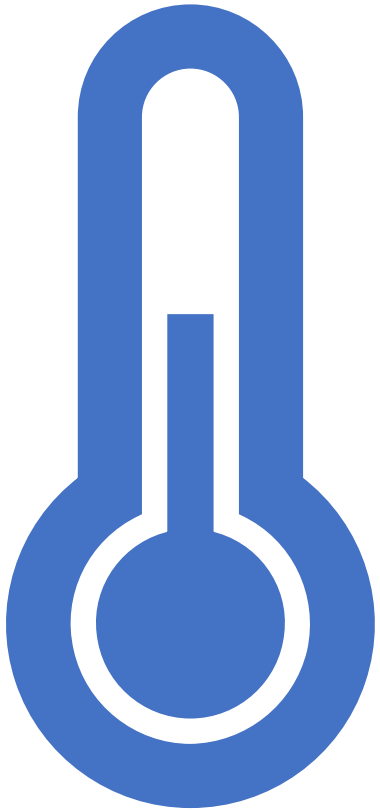
Thermal Imaging Camera User Guide



Working together

South Hams District Council

West Devon Borough Council

Contents

1. Introduction

This user guide is for users of the South Hams and West Devon Thermal Imaging Camera hire service. While the guide is not extensive, its purpose is to help users to make sure they are using the camera in the best possible conditions and get the best use of the camera. It is also not a replacement for the included technical user manual.

Thermal imaging cameras use infrared technology to capture temperature differences in objects and provide visual images. This tool has various applications, including home inspection, electrical diagnostics, and energy efficiency assessments.

2. Getting Started

- Make sure that the camera is fully charged.
- Turn on the camera using the stated button or switch.
- Take time to get used to how the camera works, as well as its settings and the manufacturers user manual.

3. Thermal Imaging Camera Limitations

- **Surface Temperature vs. Insulation Quality**: Thermal cameras can only detect temperature differences on the surface of materials. They cannot directly measure the quality of insulation within walls or other structural elements. Therefore, they can identify areas with temperature anomalies but not necessarily pinpoint the cause (e.g., inadequate insulation, air leaks, or thermal bridging).
- **Inaccessible Areas**: Thermal imaging cameras are most effective when scanning accessible surfaces. They may not provide information about areas that are hidden, obstructed, or difficult to reach, such as inside wall cavities or behind built-in furniture.
- **Outside Use**: Thermal cameras rely on the temperature difference between the object being measured and its surroundings. During the day, solar heating can affect the accuracy of readings, be wary of areas where the sun has been shining on or reflecting from. Always do readings at least 2 hours after the sun has left a surface and never read a wet surface. A cold, windy day may lead to false positives by creating temperature differences that aren't related to energy inefficiency. Always measure the ambient atmospheric temperature by pointing at a nearby bush or tree.
- **Emissivity Variations**: Different materials have different emissivity values, meaning they emit and absorb thermal radiation differently. If the camera's emissivity settings are not adjusted correctly for the materials being examined, it can lead to inaccurate readings.
- **Surface Reflectivity**: Highly reflective surfaces, such as mirrors or metallic finishes, can reflect ambient thermal radiation onto walls and other nearby surfaces, potentially leading to false readings. Care should be taken to avoid misinterpreting reflections as energy efficiency issues.
- **Depth of Detection**: Thermal imaging cameras have limitations in terms of how deeply they can detect temperature variations within materials. They are better at identifying surface-level issues but may not reveal problems deep within walls or structures.
- **Infrared Transparency**: Some materials, such as glass or certain plastics, are transparent to infrared radiation. This means the camera cannot detect temperature differences through these materials, limiting their ability to assess windows and some building materials effectively.
- **Interpretation Required**: Thermal images provide visual data that requires interpretation. Anomalies detected by the camera may need further investigation to determine their cause and whether they indicate an energy efficiency problem.
- To overcome these limitations, **it's advisable to use thermal imaging as part of a comprehensive energy audit** that includes other diagnostic tools and techniques. Additionally, consider consulting with a professional home energy advisor who can provide a more thorough assessment of your home's energy efficiency and recommend appropriate solutions based on the thermal imaging results. Click here to visit Energy Saving Devon to begin on this journey, more on this at the end of this guide.

