Sustainable Lifestyles Limited

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15/8/2020

Thermal imaging report for;

Client name and address.

Building details.

The building is a traditionally built 2 storey detached house built in 2016.

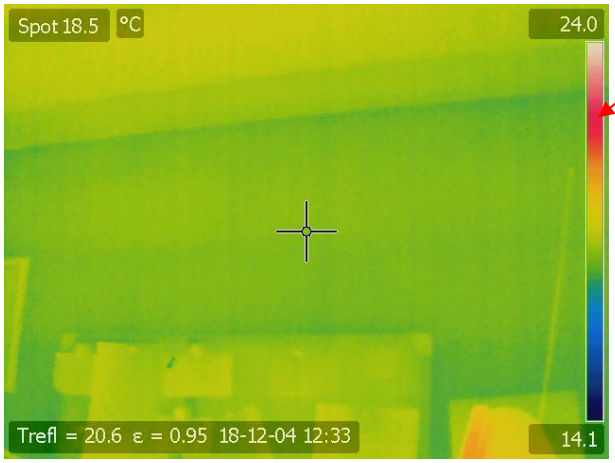
Photo of property.

Thermal imaging survey explained.

A thermal imaging survey looks at surface temperature and the results are analysed through the thermographers interpretation of the images. The images visually show a variation of colour (temperature variation) with darker colours indicating lower surface temperature and lighter colours indicating higher temperatures.

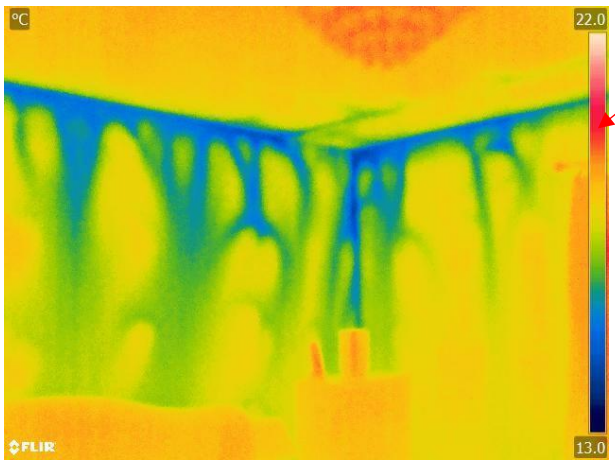
Sustainable Lifestyles Ltd. generally use a temperature span (range) of around 10°C with the ambient temperature of the building roughly in the middle of the span, this gives a good temperature range within which any anomalies can be identified. In some cases, where there are severe anomalies and temperature variations, the span needs to be expanded to take account of this to produce a suitable image. With the survey we are looking for temperature anomalies on the surfaces being surveyed which can indicate building defects. If the building has been constructed well with adequate sealing of air paths within the building structure and the insulation has been installed correctly to a high standard, there will be very little in the way of temperature variation and, visually, a relatively uniform colour variation across the image *(see image 1 below)*. If there is a wide temperature variation and a lot of colour in the image, it is indicative of defective construction *(see image 2 below)*.

The thermal imaging survey will not identify the source of the defect on its own but will guide a qualified building surveyor to areas of concern that require opening up for visual inspection to confirm the cause of the anomaly. In the words of a qualified building surveyor, *"thermal imaging gives [the surveyor], 'x-ray vision' to help identify defects that would not normally be identified."*



Temperature span 14.1 - 24°C

Image 1 - this is an image of a top floor bedroom wall, there are no anomalies and the temperature and colour variation is small with a relatively uniform colour across the image. This is what you would expect to see in a well-sealed and insulated house with no defects. The house was built in the early 1960's and would probably have an EPC rating of D or C.



Temperature span 13 - 22°C

Image 2 – this is a similar image of a top floor bedroom wall under similar conditions. Clearly seen is a significant temperature variation and a lot of colour. This is indicative of defective construction and would not be expected in a new modern, energy efficient house. This house was built in around 2017 with an EPC rating of B.

Thermographer details.

Paul Buckingham MSc Arch:AEES

MSc Architecture – Advanced Environmental and Energy Studies. (Centre for Alternative Technology/ University of East London)

- Environmental assessment, management and performance
- Environmentally responsive materials
- Fabrication and experimentation project
- Environmental politics, economics and legislation
- Design and evaluation
- Climate, comfort and building performance
- Ventilation and cooling
- Occupant health and wellbeing, principals of noise and wind power
- Independent research (thesis)

Thermography PCN Category 1.

Thermography PCN Category 2.

10 years' experience of thermographic building surveys, air tightness testing and energy efficiency and building regulation compliance consultation on domestic and commercial properties.

Methodology and Supporting Documentation.

Sustainable Lifestyles Ltd. use a combination of air tightness testing and thermography, in accordance with BS EN 13187:1999, to carry out building surveys to help identify areas of heat loss, uncontrolled air flow within the building structure, air leakages which should not be present and other potential issues such as damp.

A thermographic survey is based on non-destructive testing techniques, the findings are based on the qualified thermographer's interpretation of the thermal variations of the images. Where thermal anomalies are identified, further, potentially invasive, investigations are required to validate the findings with visual inspection to confirm the findings, typically by a chartered building surveyor or engineer.

An internal thermographic survey carried out with a negative building pressure of > -30pa in accordance with the following;

> **NHBC Foundation Thermal imaging report guide** - How to interpret the results of a thermal imaging survey.30/1/2020
> *Thermal imaging can be used in conjunction with airtightness testing to help identify paths that would cause uncomfortable draughts or give rise to unwanted heat loss. The air tightness test is carried out at the same time as the thermographic survey is undertaken inside the home.*
>
> https://www.nhbcfoundation.org/news-and-media/thermal-imaging-explained-a-new-nhbc-foundation-guide/?fbclid=IwAR1HBQCVMLOAs2o4LDcXRgudLyB38VEtuPrinC3KME2pWtf4DByUWdiq0ss
>
> **BS EN 13187:1999 Thermal performance of buildings** - Qualitative detection of thermal irregularities in building envelopes - Infrared method (ISO 6781:1983 modified)
> *6 Thermographic examination*
> *6.1 General test requirements*
> ***If air leakages are relevant to the examination, a pressure difference shall be produced across the building envelope**, or the examination shall be carried out at an appropriate time such that a pressure difference exists. If the main purpose of the thermographic examination is to locate air leakages, the pressure difference shall be at least 5 Pa at the location of the inspection. The thermographic examination shall be carried out from the low pressure side."*
>
> **"The BSRIA Guide to – Airtightness Testing For New Dwellings** under the section - *Assessing the results of an airtightness test;*
> *Thermographic testing for air leakage requires strict environmental conditions, including:*
> *A **temperature difference** across the building envelope, typically at least10°C. Depending on camera sensitivity, 5°C is often more than adequate. This is usually achieved by running the central heating for several hours.*
> *A **pressure difference** across the building envelope, so that the side being viewed is at a lower pressure, at least 30 Pa recommended.* https://www.bsria.co.uk/resources/asset/document/airtightness-dwellings.pdf"

“Principals and Practice for Infrared Thermography produced by BINDT.
Page 71 section 5.3.3.2 states that “for internal surveys a negative pressure will be required within the building”! http://www.bindt.org/shopbindt/books/infrared-thermography-handbook-volume1-principles-and-practice.html#.W4-pL7gnZPY”

“**Flir Infrared Guidebook for Building Applications.**
Chapter 5. How to Carry out a Thermographic Inspection
Section 3. Set up a Blower Door Test
A thermographic inspection should always be carried out under a negative pressure. With the blower door we create a negative pressure inside of 50pa.”

Survey environmental details.

Weather conditions = light wind, clear, dry.

External temperature = 5.8°C.

Internal ambient temperature = 17.0°C

Reflected Apparent temperature = 17.6°C

Start time = 09.30am

End time = 10.30am

The building was depressurised to -50pa using a Miniapolis Duct Blaster fan.

Camera Details.

Camera – Flir P640 Serial no. 309001108

Calibration certificate no. J000211 6th November 2019

Purpose of the Survey.

Sustainable Lifestyles Ltd were commissioned to carry out a thermal imaging survey of the property in response to concerns raised by the owner, [client name] with regards to cold areas of the house indicative of defective construction. We undertook thermography and air tightness testing, to identify air paths, location of air leakages and cold areas indicating possible missing, limited or poorly installed insulation and other potential issues such as damp.

Pages 1 – 13 are the body of the report.

Pages 1 – 39/39 (bottom left hand corner) are the numbers of the thermal images referenced.

Findings.

1. Windows and doors.

1.1 Around some of the window and door reveals there was some air infiltration behind the dry lining, ***see images 10, 12, 14, 20 & 21/39 as examples,*** this is a result of defective sealing around the window reveals.

1.2 The patio doors do not close properly and the hinge at the top of the right-hand door has become detached from the frame, ***see image 11/39*** which shows serious draughts flowing under the bottom of the doors. this is a security concern as well as a significant source of heat loss.

2. Walls and voids.

2.1 Many of the external walls defective seals along the tops of the walls and clearly showed individual adhesive dabs, in places, where there should be a solid ribbon of adhesive to fully seal the walls. This is both a source of heat loss and a potential fire risk due to free-flowing air within the building structure. ***Images 10, 15, 16, 17, 19, 20, 21, 23, 29 & 36/39*** all show this air flow.

According to all standards, etc, there should a solid ribbon of adhesive along the tops of the walls, including the corners, down the corners, along the bottom and around all electrical outlets to prevent air flow for fire safety, acoustic and thermal purposes so the building is in breach of these.

2.2 The cold area on the wall at the top of the stairwell, ***see images 15 – 17/39,*** is almost certainly causing cold draughts to flow down the stairs and under the living room door causing the room to be thermally uncomfortable. The area is so cold that warm air rising from downstairs will hit this area, cool and fall as convection currents causing a strong downwards flow of cold air that will flow down the stairs and across the floor. The owner has mentioned that there is a strong cold draught flowing under the living room door across the floor.

2.3 In two corners, ***see images 22 & 36/39,*** there is significant cold showing down the corners, the dry lining does, however, appear to be reasonably well sealed along the tops. The cold is, almost certainly, cracking down the corner junction, behind the dry lining, bridging through to the cavity and allowing cold air flow into the dry lining void.

Through convection and conduction warm air can flow within the wall voids behind the dry lining and rise into the roof void, which is a significant source of heat loss. Wind can also flow into the void from the roof, around windows and from the cavity if there is defective sealing around these areas, which is clearly the case here.

2.4 Each part of the building, such as rooms, floor/ ceiling voids, studwork walls, etc, should be fully sealed to form compartments to help prevent the spread of fire between compartments. Air flow within stud walls, and other void boxings such as generally found in many bathrooms, create air paths that link these compartments increasing the risk of fire spread within a building. A number of the internal stud walls showed cold air infiltration, ***see images 23, 24, 27, 31, 32 & 37/39.***

2.5 The service void boxing in the en-suite shower room was showing as colder than the adjacent walls indicating air flow within the void, which suggests that it is fully open at the top and uninsulated, ***see images 28 & 30/39.***

3. Floors.

3.1 Draughts were identified flowing from some of the skirtings around the house, ***see images 1, 5, 13 & 34/39, as examples***. These examples are mainly on the ground floor and are almost certainly coming from under the floor. The property owner has indicated that the site was previously an industrial processing site and as such the ground is almost certainly contaminated with toxic material. If this is the case, there would have been a requirement for the ground to be either decontaminated or a gas membrane installed to seal the property from the ingress of potentially toxic gas build up under the block and beam floor. The air flow from under the skirting is indicative of there being a defective or missing gas barrier because this air flow is almost certainly flowing through the block and beam floor

3.2 ***Image 34/39*** is the skirting under the radiator in bedroom 1 showing draughts flowing from under the skirting.

3.3 ***Image 33/39*** is the skirting under the bedroom 1 patio door to the front balcony and shows significant draughts flowing from the skirting. This is a highly exposed area facing the sea and is subject to strong winds and driving rain. There should not be any draughts from this area if the building had been built to take account of the exposed area.

4. Ceilings.

4.1 ***Image 6/39*** shows an area of the living room ceiling where there appears to be air flow from the joist ends where they penetrate the internal wall leaf through to the cavity, this would suggest the joist ends have not been sealed.

4.2 ***Image 3/39*** shows a patch in the corner of the porch where there appears to be either missing insulation, air infiltration or, potentially, a damp area. The owner mentioned frequent mould growth in this area, which is evident from the

photo below the thermal image, and it is directly below the balcony. This requires further investigation.

4.3 There are many cold patches on the 1st floor ceilings where there is defective loft insulation, ***see images 18, 20, 23, 24, 27, 29, 31, 32, 35, 36 – 39/39.*** The loft insulation requires checking and reinstalling/ topping up as appropriate.

5. Other.

5.1 The loft hatch has significant draughts flowing from under the frame and around the hatch itself, ***see image 38/39.***

5.2 There are draughts flowing from behind the cooker extractor in the kitchen, ***see image 7/39,*** this is likely to be lack of sealing around the ducting where it penetrates the inner wall leaf, sealing around the plasterboard is not sufficient. This requires further investigation.

5.3 There are draughts flowing out from under the kitchen units, ***see image 8/39,*** this is likely to be coming from under the floor and also from behind the dry lining.

5.4 There were signs of possible damp on the floor of the hall/ porch, ***see image 4/39,*** the owner reported this area often feels damp, cooler parches identified on the floor could confirm this. This requires further investigation.

Standards, Specifications and Regulations.

Although the building is a traditional build, the internal structure is basically timber framed so poor workmanship can have a detrimental effect on the fire resistance of the building. The following paper written by the **Chief Fire Officers Association** highlights the concerns with timber frame buildings and fire risk stating that poor workmanship can dramatically increase the fire risk in timber framed buildings. This could also be very relevant to traditional build dwellings where much of the internal structure (such as floor joists, floor boards and in many cases, although not all, the internal stud walls) is of timber frame construction as with this property.

Timber Framed Construction Report *(Mon, 07 Dec 2009)*

http://www.cfoa.org.uk/11065

Page 3 section 5) Main Findings c)

> c) Within completed timber frame buildings the risk of fire spread in the event of a fire occurring can increase dramatically should there be any aspects of poor workmanship in areas such as cavity barriers, fire stopping or finish quality;

It is not known which edition of the NHBC Technical Standards the house was built to, however, the 2016 standard has been quoted because it was the year the house was constructed.

NHBC Standard 2016 Chapter 6.3 states the following:

Fire resistance 6.3.6

Also see: Chapter 6.2 and 8.1

Internal walls shall have adequate resistance to the spread of fire. Issues to be taken into account include:

a) fire resistance
b) typical construction
c) services
d) materials.

The guidance below does not apply to Scotland, and reference should be made to the Technical Handbooks.

Fire resistance

Internal walls should provide fire resistance in accordance with building regulations.

Typical construction

Internal walls of hollow or cavity construction (fire-resisting or otherwise) should have cavity barriers installed at:

- the perimeter
- junctions with fire-resisting floors and walls.

