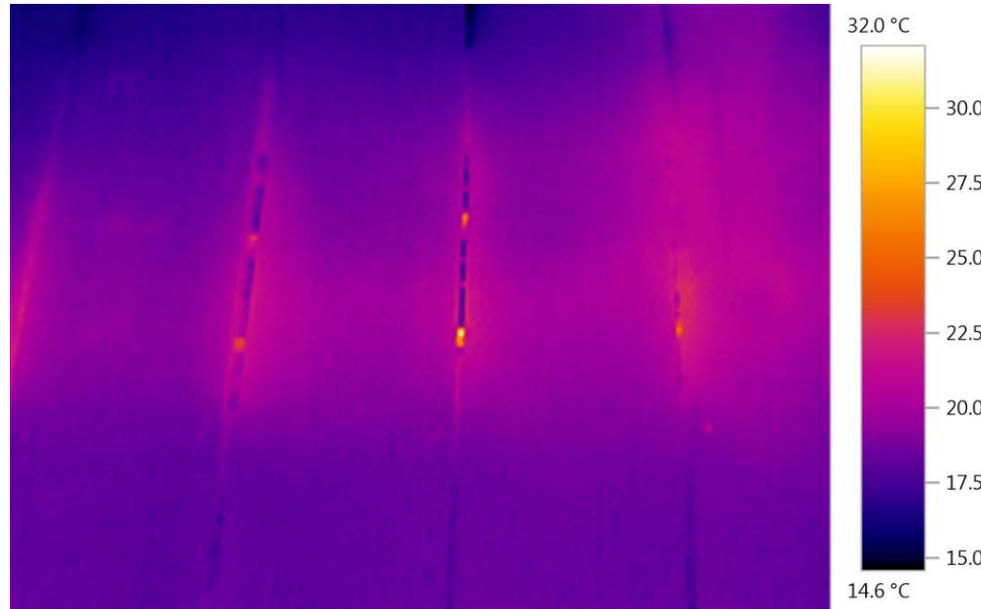


- Cold air leaking through below skirting board



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Uninsulated central heating pipes

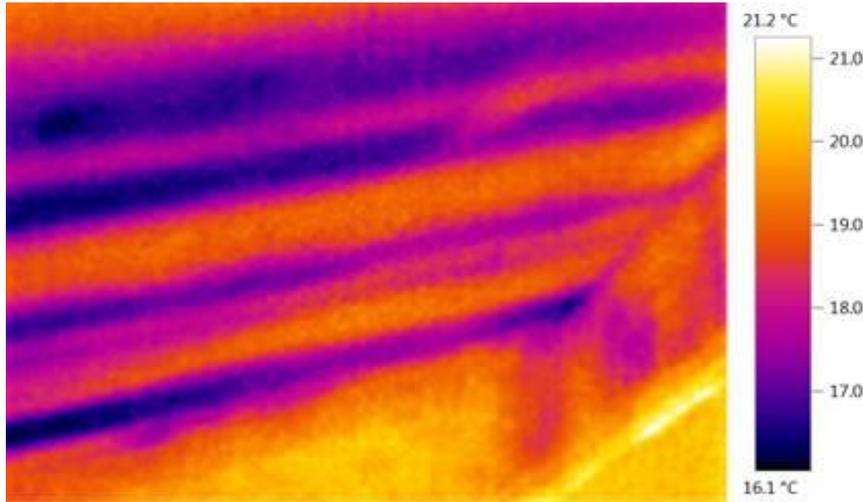


Uninsulated central heating pipes spotted through gaps in floorboards heating space under house!