4. Ideal Conditions for Use

To obtain accurate and reliable results, use the thermal imaging camera under the following conditions:

- **Stable Temperature**: Avoid extreme temperature changes or direct sunlight on the camera's lens, as they can affect readings.
- **Low Humidity**: High humidity levels can interfere with temperature readings.
- **Clear Line of Sight**: Make sure there is an unobstructed view of the object you're inspecting.
- **No Wind**: Wind can cool or heat surfaces, affecting temperature readings.
- **Proper Emissivity Settings**: Adjust the emissivity settings to match the material you're measuring (e.g., adjust for wood, metal, or plastic).
- **Calibration**: Periodically calibrate the camera as per the manufacturer's instructions.

5. Suggestions on Where to Use it in the Home

Thermal imaging cameras can be a valuable tool to start your retrofit journey for your home. Here are some of the best places and scenarios to use a thermal imaging camera in residential settings:

- Perimeter of the ground floor, particularly corners where skirting or door seals are.
- Joints between French doors and flooring
- Wall areas around the window, checking the window frame and sill for possible incorrect cavity closing/installation of window.
- Ceiling downlights.
- Ceiling junctions near gable walls.
- Ceiling at junctions with external walls, particularly corners.
- Space around dormer windows.
- Space around the perimeter of other doors leading outside, checking the frame for gaps and missing or poor performing seals.

6. Understanding the potential for misleading results

Thermal imaging cameras are powerful tools, but they can produce misleading results in certain situations:

- **Reflective Surfaces**: Shiny or reflective surfaces can reflect temperature from other objects, creating inaccurate readings.
- **Glass**: Thermal imaging can't see through glass; it only captures the surface temperature of the glass.
- **Thin Materials**: Thin walls, curtains, or materials may not show temperature differences clearly.
- **Low Emissivity Materials**: Some materials, like polished metal, have low emissivity and may not provide accurate readings. If the camera's emissivity setting is not adjusted correctly for the material being examined, it can lead to inaccurate temperature measurements.
- **Distance**: The accuracy of the camera's readings decreases with distance; get as close as possible for precise measurements.
- **Moisture and Condensation**: Moisture on surfaces or condensation can affect temperature readings. It may show as cold spots even if there is no underlying energy efficiency issue.
- **Fire or Heat Sources**: Nearby fires, stoves, or other heat sources (watch out for external boiler flues in particular!) can skew temperature readings in the vicinity.

7. Maintenance and Care

- Keep the camera clean and free of dirt.
- Store it in the protective case when not in use.
- Follow the manufacturer's guidelines for cleaning and maintenance.
- Make sure the camera is returned to South Hams District Council or West Devon Borough Council as per the agreed date within the hire agreement.

8. Troubleshooting

If you encounter issues with your thermal imaging camera, check the included user manual for troubleshooting steps. In the event of damage or malfunction, contact the Council at climatechange@swdevon.gov.uk

9. Safety Precautions

- Do not stare directly into the camera's infrared beam.
- Do not expose the camera to extreme temperatures or moisture.
- Keep it out of reach of children.
- If using the camera in potentially hazardous areas (e.g., electrical work), follow safety guidelines.
- Ensure the camera is securely stored and not shared beyond the intended audience.