Fire-resisting walls should be fire stopped or constructed to resist fire spread at:

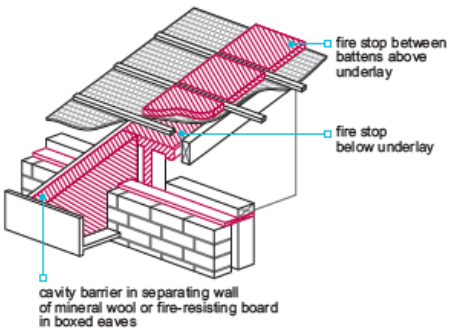
- their perimeter
- openings for doors and pipes, etc.
- junctions with other fire-resisting walls, floors and roofs

Where fire-resisting walls are of:

- masonry construction with a cavity, they should be closed at the top
- timber construction, they should have wire reinforced mineral wool cavity barriers at junctions with floors and ceilings.

At junctions between a separating or compartment wall and a pitched roof or flat roof:

- adequate precautions should be provided to prevent fire spread
- the separating wall should stop approximately 25mm below the top of adjacent roof trusses
- soft packing such as mineral wool should be installed above and below the roofing underlay to allow for movement in roof timbers to prevent 'hogging' of the tiles.



A wire reinforced mineral wool blanket cavity barrier should be provided within boxed eaves and be:

- a minimum 50mm thick
- carefully cut to shape to seal the boxed eaves fully
- fixed to the rafter.

The wall dividing an integral, or attached, garage and the floor above should be designed to act together to provide adequate resistance to fire spread. Where the garage has either no ceiling or there is no floor in the space above, vertical fire separation may be required.

For timber constructions, fire stopping material should be compressible, e.g. mineral wool, to accommodate timber shrinkage without affecting fire stopping.

Services

Where services such as pipes, cables and ducting pass through fire-resisting walls, penetrations should be fire stopped. Services should not penetrate plasterboard layers of separating walls.

Fire stopping should be:

- in accordance with building regulations and the design information
- completed neatly.

Materials

Suitable fire stopping materials include:

- mineral wool
- cement mortar
- gypsum plaster
- intumescent mastic or preformed strip
- proprietary sealing systems assessed in accordance with Technical Requirement R3.

"Building Regulation Part B – Fire Safety
Chapter 3B
Construction of compartment walls and compartment floors.
General.
5.6 Every compartment wall and compartment floor should:
a. form a complete barrier to fire between the compartments they separate."

Fire resistance 6.2.9

*Also see: 'Fire Prevention on Construction Sites' Construction Federation and Fire Protection Association (**www.thefpa.co.uk**) 'Site Safety Strategy' STA '16 Steps to Fire Safety' STA 'Design Guide to Separating Distances' (**www.uktfa.com**)*

Timber walls and panels shall control and resist the spread of fire and smoke. Issues to be taken into account include:
a) cavity barriers and fire stops
b) services.

All building elements should have adequate fire resistance. Materials in accordance with building regulations are acceptable; other materials should be assessed in accordance with Technical Requirement R3.

"NHBC Standard 2016 section 9.2.4 Wall and ceiling finishes under the sub heading DRY LINING states:

Dry lining 9.2.4

Dry lining shall provide an adequate substrate for the decorative finish. Issues to be taken into account include:
a) installation
b) vapour control
c) detailing and support
d) fixing.

Installation

Dry lining should:

- not be started until the building is substantially weatherproofed
- be programmed so that finishes are applied as soon as possible after completion
- provide performance in accordance with building regulations where it contributes to fire resistance
- ensure that gap sealing is specified where necessary to prevent draughts.

9.2

Table 4: Standards relevant to dry lining

BS 1230	Gypsum plasterboard
BS 8212	Code of practice for dry lining and partitioning using gypsum plasterboard

The air flow behind the dry lining, as identified in many of the thermal images, will also allow a fire to spread through the building, in the event of a fire breaking out, by providing air paths through the building structure through which smoke and flammable gases under pressure can flow to other parts of the building. The NHBC Technical Standard, quoted above, refers to standards BS 1230 and BS 8212. The relevant section from BS 8212 is quoted below. BS 1230 was withdrawn in 2006 and replaced by BS EN 520:2004+A1:2009. It is not known why the NHBC are referencing an obsolete standard.

Standard Number	BS 1230-1:1985
Title	Gypsum plasterboard. Specification for plasterboard excluding materials submitted to secondary operations
Status	Superseded, Withdrawn
Publication Date	28 February 1985
Confirm Date	15 April 1994
Withdrawn Date	31 July 2006
Normative References(Required to achieve compliance to this standard)	No other standards are normatively referenced
Informative References(Provided for Information)	No other standards are informatively referenced
Replaced By	BS EN 520:2004+A1:2009

"BS 8212:1995 - Code of practice for Dry lining and partitioning using gypsum plasterboard.

3.11 Sealing

The nature, behaviour, tolerances and application of the extensive range of materials used in the construction of buildings inevitably results in gaps occurring between adjoining materials. A number of critical situations can develop if adequate precautions are not taken during construction to minimize or eliminate these conditions. Fire protection performance, sound insulation and thermal insulation are all dependent upon the integrity of the dry lining being maintained. These critical situations should be identified and suitably detailed.

For example, floor to wall, ceiling to wall and wall to wall junctions may need to be fire stopped to prevent the spread of flame and smoke. The fire stopping also contributes to the integrity of the lining by preventing air movements through the cavity formed by the lining.

3.12 Thermal insulation

Every effort should be made to avoid cold bridging. For masonry external walls and masonry walls adjacent to unheated spaces, the optimum thermal insulation from a dry lining system will be achieved when the background is imperforate and the dry lining has been sealed at the perimeter in accordance with ***3.11***

3.14 Sound insulation

Sound insulation performance requirements of various parts of the building are the responsibility of the designer. If optimum sound insulation performance is to be

achieved, it is important that the adjoining elements offer similar sound insulation performance. The dry lining systems should be assembled in accordance with the specification, ensuring that no airpaths exist, particularly at perimeters."

"The British Gypsum Installation guide For Thistle plaster and Gyproc Plasterboard DriLyner BASIC specifies;

Stage 3: (page 20)

- *Mix Gyproc Dri-Wall Adhesive to a thick consistency.*
- *Using a trowel, apply a continuous band around the perimeter of the wall, ceiling edge, and around any services or openings to provide greater airtightness.*

(See link below.)

https://www.google.co.uk/search?q=british+gypsum+lit+installation+guide&ie=utf-8&oe=utf-8&gws_rd=cr&ei=5OMkV6TfCoTBgAaj4KXIBQ"

According to the evidence shown in the images listed in paragraph 2.1 above, ***10, 15, 16, 17, 19, 20, 21, 23, 29 & 36/39,*** the dry lining has certainly not been installed in accordance with BS 8212:1995 and therefore, does not meet the standard set out by the NHBC. The significantly low temperatures, shown as lines or streaks, are indicative of air flow behind the dry lining which the standards set out to avoid. Invasive investigations with enable the appointed chartered surveyor to report on the state and condition of the design and construction to confirm these defects, recommendations on remedial works can then be made.

Building Regulation Part L1 states the building should facilitate sustainable development.

"Standard and technical specifications

3.19 Building regulations are made for specific purposes, including securing the health, safety, welfare and convenience of people in or about buildings; furthering the conservation of fuel and power; furthering the protection or enhancement of the environment; and ***facilitating sustainable development."***

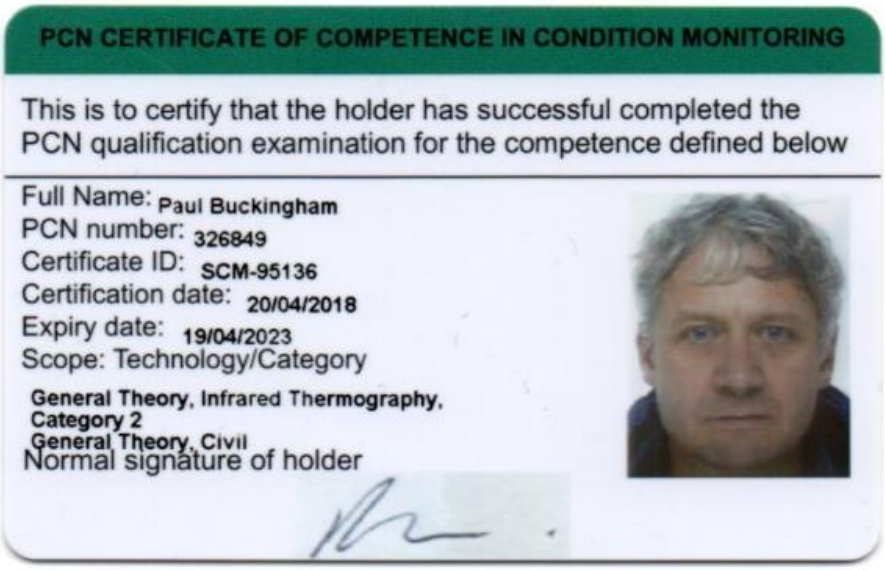
Conclusion.

The building in its current state is certainly not representative of its EPC B rating due to the extent of defective areas identified around the house which are contributing to significant heat loss.

The house is built in a highly exposed area and directly faces the sea so is subject to high winds and wind driven rain as well as sea spray. The amount of air infiltration identified, due to defective construction, would certainly make it unsuitable for the environment it has been built in.

The constant elemental impact of the environment it is built in will undoubtedly be detrimental to the longevity of the building and there are already significant signs of building degradation caused by this impact.

Extensive remedial works are required to the defective areas identified around the whole building to bring it up to a standard appropriate for its surrounding environment.



PCN CERTIFICATE OF COMPETENCE IN CONDITION MONITORING

This is to certify that the holder has successful completed the PCN qualification examination for the competence defined below

Full Name: Paul Buckingham
PCN number: 326849
Certificate ID: SCM-95136
Certification date: 20/04/2018
Expiry date: 19/04/2023
Scope: Technology/Category

General Theory, Infrared Thermography, Category 2
General Theory, Civil

Normal signature of holder

Paul Buckingham MSc Arch:AEES
PCN Category 2,
Technical Director,
Sustainable Lifestyles Ltd.

Sustainable Lifestyles Limited

Measurements

Bx1	Max	16.6 °C
	Min	13.2 °C
	Average	15.2 °C
Bx2	Max	17.0 °C
	Min	12.1 °C
	Average	15.0 °C

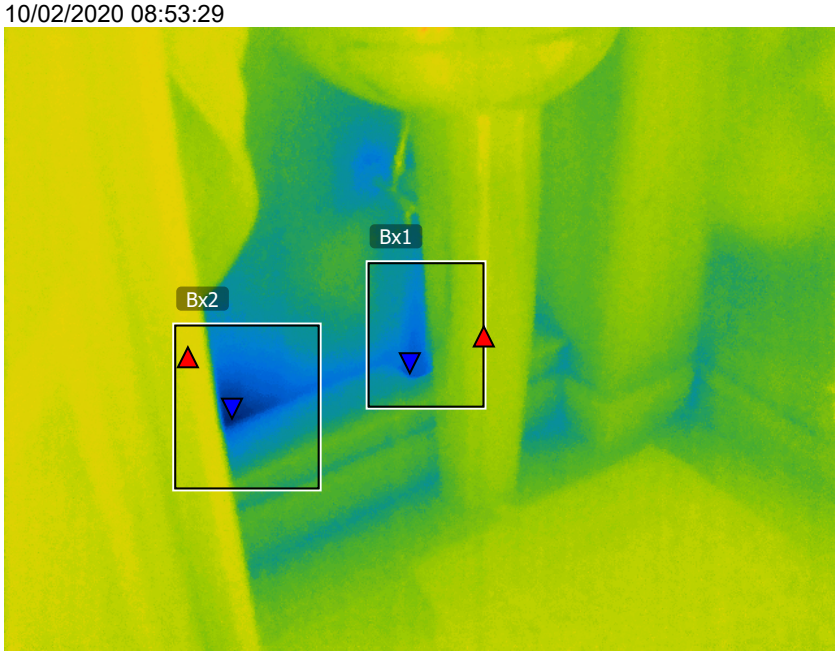
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Ground floor W/C showing draughts flowing from the service boxing along the skirting below the sink and a cold area just above the boxing.

10/02/2020 08:53:29



IR_2020-02-10_0119.jpg ThermaCAM P640 West 309001108

10/02/2020 08:53:29

DC_2020-02-10_0120.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	17.7 °C
	Min	14.2 °C
	Average	16.6 °C
Bx2	Max	17.2 °C
	Min	14.0 °C
	Average	15.9 °C

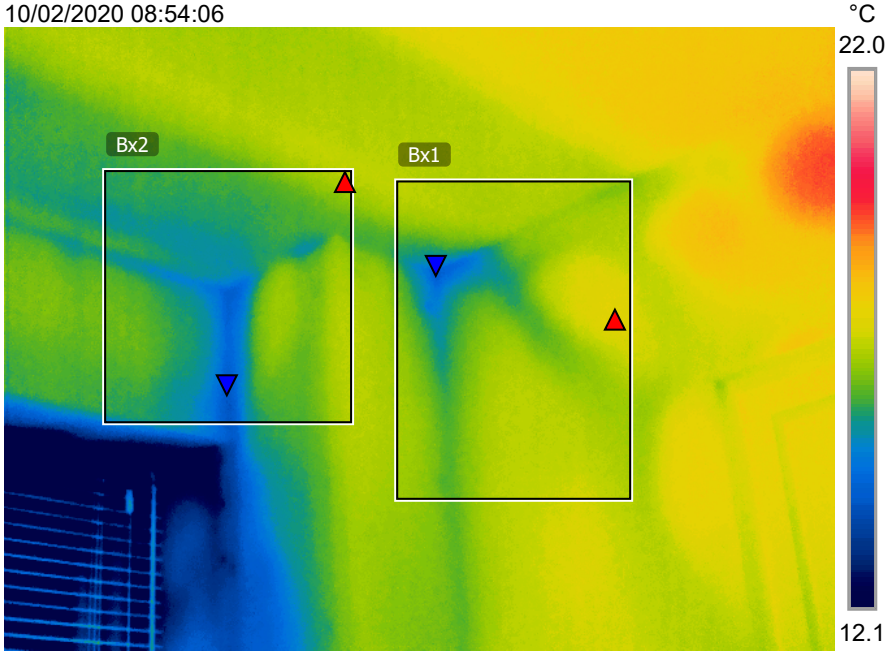
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Ground floor W/C showing the top of the soil vent pipe (SVP) boxing and indications of air flow behind the dry lining coming from behind the boxing.