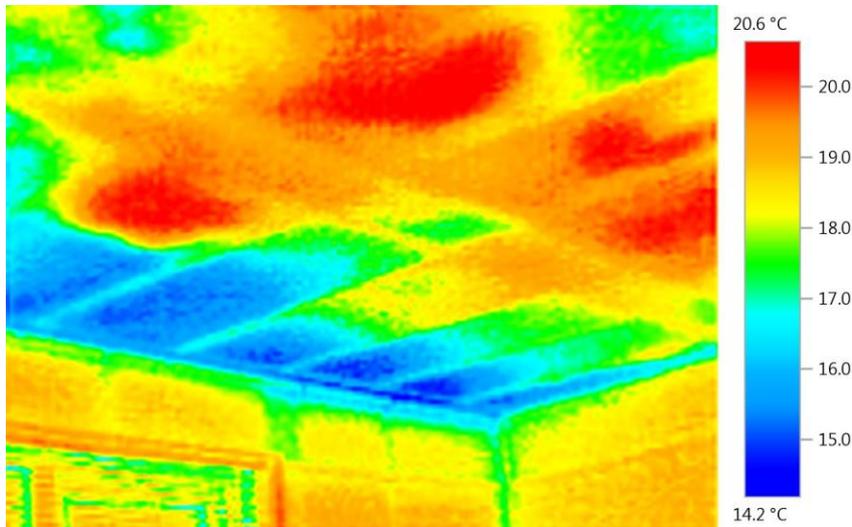


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Missing loft insulation



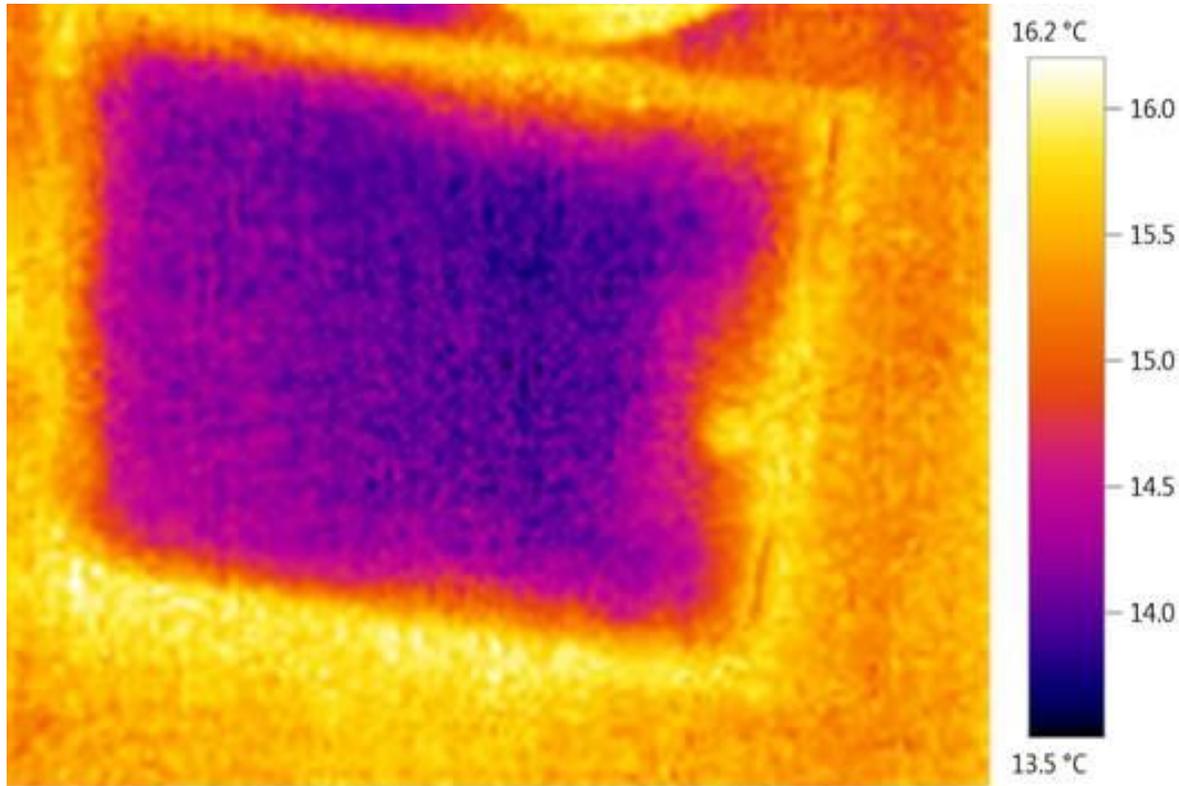
Sometimes missing altogether or more commonly not covering the whole roof area (typically its been disturbed)





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Uninsulated loft hatches



This is a common problem in most homes. Both insulation and draught-proofing is generally required.



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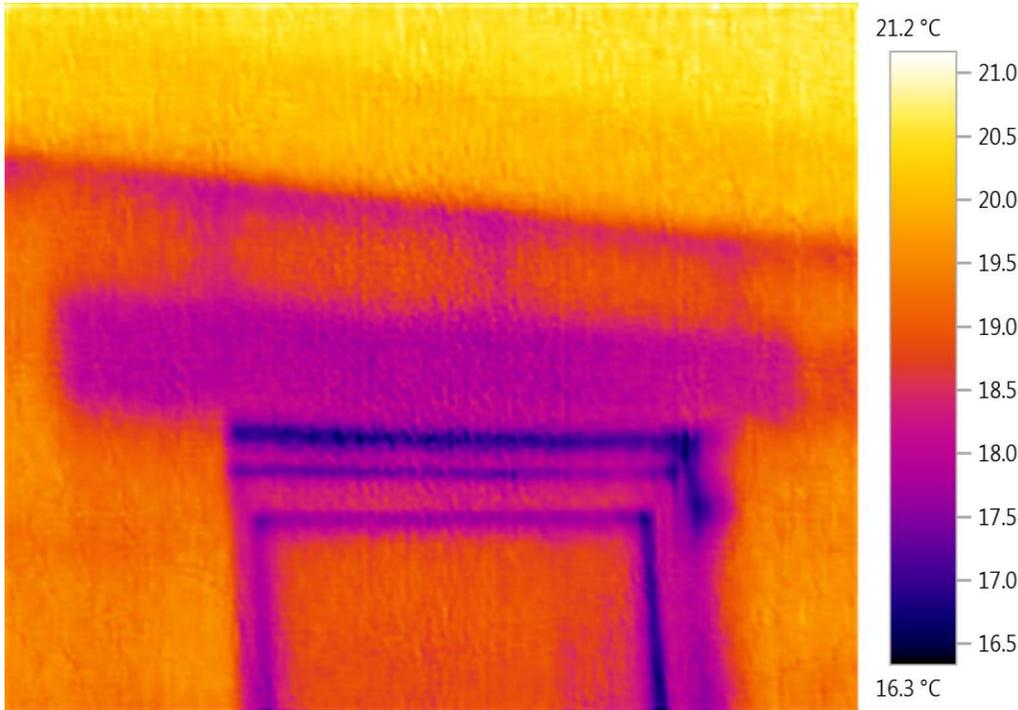
Radiators heating outside walls



This is a common sight in Bath with radiators on outside walls of solid walled homes. It will also affect homes with uninsulated cavities, but this will be less obvious with the camera as the heat will be dispersed within the cavity. The owner should fit (Radflek) radiator reflectors.



Thermal bridging through cills and lintels



This is also very common. In this example, a retrofitted home with triple glazing there is cold bridging through the lintel and you can see the mortar work between the block work above which I also quite thermally conductive.



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If you have any questions please email:
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