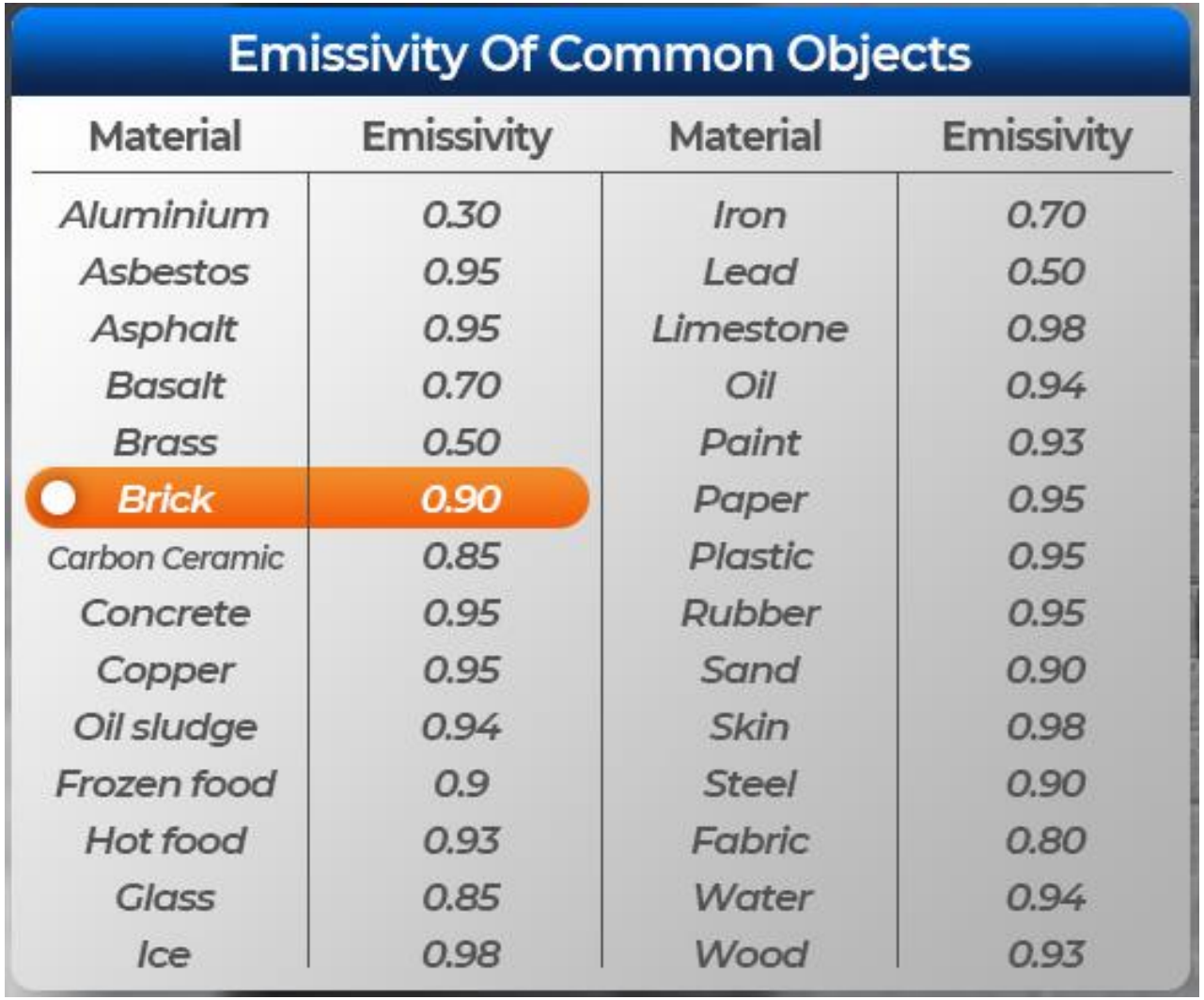
10. Next Steps

It is advisable to use a thermal imaging as part of a comprehensive energy audit that includes other diagnostic tools and techniques such as air tightness tests. Please do consider consulting a professional energy assessor who can provide a more thorough assessment of your home's energy efficiency and recommend appropriate solutions based on the thermal imaging results.

The first point of contact should be Energy Saving Devon, this service is operated by Devon County Council and supported by Devon councils and community retrofit advice services it is the one stop shop for all things retrofit in Devon. From here you are able to;

- Create a free home upgrade plan.
- Get advice through an advice line.
- Apply for home energy grants.
- Find reputable installers.