10/02/2020 08:54:06



IR_2020-02-10_0121.jpg ThermaCAM P640 West 309001108

10/02/2020 08:54:06

DC_2020-02-10_0122.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	17.6 °C
	Min	10.4 °C
	Average	14.7 °C
Bx2	Max	16.8 °C
	Min	8.1 °C
	Average	14.6 °C

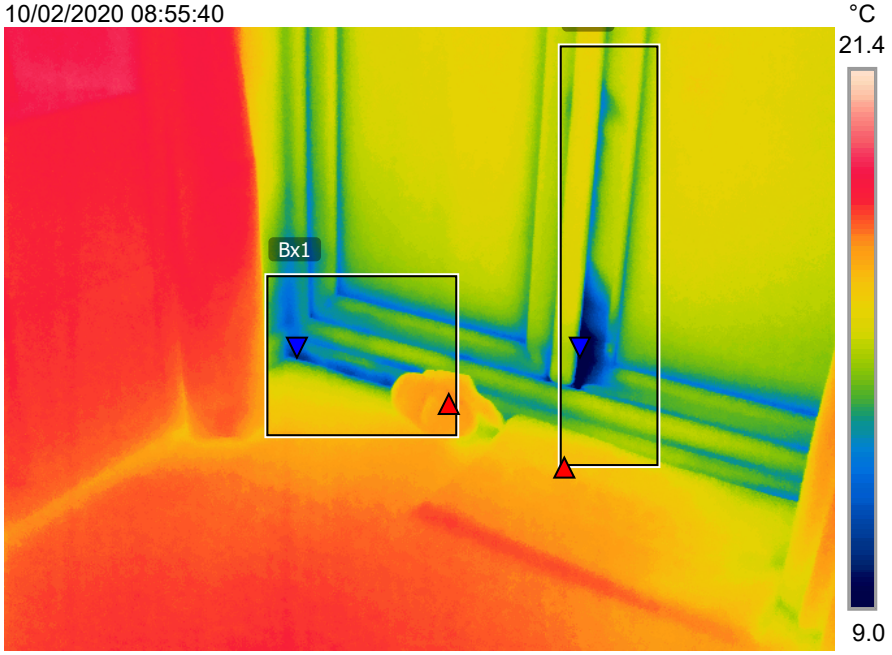
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Living room patio doors showing draughts flowing from under the door frame along the bottom and through the seal between the doors.

10/02/2020 08:55:40



IR_2020-02-10_0123.jpg ThermaCAM P640 West 309001108

10/02/2020 08:55:40

DC_2020-02-10_0124.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.5 °C
	Min	14.3 °C
	Average	17.6 °C

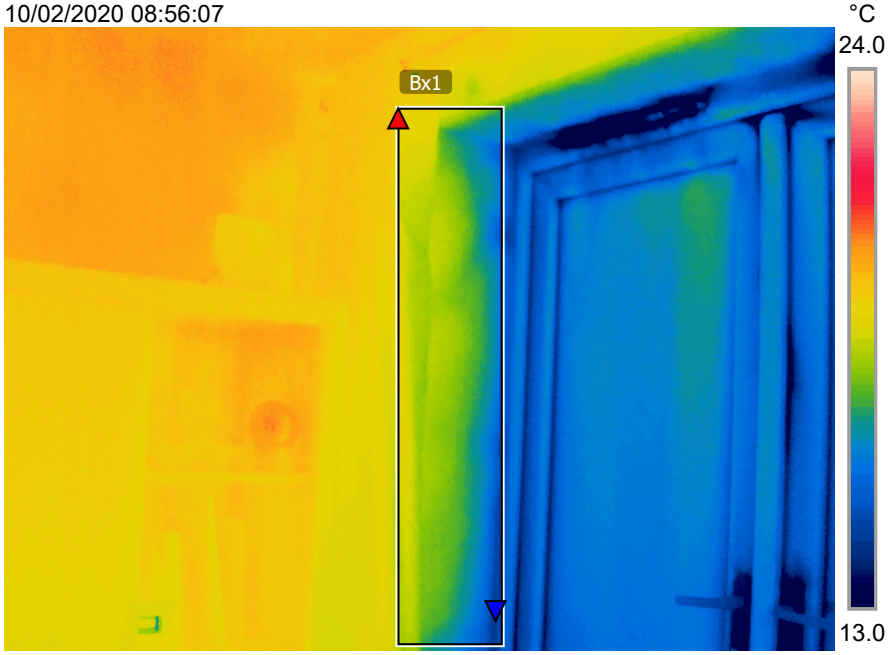
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Living room patio doors showing indications of air infiltration behind the plasterboard of the reveals.

10/02/2020 08:56:07



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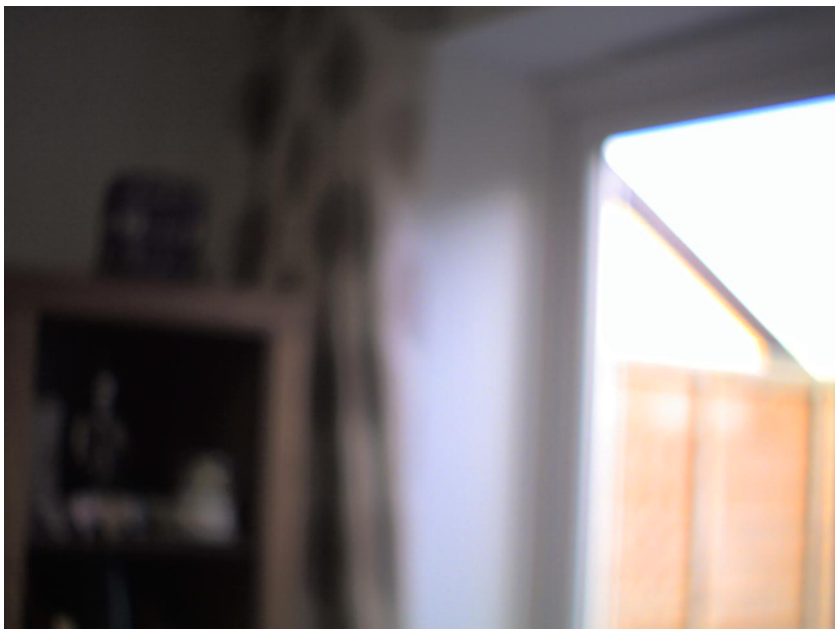

DC_2020-02-10_0126.jpg

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Measurements

Bx1	Max	18.3 °C
	Min	7.1 °C
	Average	15.2 °C

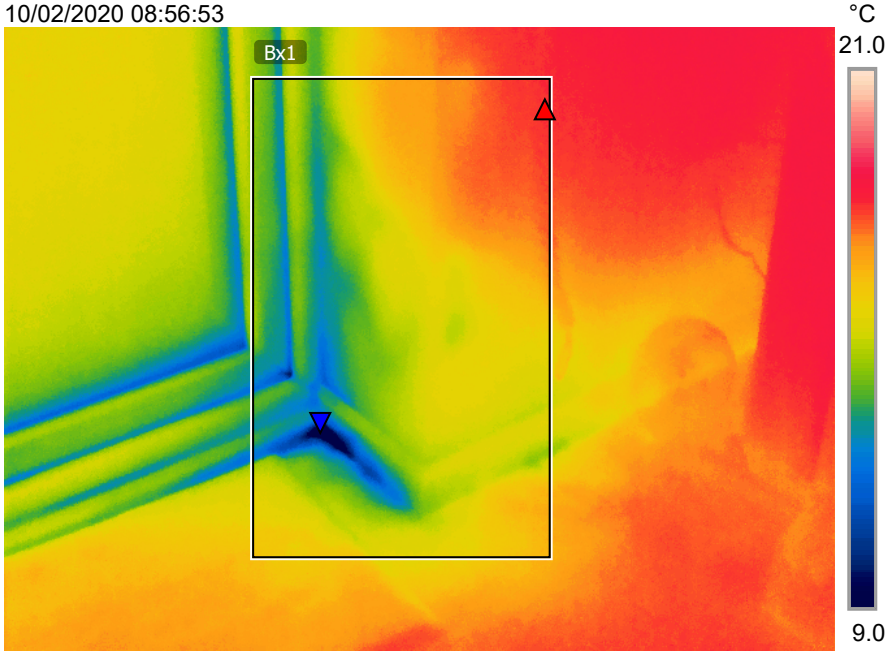
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Living room patio doors again showing similar draughts from the skirting of the reveal and air infiltration behind the plasterboard of the reveal.

10/02/2020 08:56:53



IR_2020-02-10_0129.jpg ThermaCAM P640 West 309001108

10/02/2020 08:56:53

DC_2020-02-10_0130.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.6 °C
	Min	11.5 °C
	Average	17.5 °C

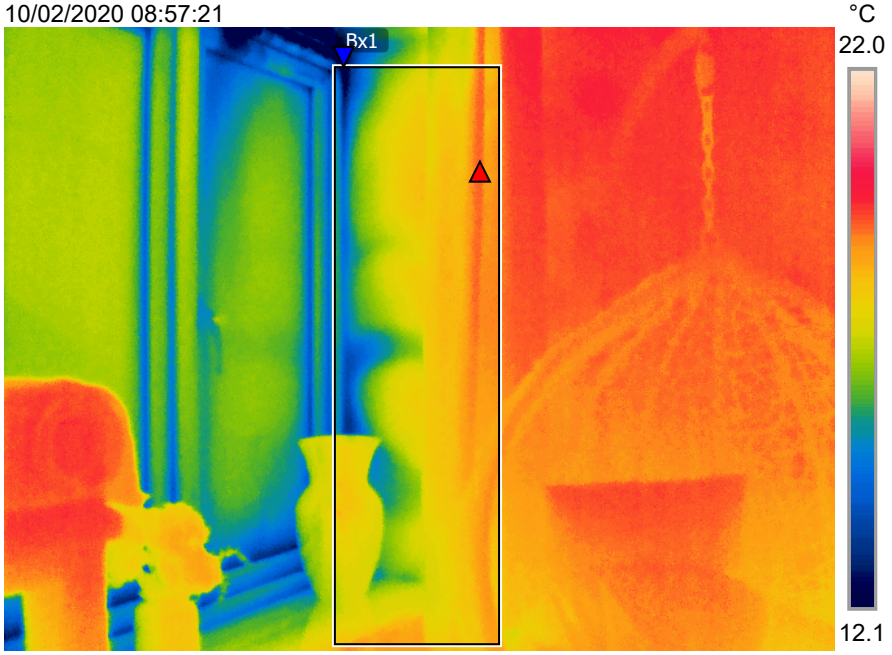
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Living room window showing air flow behind the dry lining of the reveal where it has not been fully sealed.

10/02/2020 08:57:21



IR_2020-02-10_0131.jpg ThermaCAM P640 West 309001108

10/02/2020 08:57:21

DC_2020-02-10_0132.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.5 °C
	Min	10.4 °C
	Average	16.9 °C

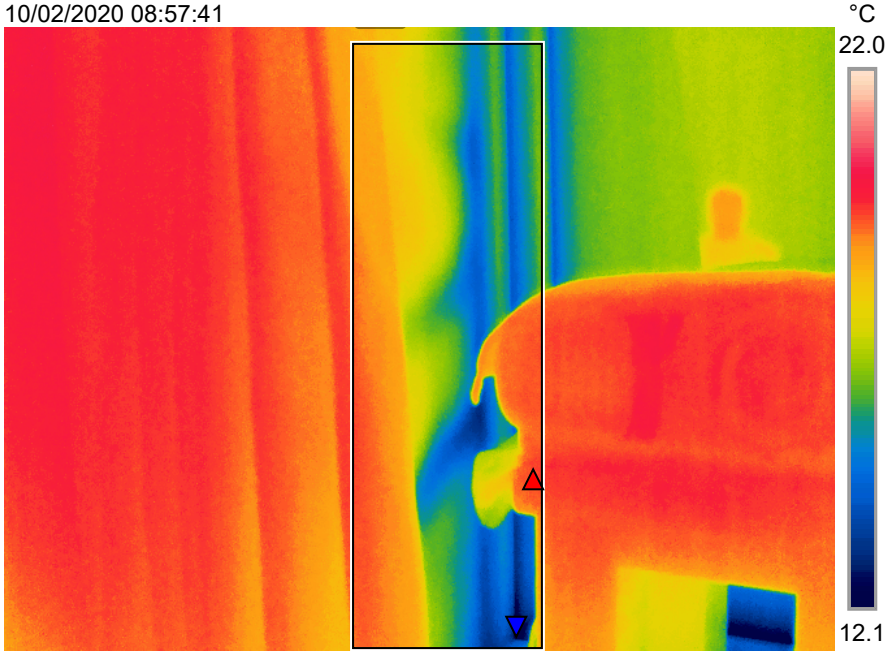
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

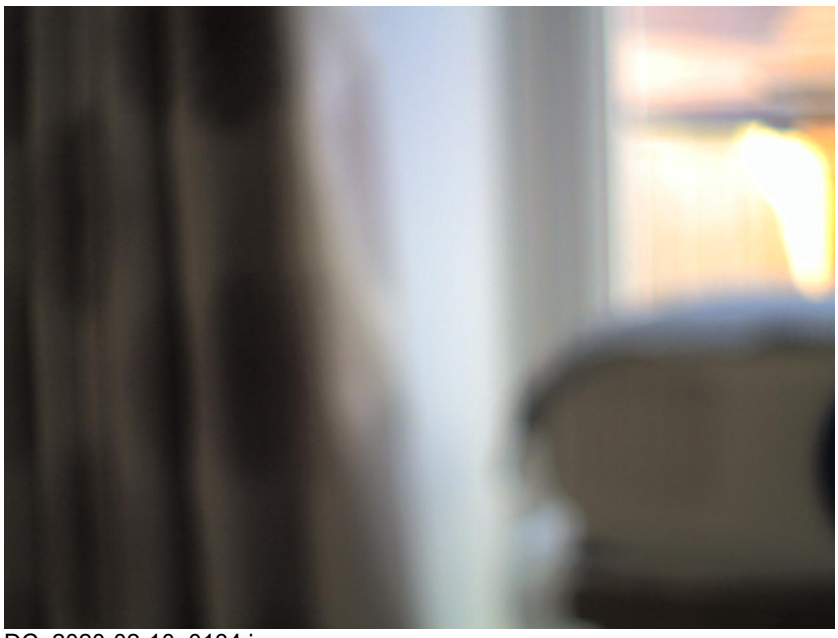
The opposite side of the living room window showing similar air flow behind the plasterboard of the reveal.