Appendix 1 - TOPDON TC004 Emissivity Settings



Emissivity Of Common Objects

Material	Emissivity	Material	Emissivity
Aluminium	0.30	Iron	0.70
Asbestos	0.95	Lead	0.50
Asphalt	0.95	Limestone	0.98
Basalt	0.70	Oil	0.94
Brass	0.50	Paint	0.93
Brick	0.90	Paper	0.95
Carbon Ceramic	0.85	Plastic	0.95
Concrete	0.95	Rubber	0.95
Copper	0.95	Sand	0.90
Oil sludge	0.94	Skin	0.98
Frozen food	0.9	Steel	0.90
Hot food	0.93	Fabric	0.80
Glass	0.85	Water	0.94
Ice	0.98	Wood	0.93

Appendix 2 - Additional Resources

Thermal Camera Tips to Avoid Common Home Inspection Mistakes

NHBC Thermal Imaging Guide

South Dartmoor Community Energy Retrofit Advice – South Hams

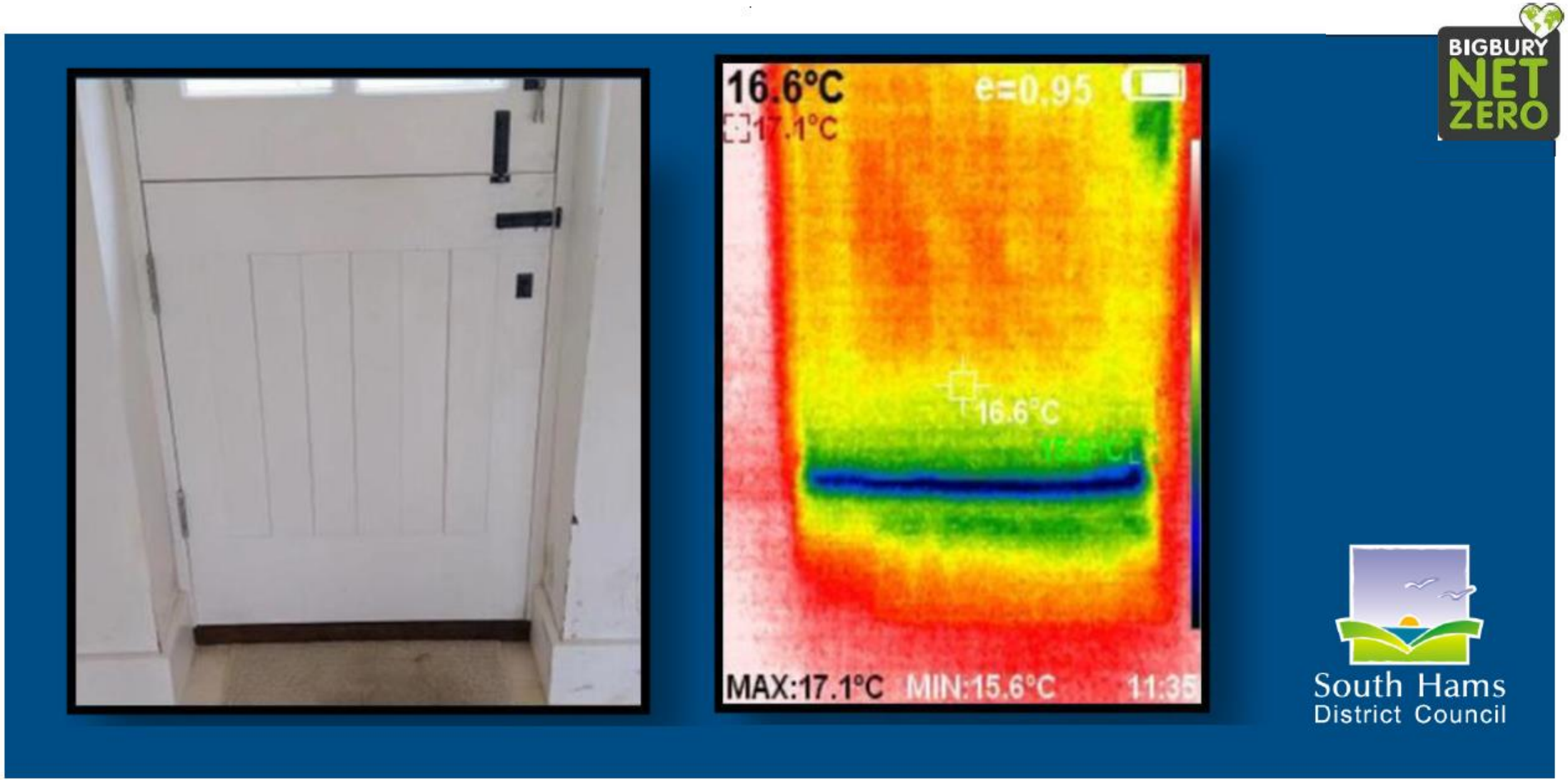
Tamar Energy Community Retrofit Advice – West Devon

Historic England Advice:

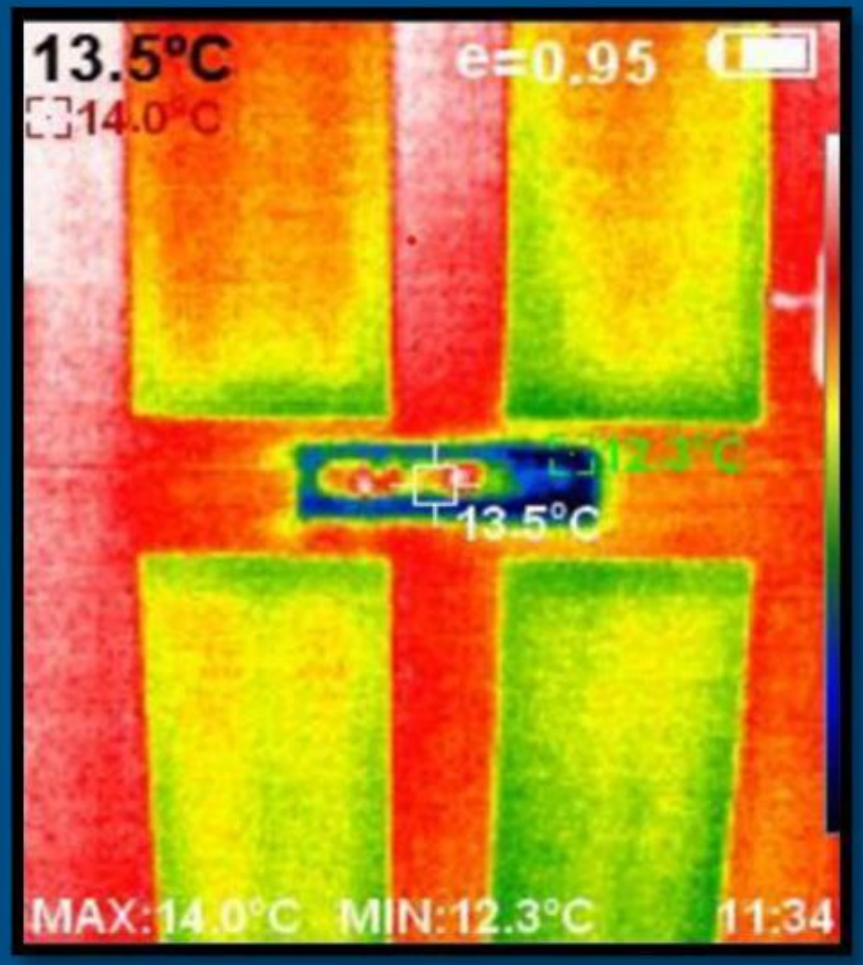
https://historicengland.org.uk/advice/your-home/energy-efficiency/
https://historicengland.org.uk/content/heritage-counts/pub/2020/hc2020-know-your-home-know-your-carbon/