10/02/2020 08:57:41



IR_2020-02-10_0133.jpg ThermaCAM P640 West 309001108

10/02/2020 08:57:41



DC_2020-02-10_0134.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	24.6 °C
	Min	13.1 °C
	Average	19.0 °C

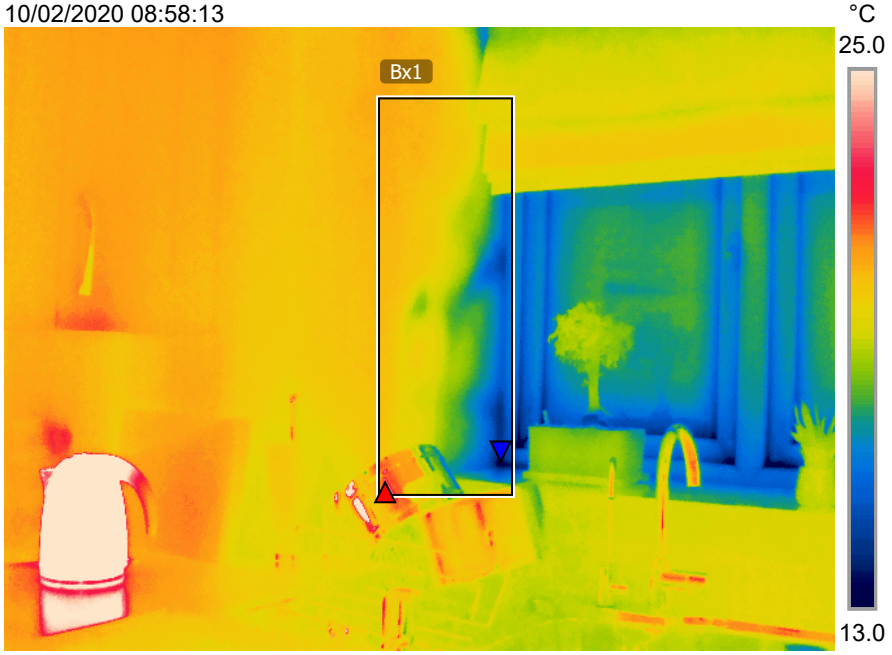
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

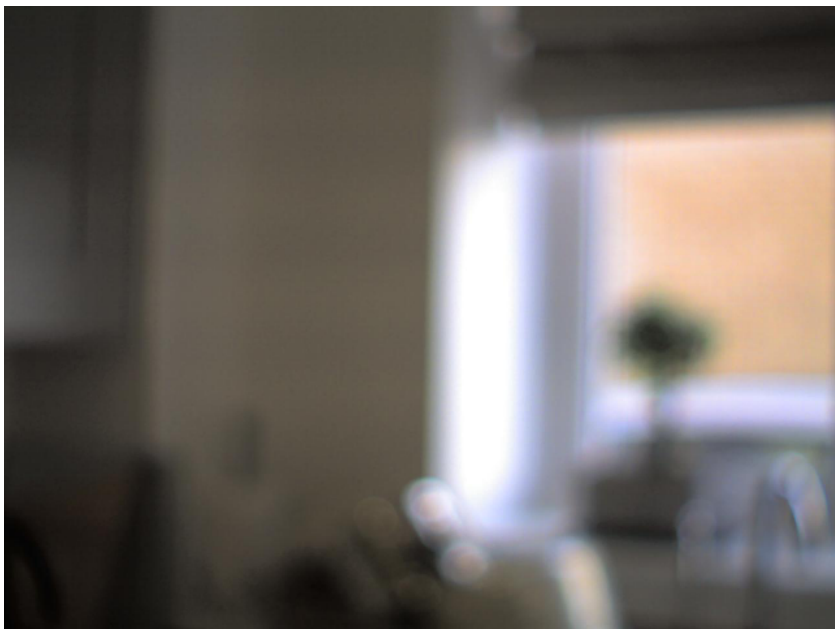
Kitchen window showing air flow behind the dry lining of the reveal and flowing into the wall adjacent.

10/02/2020 08:58:13



IR_2020-02-10_0135.jpg ThermaCAM P640 West 309001108

10/02/2020 08:58:13



DC_2020-02-10_0136.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	22.3 °C
	Min	13.8 °C
	Average	19.9 °C

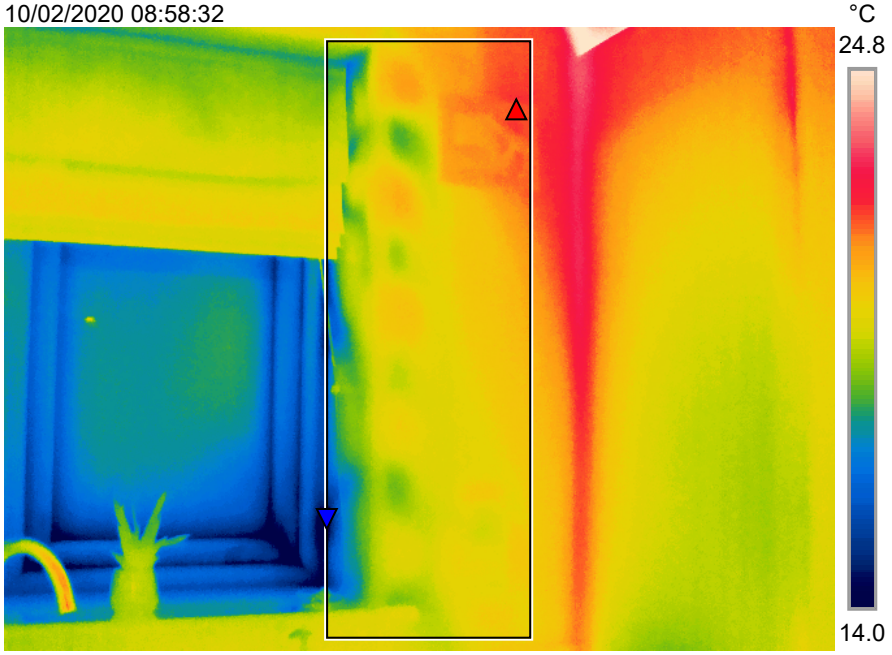
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

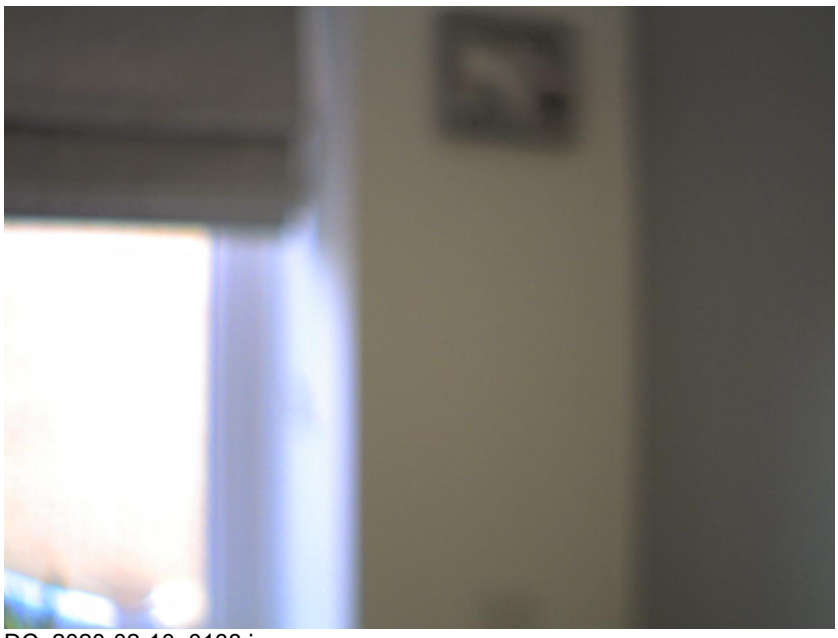
The other side of the kitchen window showing air flow behind the dry lining of the reveal and the adjacent wall.

10/02/2020 08:58:32



IR_2020-02-10_0137.jpg ThermaCAM P640 West 309001108

10/02/2020 08:58:32



DC_2020-02-10_0138.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	22.5 °C
	Min	10.6 °C
	Average	18.6 °C

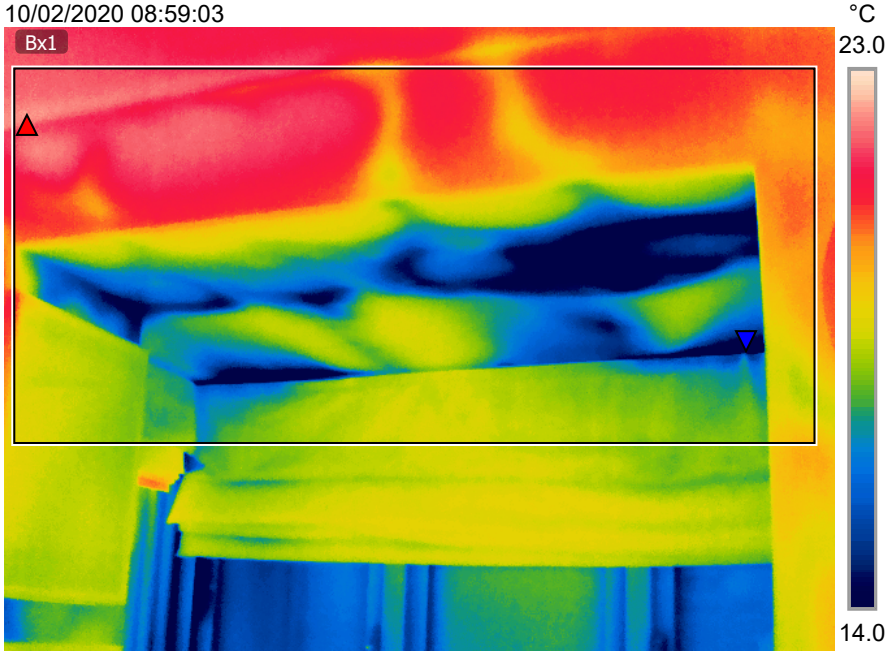
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Kitchen bay window ceiling showing missing or ineffective insulation in the roof above and lack of sealing. There is considerable air flow above the ceiling and flowing into the wall above the bay behind the dry lining.

10/02/2020 08:59:03



IR_2020-02-10_0139.jpg ThermaCAM P640 West 309001108

10/02/2020 08:59:03

DC_2020-02-10_0140.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	23.4 °C
	Min	13.4 °C
	Average	19.3 °C

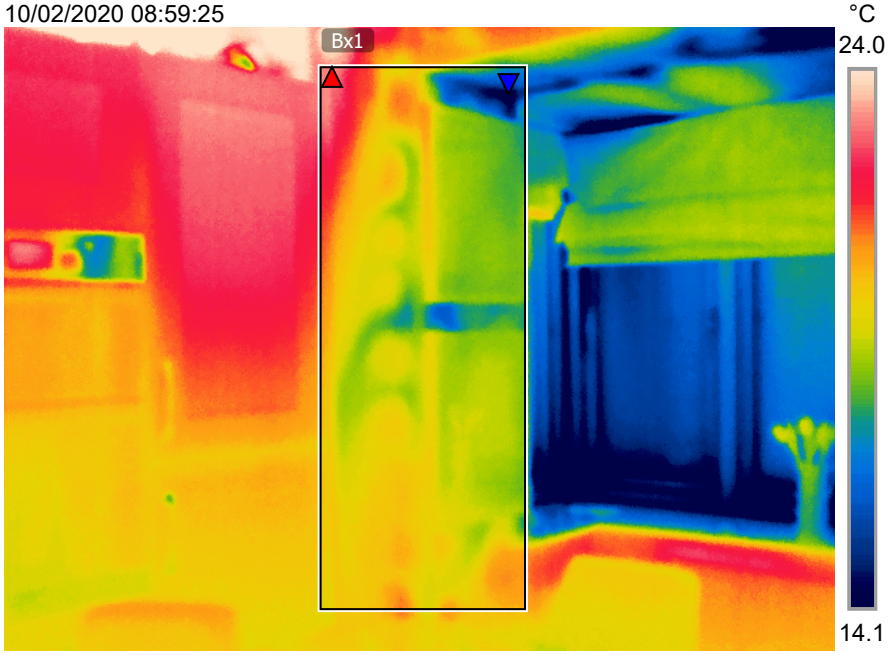
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Air flow behind the dry lining of the window reveal and flowing into the adjacent wall.

10/02/2020 08:59:25



IR_2020-02-10_0141.jpg ThermaCAM P640 West 309001108

10/02/2020 08:59:25

DC_2020-02-10_0142.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	21.3 °C
	Min	12.9 °C
	Average	19.2 °C

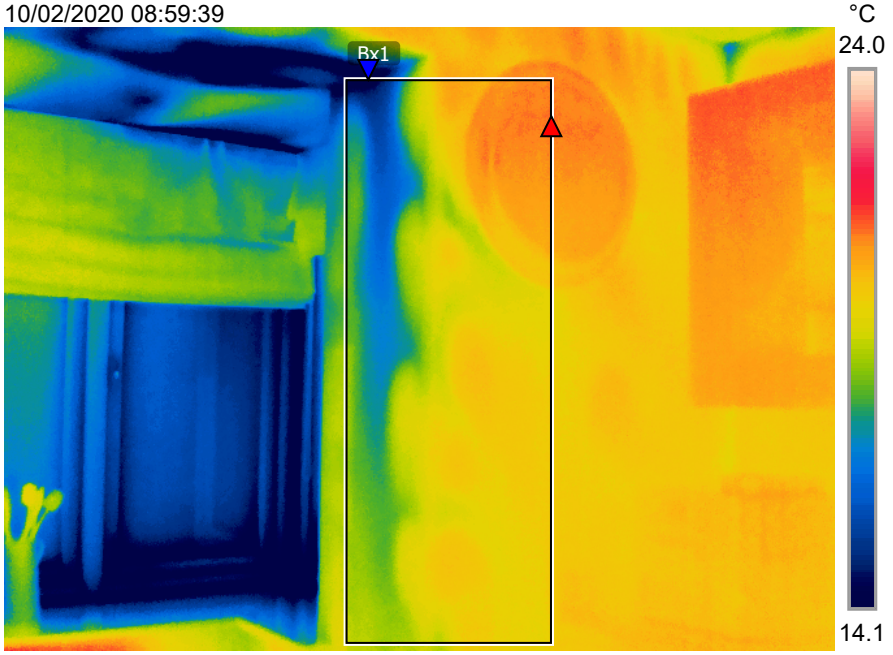
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

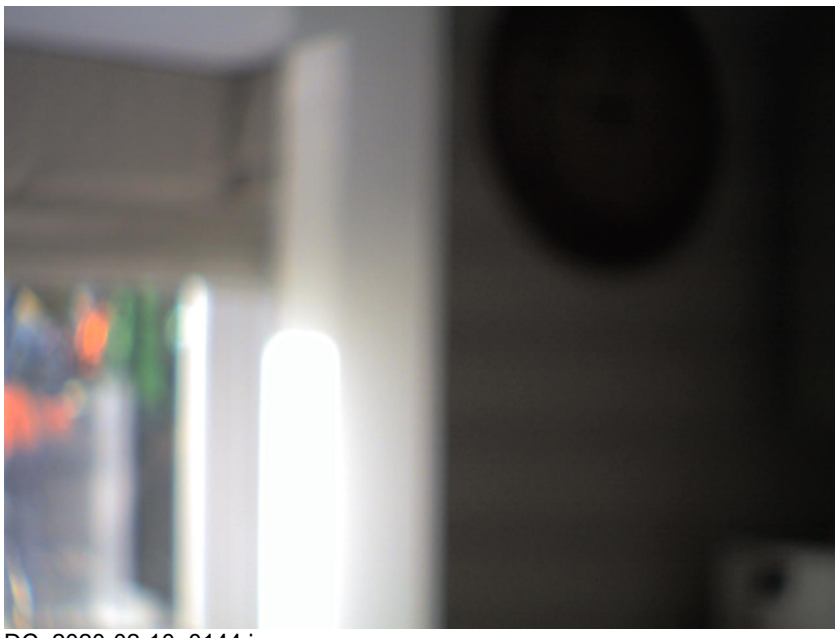
The other side of the bay reveal showing similar air flow behind the dry lining and into the adjacent wall.