The Bedford Cottages advice note is useful for many old cottages - https://tamarenergycommunity.com/wp-content/uploads/2022/10/Warmer-Bedford-Cottages-Guide-for-Residents-final.pdf

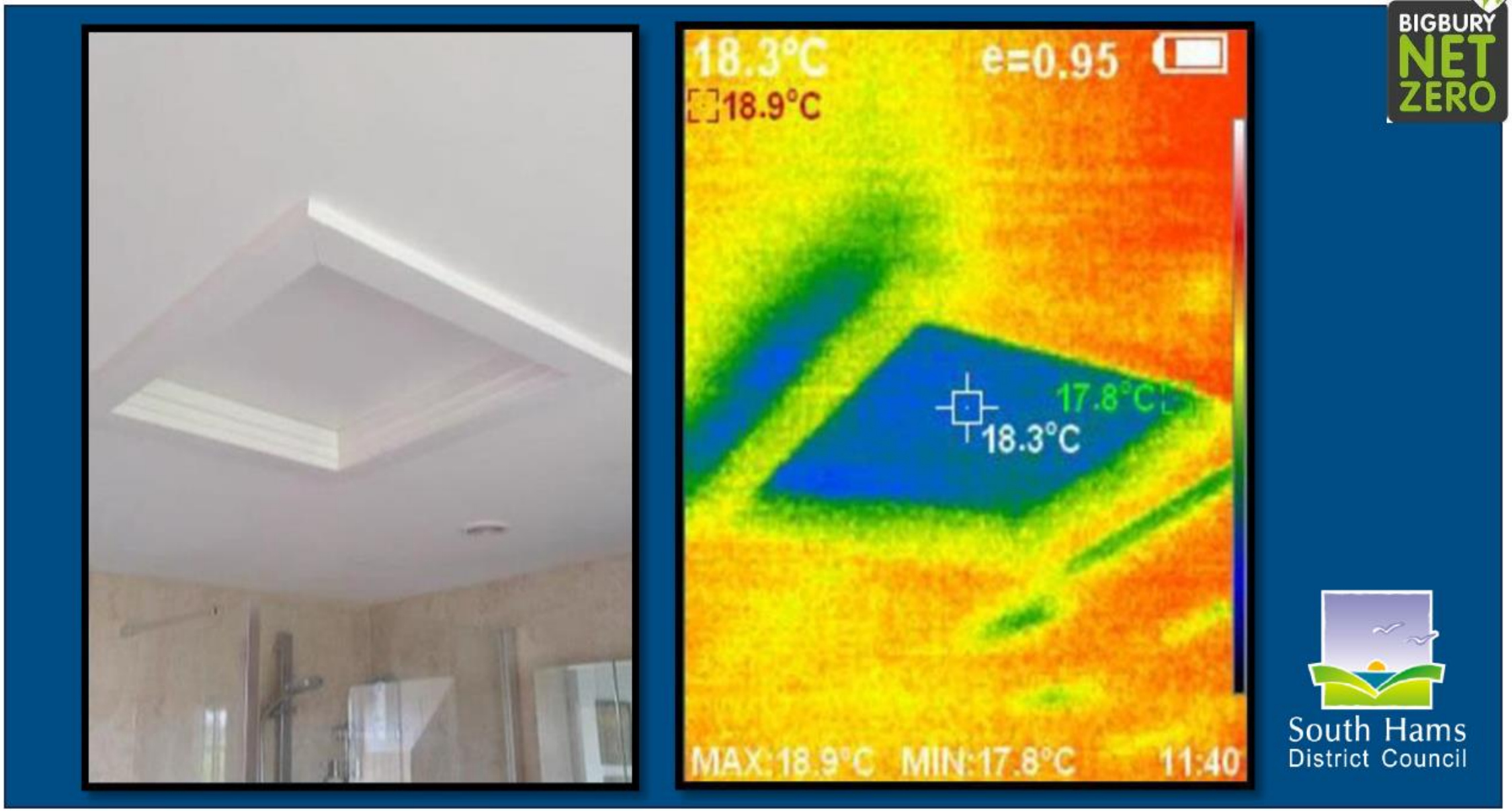
Appendix 3 - Use Example Images – Bigbury Net Zero Thermal Imaging trial funded by South Hams District Council