10/02/2020 08:59:39



IR_2020-02-10_0143.jpg ThermaCAM P640 West 309001108

10/02/2020 08:59:39



DC_2020-02-10_0144.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	20.3 °C
	Min	15.6 °C
	Average	18.7 °C

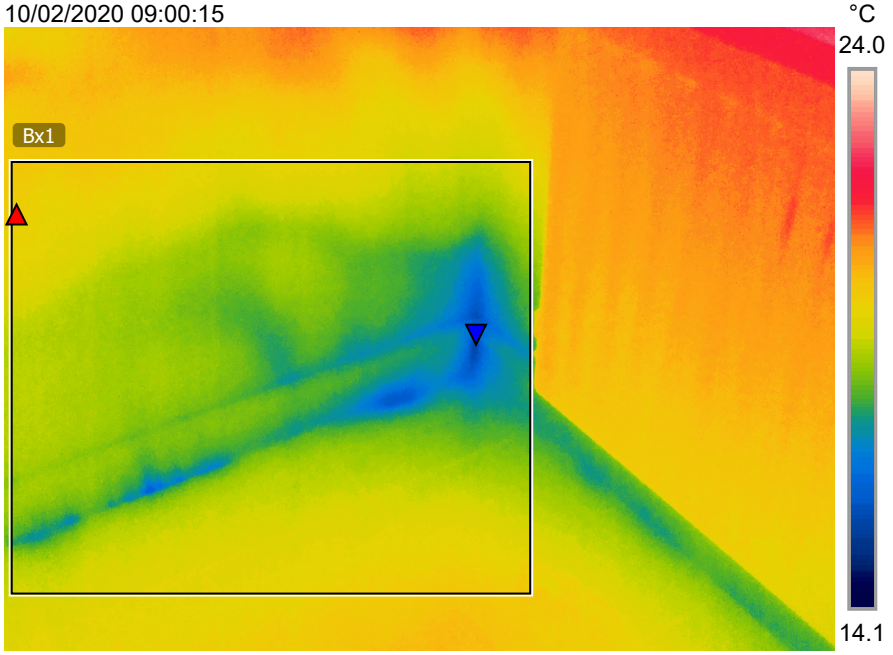
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Bottom of the bay window side wall showing draughts flowing from under the skirting and behind the dry lining above. It is likely this air flow in coming from under the block and beam floor.

10/02/2020 09:00:15



IR_2020-02-10_0145.jpg ThermaCAM P640 West 309001108

10/02/2020 09:00:15

DC_2020-02-10_0146.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	18.4 °C
	Min	15.0 °C
	Average	17.0 °C

Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

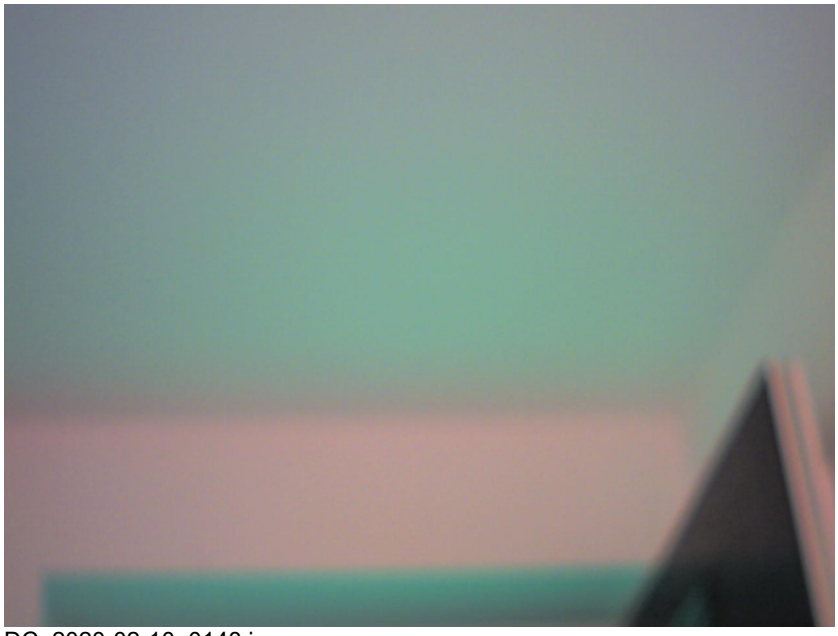
Note

Cold area across the ceiling above the front door. This indicates air flow within the void between the joists above and could be flowing from the SVP boxing of the ground floor W/C. This requires further investigation.

10/02/2020 09:00:41

IR_2020-02-10_0147.jpg ThermaCAM P640 West 309001108

10/02/2020 09:00:41



DC_2020-02-10_0148.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	21.8 °C
	Min	12.4 °C
	Average	20.2 °C

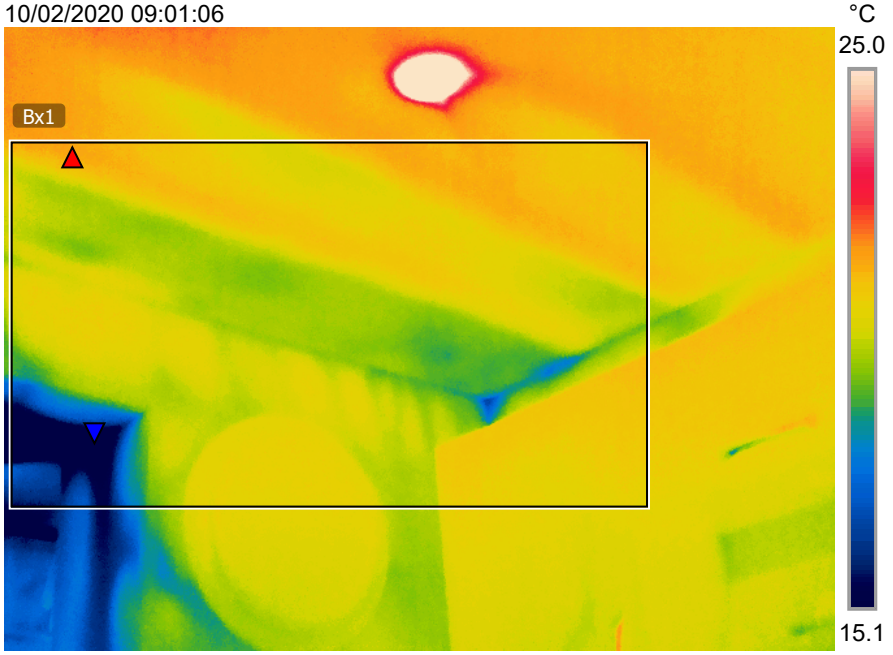
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

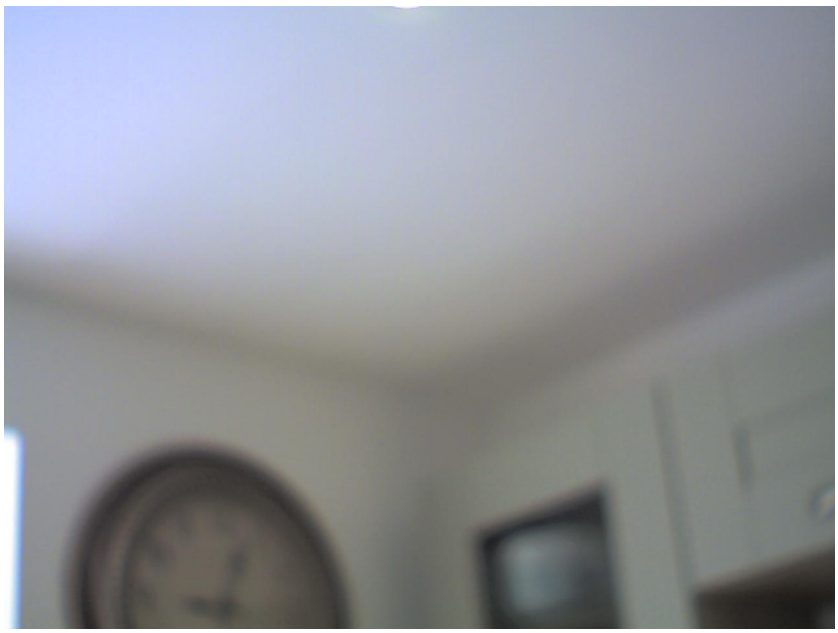
This is the ceiling adjacent to the bay window area and shows the air flow identified above the front door continuing across the kitchen ceiling. Note the indication of individual adhesive dabs along the top of the wall where there should be a continuous seal of adhesive.

10/02/2020 09:01:06



IR_2020-02-10_0149.jpg ThermaCAM P640 West 309001108

10/02/2020 09:01:06



DC_2020-02-10_0150.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.9 °C
	Min	14.2 °C
	Average	18.4 °C
Bx2	Max	19.5 °C
	Min	15.1 °C
	Average	17.6 °C

Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

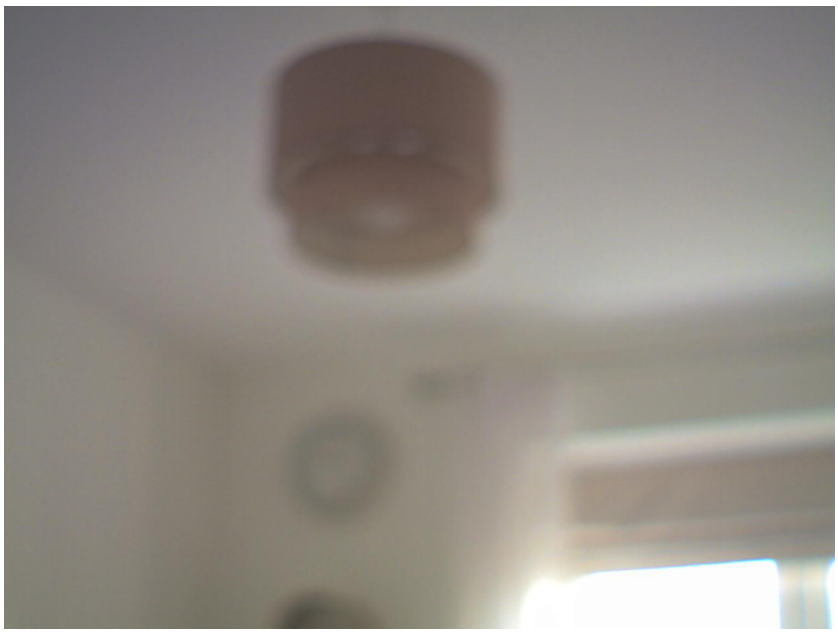
Note

Rear R/H bedroom showinmg significant air flow behind the dry lining on the walls with individual adhesive dabs clearly shown. The ceiling along the rear of the bedroom shows missing, limited or poorly installed insulation above within the roof void of the top floor.

10/02/2020 09:02:12

IR_2020-02-10_0151.jpg ThermaCAM P640 West 309001108

10/02/2020 09:02:12



DC_2020-02-10_0152.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.6 °C
	Min	14.6 °C
	Average	18.5 °C

Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

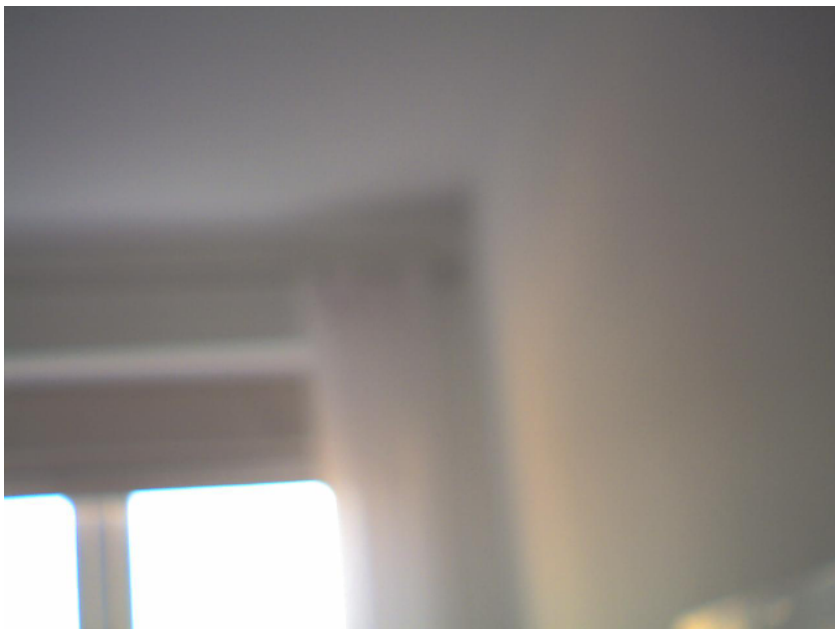
Note

Rear R/H bedroom again showing air infiltration into the internal stud wall and again, missing insulation above the ceiling.

10/02/2020 09:02:30

IR_2020-02-10_0153.jpg ThermaCAM P640 West 309001108

10/02/2020 09:02:30



DC_2020-02-10_0154.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.5 °C
	Min	14.1 °C
	Average	17.2 °C

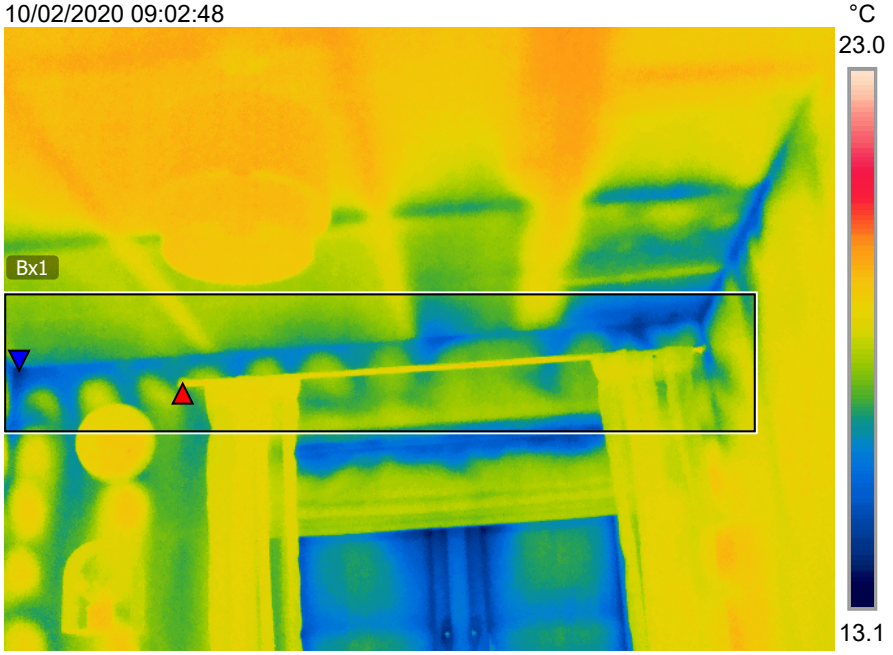
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

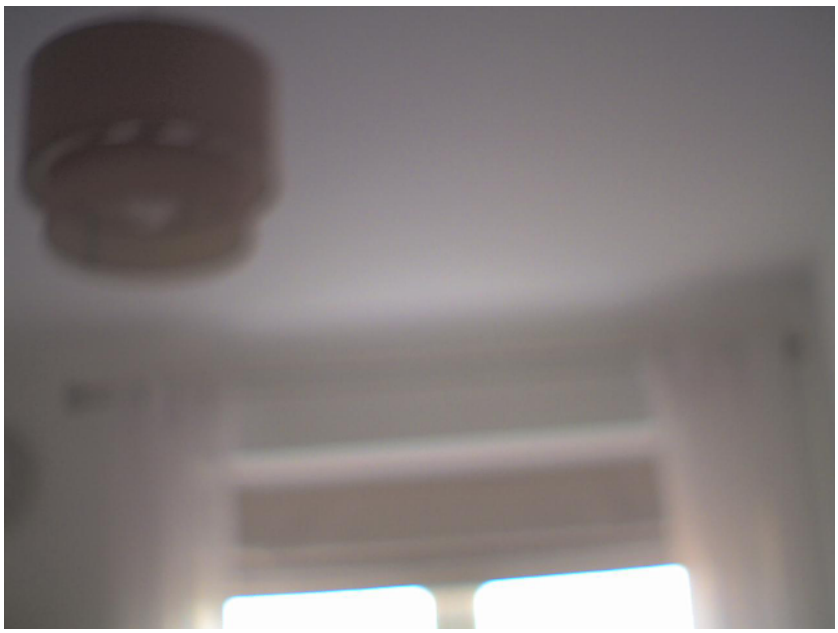
Over voew of the rear R/H bedroom clearly showing individual adhesive dabs along the top of the wall.

10/02/2020 09:02:48



IR_2020-02-10_0155.jpg ThermaCAM P640 West 309001108

10/02/2020 09:02:48



DC_2020-02-10_0156.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	21.8 °C
	Min	14.2 °C
	Average	18.9 °C

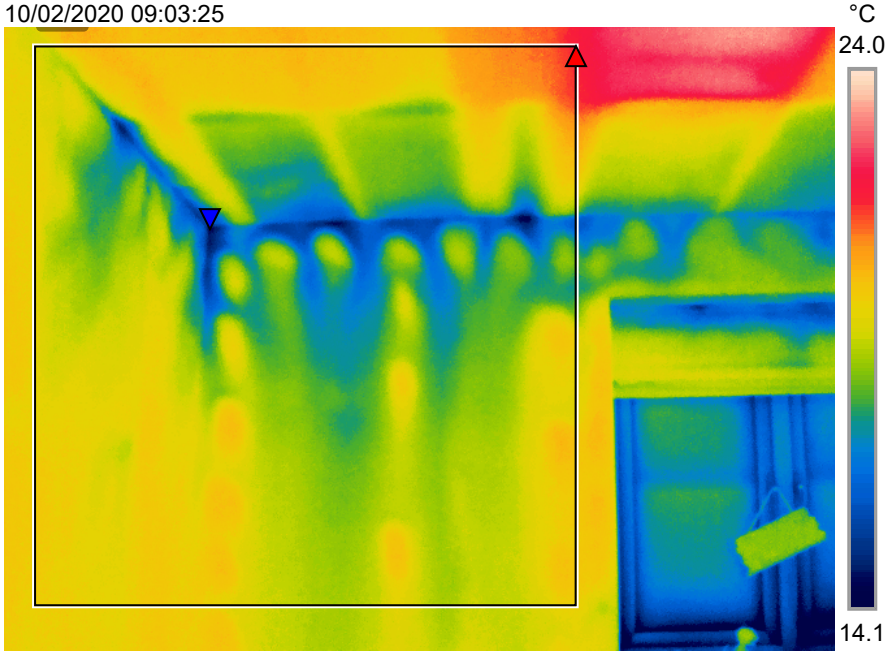
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

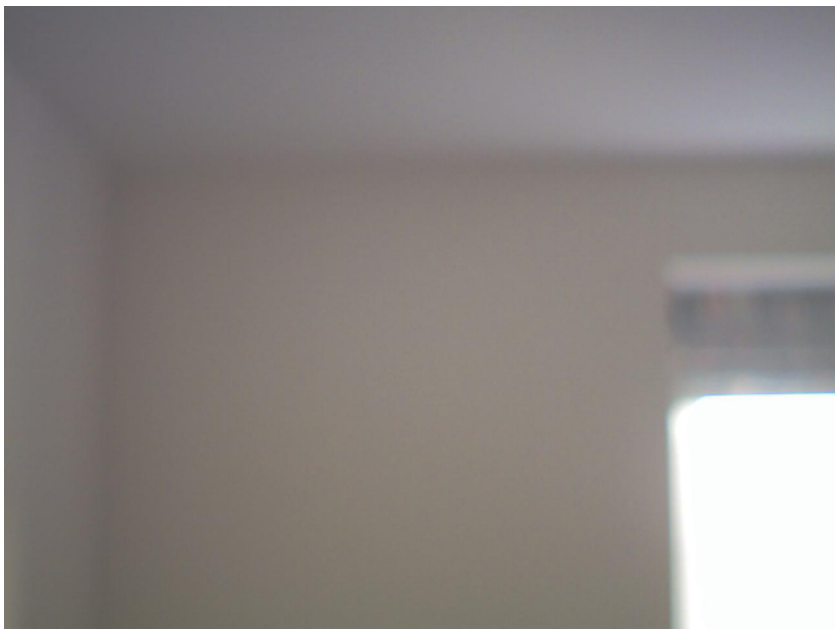
Rear L/H bedroom showing air infiltration behind the dry lining and individual adhesiver dabs. Again there is air infiltration into the internal stud wall and missing, limited or poorly installed insulation above the ceiling.

10/02/2020 09:03:25



IR_2020-02-10_0157.jpg ThermaCAM P640 West 309001108

10/02/2020 09:03:25



DC_2020-02-10_0158.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	21.2 °C
	Min	16.2 °C
	Average	19.1 °C

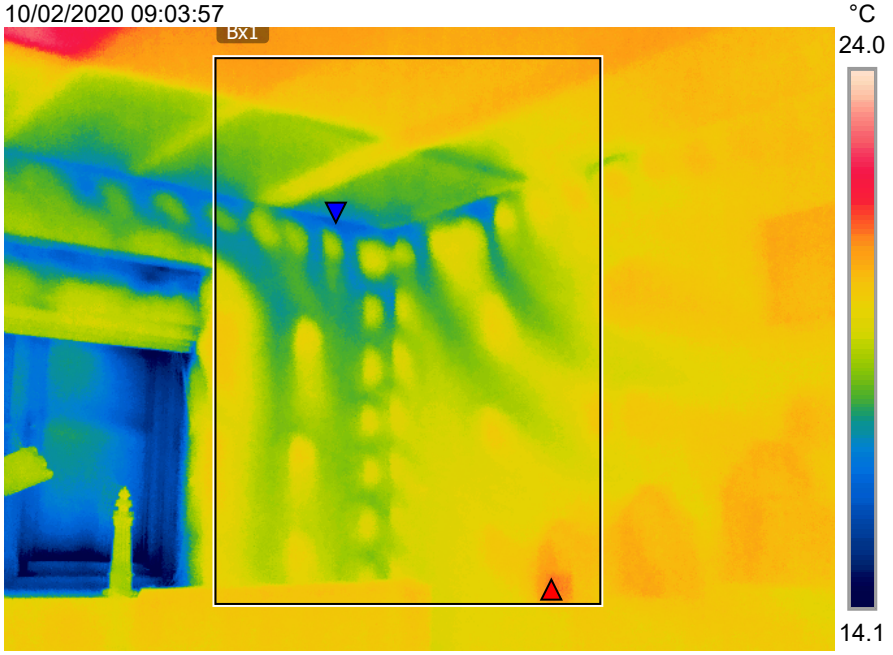
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

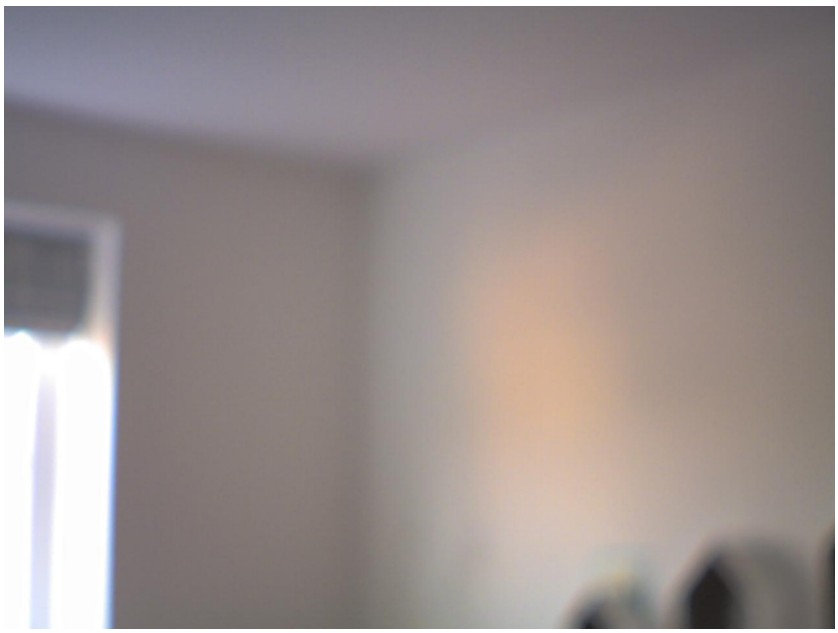
Rear L/H bedroom again showing air flow behind the dry lining, individual adhesive dabs and missing insulation above the ceiling.

10/02/2020 09:03:57



IR_2020-02-10_0159.jpg ThermaCAM P640 West 309001108

10/02/2020 09:03:57



DC_2020-02-10_0160.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.9 °C
	Min	14.0 °C
	Average	18.6 °C

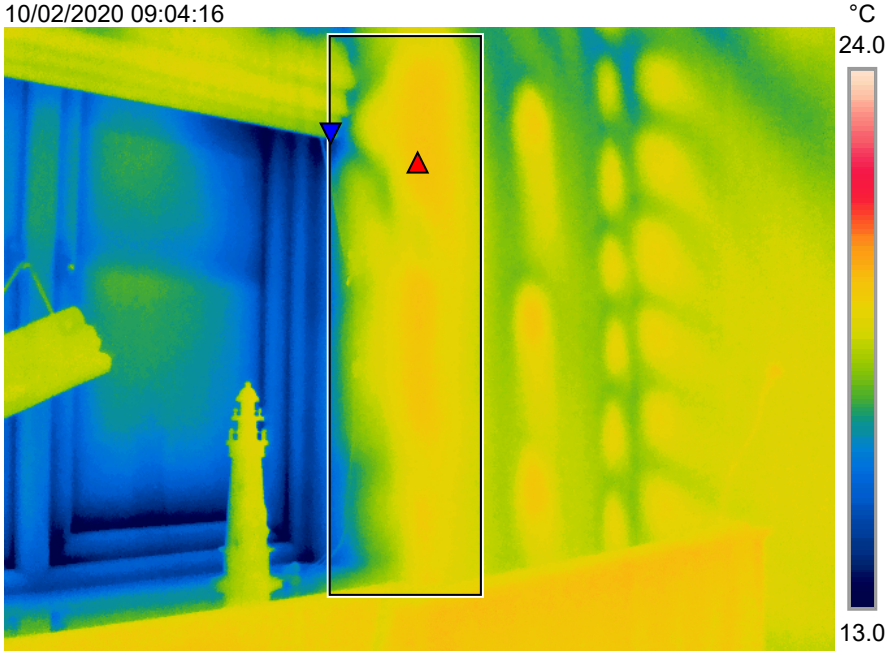
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

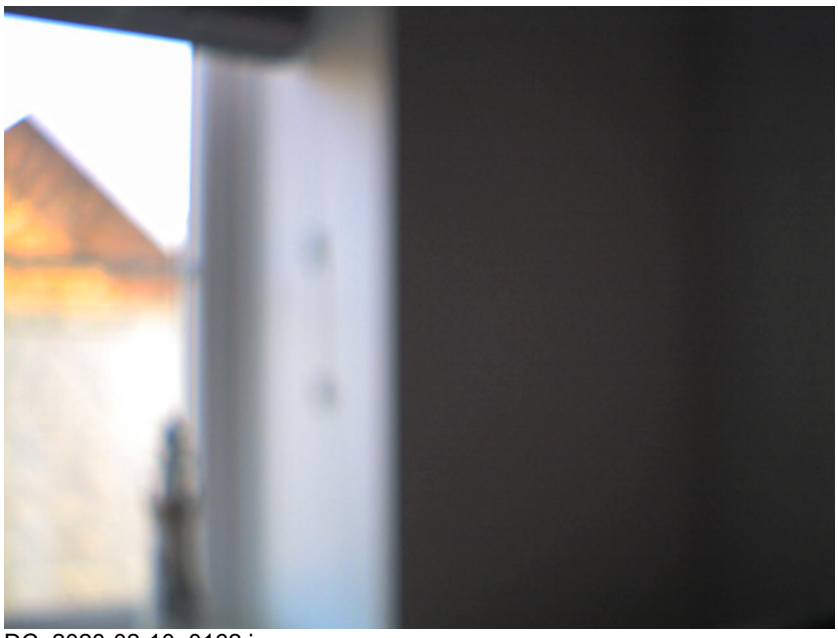
Rear L/H bedroom showing air flow behind the dry lining of the window reveal.

10/02/2020 09:04:16



IR_2020-02-10_0161.jpg ThermaCAM P640 West 309001108

10/02/2020 09:04:16



DC_2020-02-10_0162.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.0 °C
	Min	5.8 °C
	Average	17.4 °C

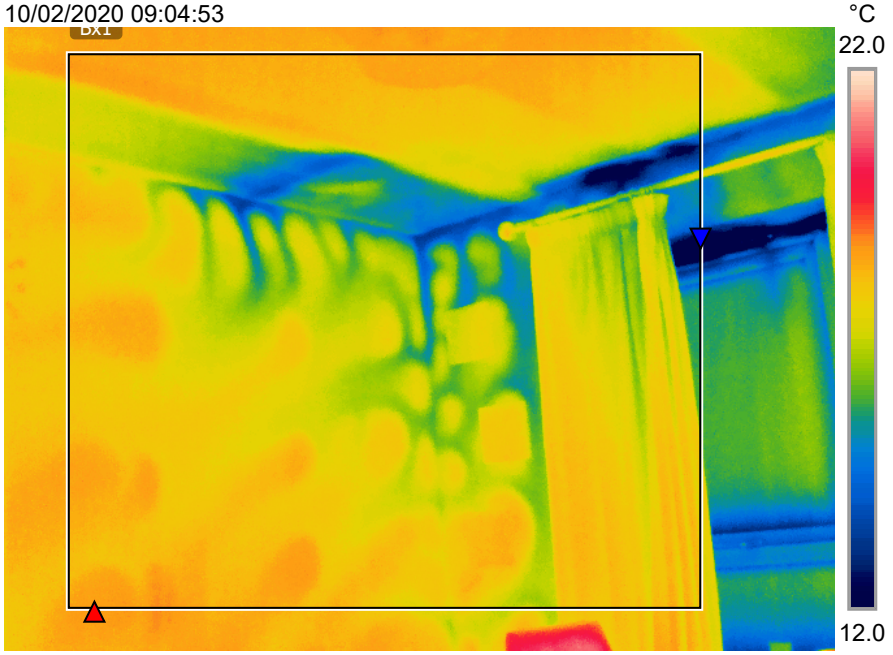
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

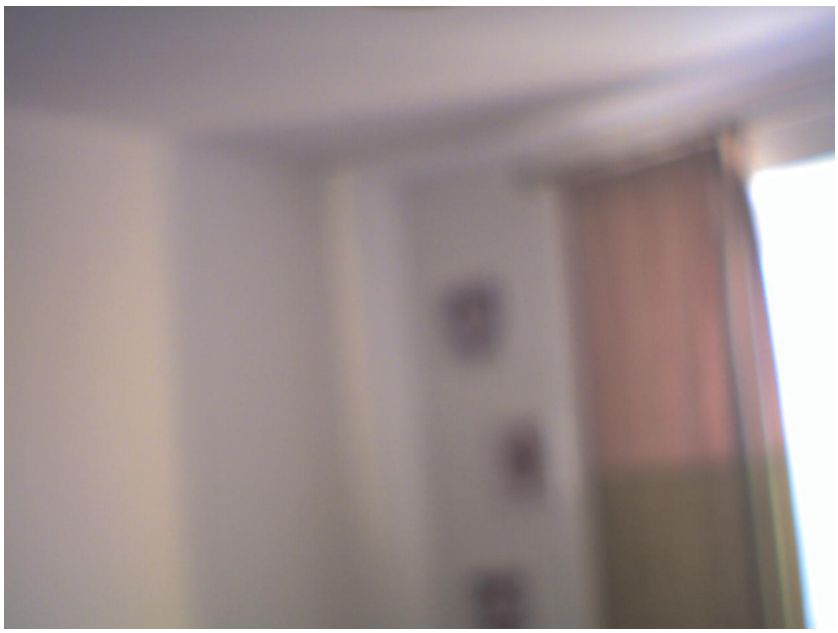
Front bedroom showing air flow behind the dry lining and individual adhesive dabs. There is also missing insulation above the ceiling.