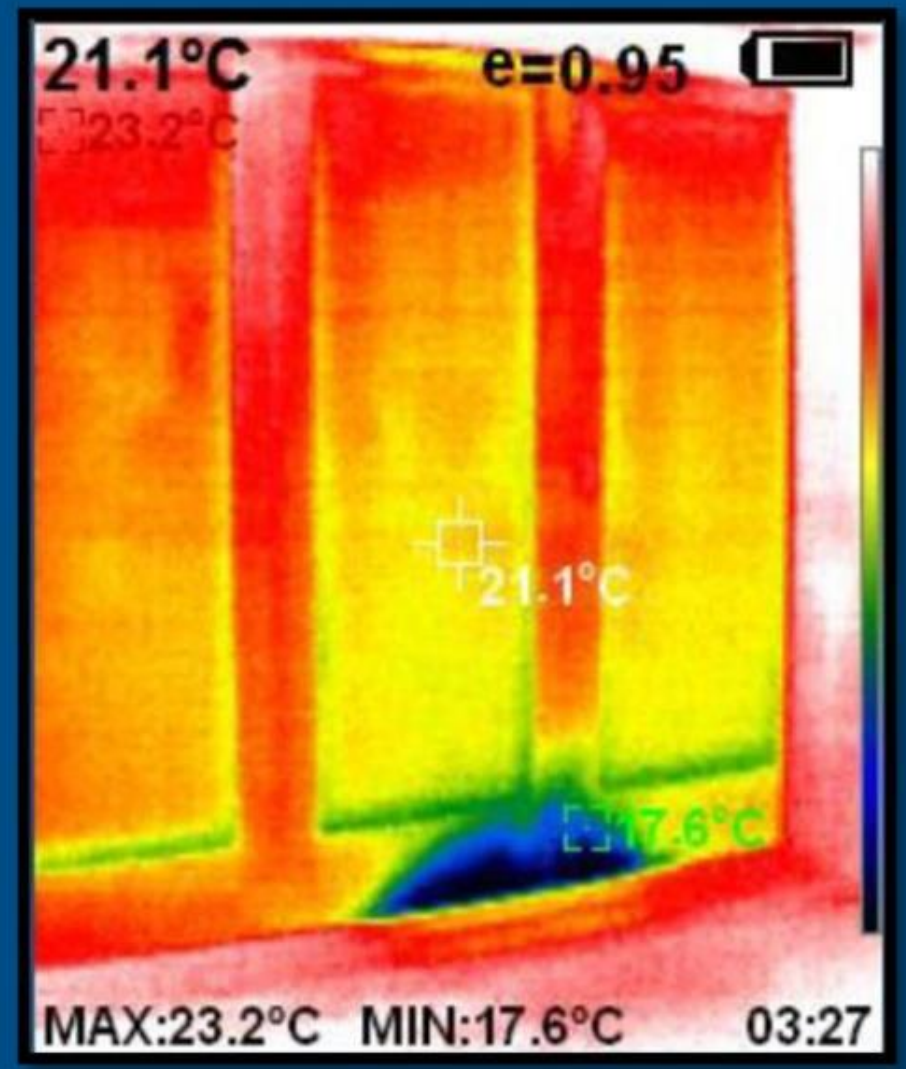
Example 1 - Bottom of a front door, gap between the door and door frame.



Example 2 – Letter box



Example 3 – loft hatch, poorly sealed.



Example 4 – French doors, uneven break between door frame and door.