10/02/2020 09:04:53



IR_2020-02-10_0163.jpg ThermaCAM P640 West 309001108

10/02/2020 09:04:53



DC_2020-02-10_0164.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.1 °C
	Min	14.4 °C
	Average	17.3 °C
Bx2	Max	19.0 °C
	Min	13.6 °C
	Average	17.9 °C
Bx3	Max	19.2 °C
	Min	15.1 °C
	Average	18.0 °C

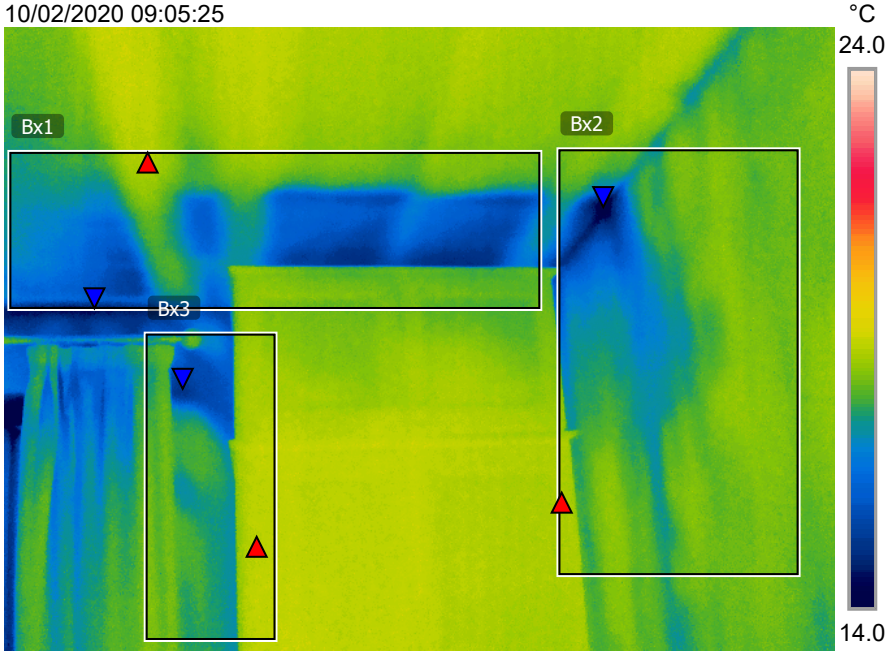
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

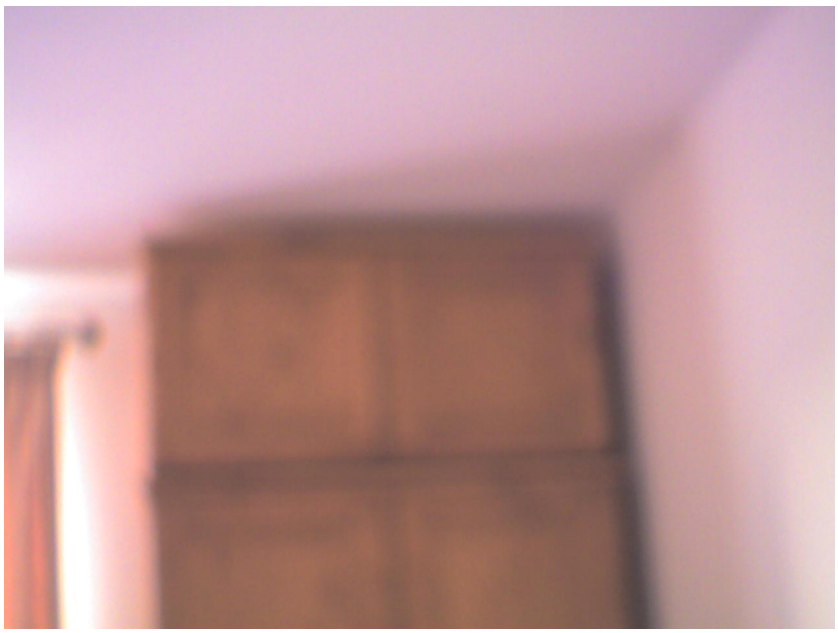
Front bedroom showing missing or limited insulation above the ceiling, air infiltration into the internal stud wall and air infiltration from the window reveals.

10/02/2020 09:05:25



IR_2020-02-10_0167.jpg ThermaCAM P640 West 309001108

10/02/2020 09:05:25



DC_2020-02-10_0168.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.1 °C
	Min	13.5 °C
	Average	18.0 °C

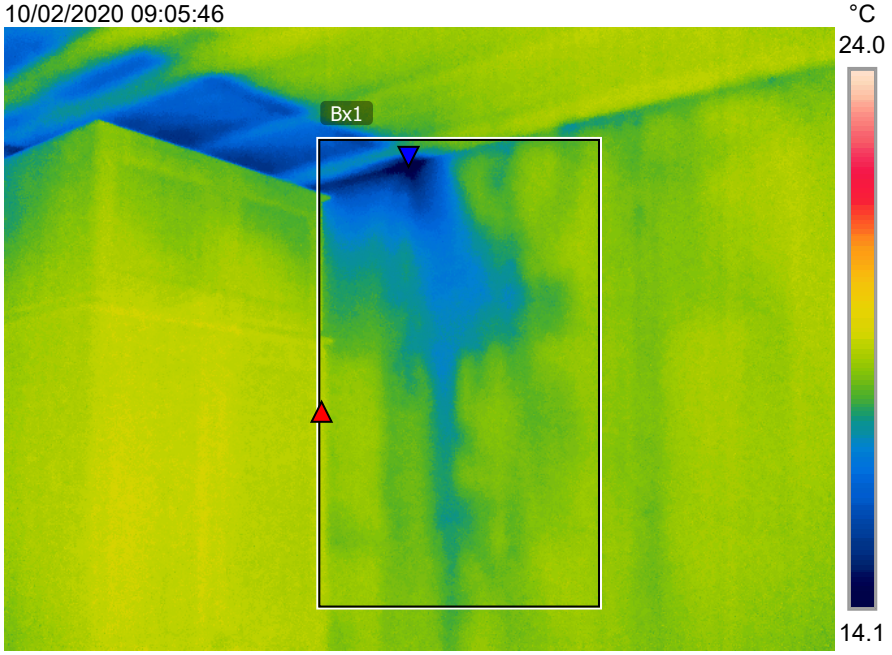
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

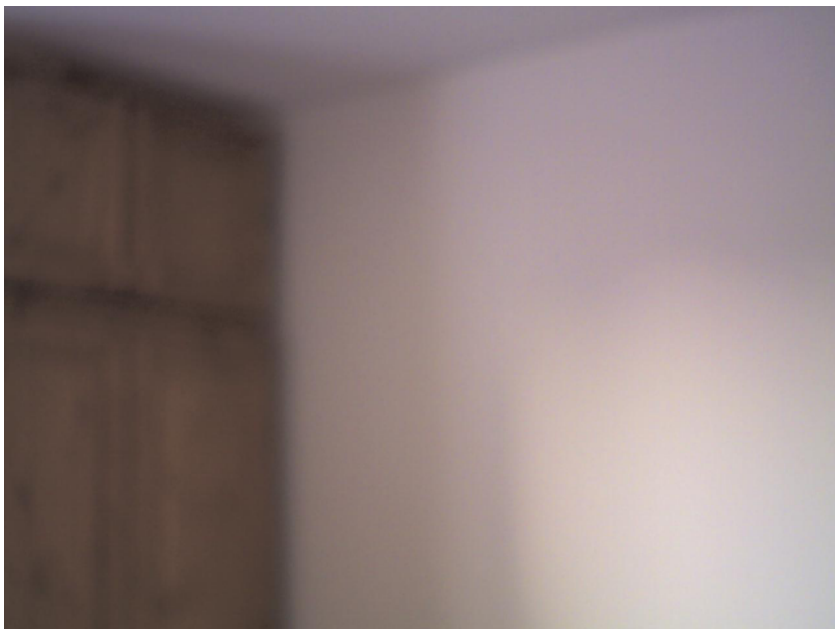
Front bedroom showing air infiltration into the internal stud wall.

10/02/2020 09:05:46



IR_2020-02-10_0169.jpg ThermaCAM P640 West 309001108

10/02/2020 09:05:46



DC_2020-02-10_0170.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.3 °C
	Min	15.9 °C
	Average	17.7 °C

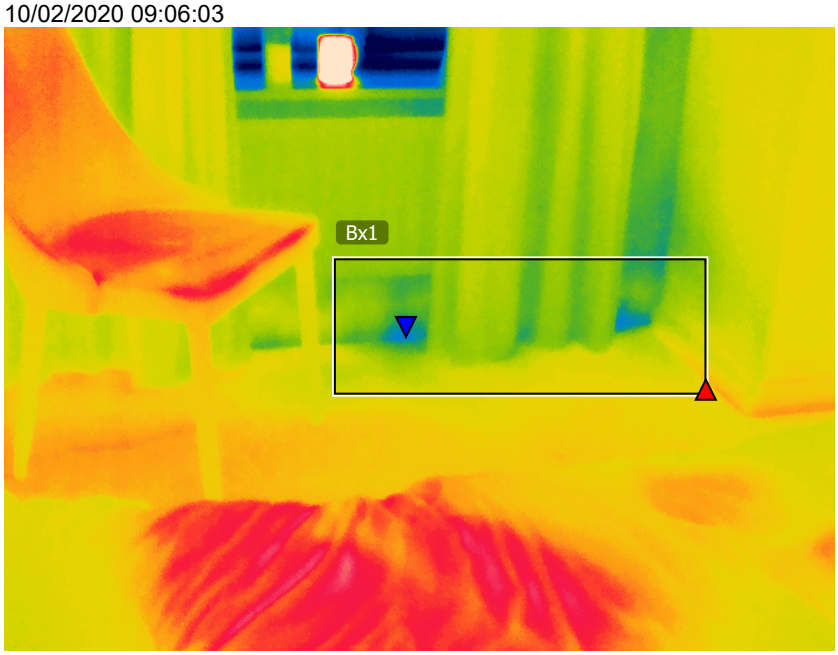
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Front bedroom showing draugfhts flowing from under the skirting. This is directly over the bay window area where air flow was identified above the ceiling, this is consistent with the draughts here.

10/02/2020 09:06:03



IR_2020-02-10_0171.jpg ThermaCAM P640 West 309001108

10/02/2020 09:06:03

DC_2020-02-10_0172.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	17.5 °C
	Min	10.8 °C
	Average	14.9 °C

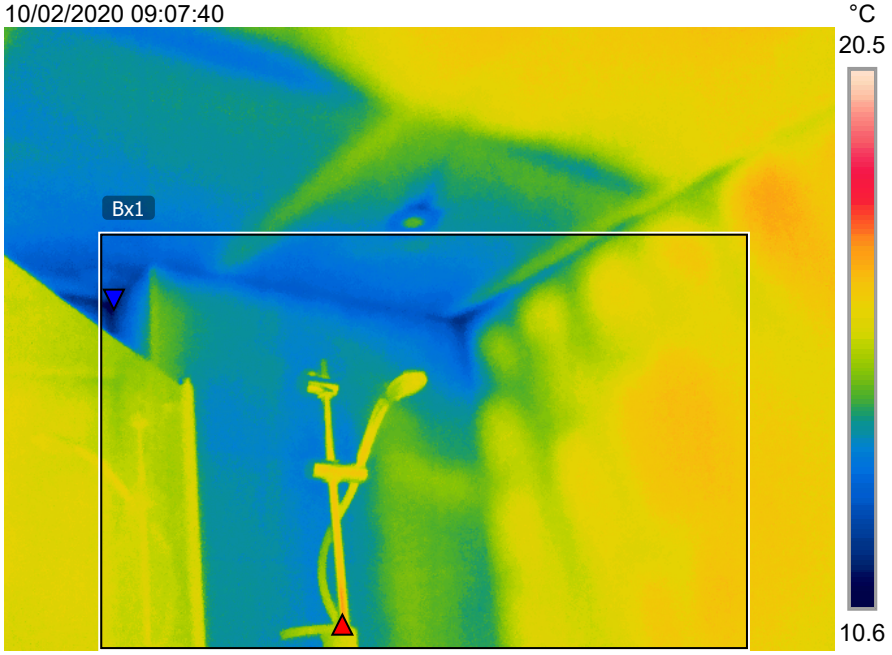
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

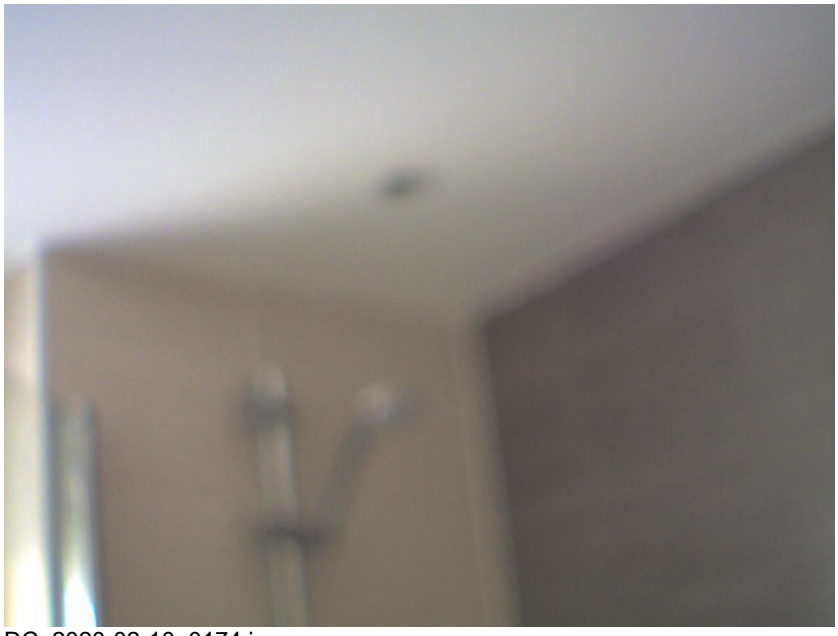
Bathroom showing the service void at the end of the bath as cold indicating the top of the void is fully open to the roof void above. There is also missing insulation above the ceiling and air flow behind the dry lining of the side wall and individual adhesive dabs.

10/02/2020 09:07:40



IR_2020-02-10_0173.jpg ThermaCAM P640 West 309001108

10/02/2020 09:07:40



DC_2020-02-10_0174.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	16.5 °C
	Min	13.8 °C
	Average	15.0 °C

Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Cold boxing at the end of the bath.

10/02/2020 09:07:52

IR_2020-02-10_0175.jpg ThermaCAM P640 West 309001108

10/02/2020 09:07:52

DC_2020-02-10_0176.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	16.5 °C
	Min	11.3 °C
	Average	14.7 °C

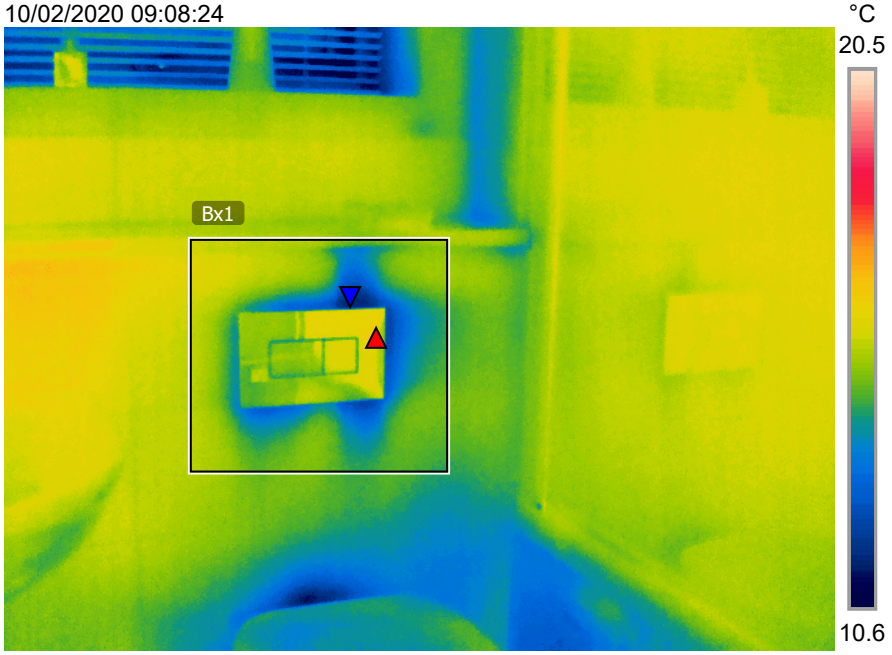
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

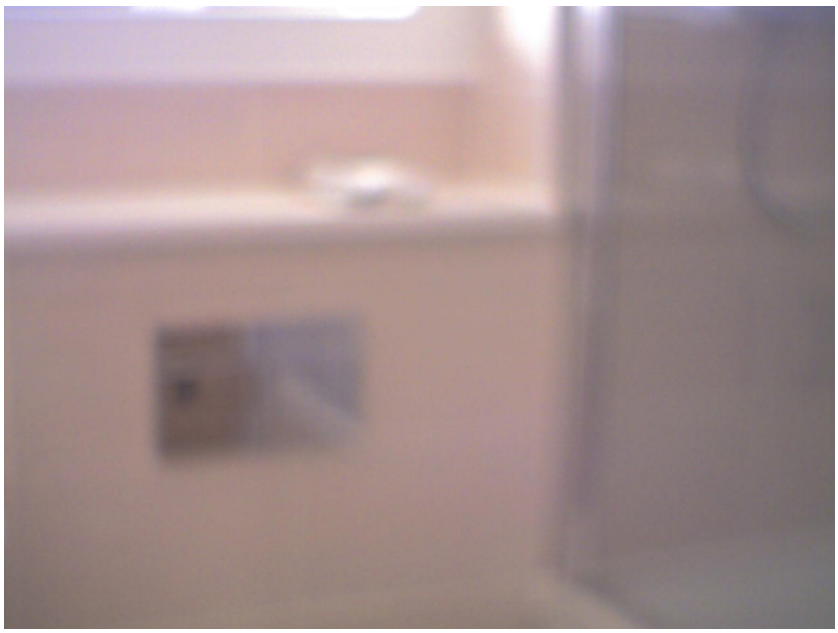
Draughts flowing from behind the toilet flush panel indicating the boxing behind has cold flowing air within, this is consistent with the cold boxing at the end of the bath being fully open at the top.

10/02/2020 09:08:24



IR_2020-02-10_0179.jpg ThermaCAM P640 West 309001108

10/02/2020 09:08:24



DC_2020-02-10_0180.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	17.5 °C
	Min	12.7 °C
	Average	15.3 °C
Bx2	Max	16.3 °C
	Min	8.9 °C
	Average	14.7 °C

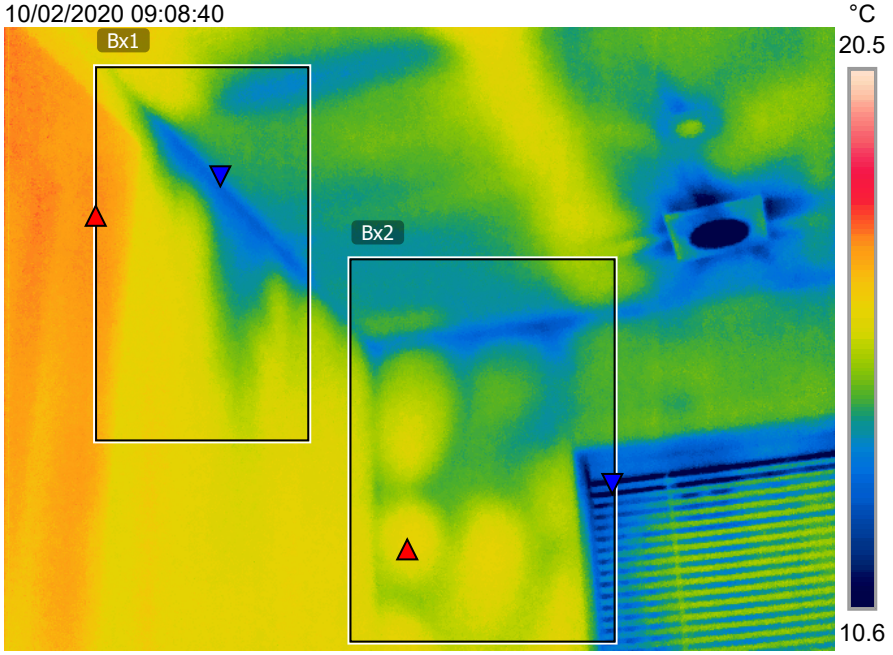
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

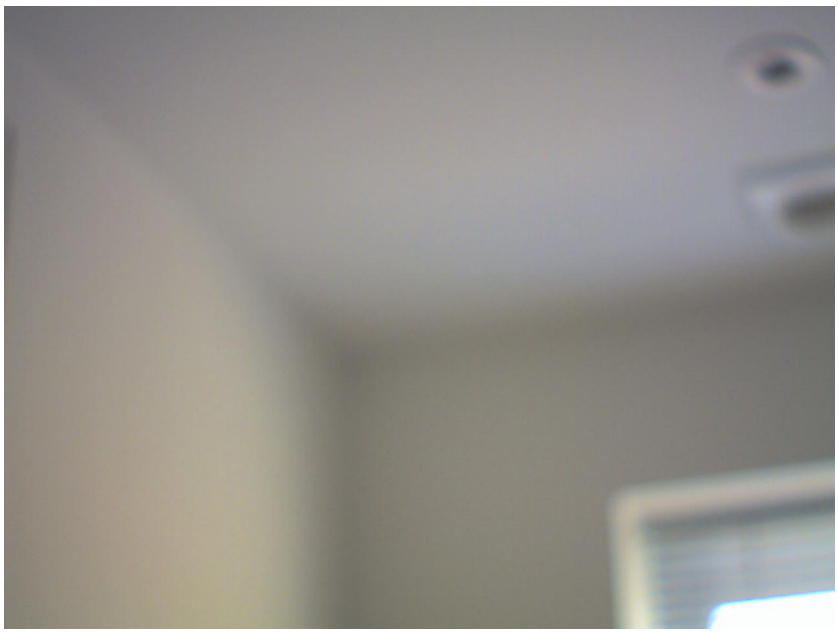
Bathroom showing air infiltration intoi the internal stud wall, consistent with that see in the front bedroom. Individual adhesive dabs and air flow behind the plasterboard on the wall.

10/02/2020 09:08:40



IR_2020-02-10_0181.jpg ThermaCAM P640 West 309001108

10/02/2020 09:08:40



DC_2020-02-10_0182.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	20.2 °C
	Min	12.5 °C
	Average	17.9 °C

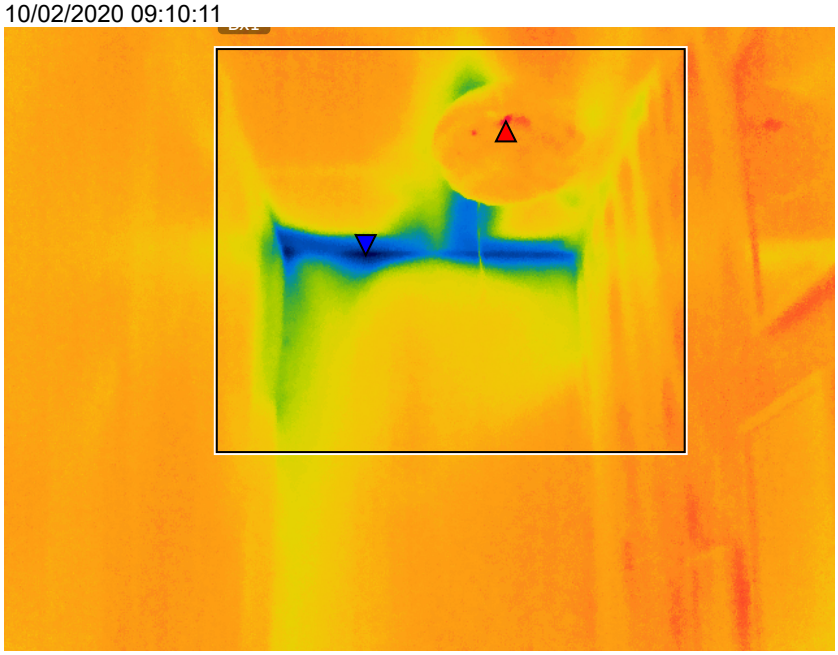
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Top of the stairwell showing missing or limited insulation along the wall ceiling junction and above the ceiling.

10/02/2020 09:10:11



IR_2020-02-10_0185.jpg ThermaCAM P640 West 309001108

10/02/2020 09:10:11

DC_2020-02-10_0186.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.9 °C
	Min	13.4 °C
	Average	18.6 °C

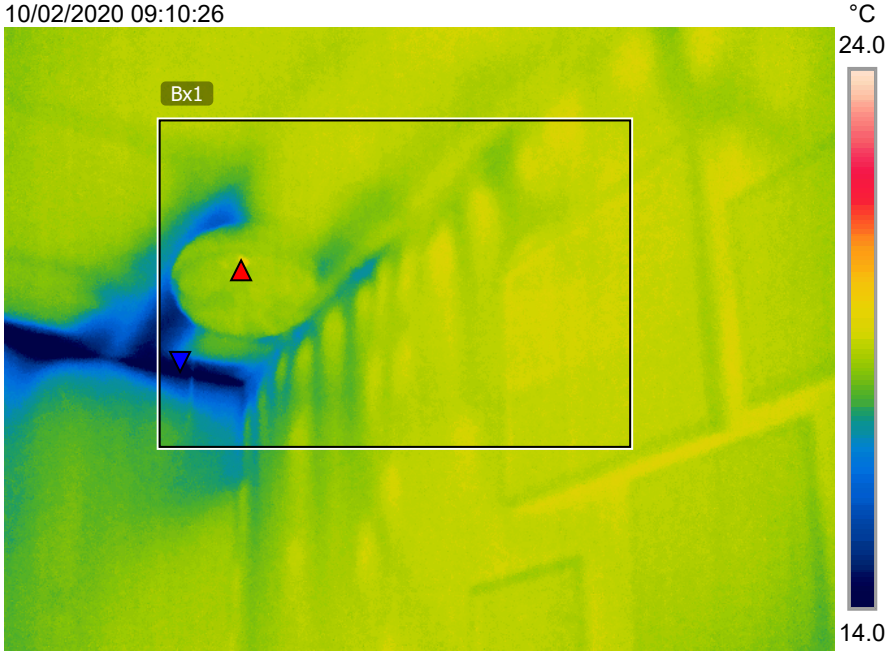
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

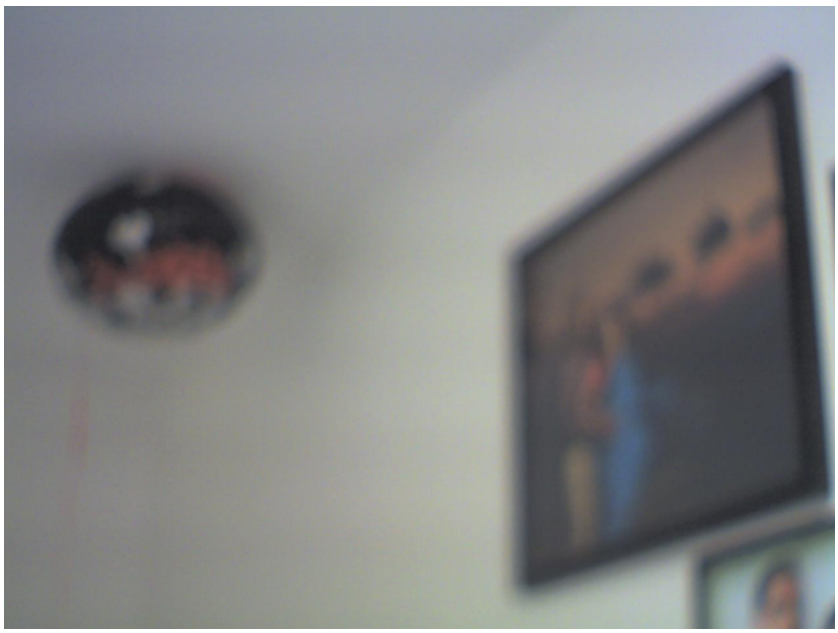
Individual adhesive dabs along the top of the stairwell wall and air infiltration behind the dry lining.

10/02/2020 09:10:26



IR_2020-02-10_0187.jpg ThermaCAM P640 West 309001108

10/02/2020 09:10:26



DC_2020-02-10_0188.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	23.0 °C
	Min	16.1 °C
	Average	18.2 °C
Bx2	Max	20.4 °C
	Min	16.5 °C
	Average	18.7 °C

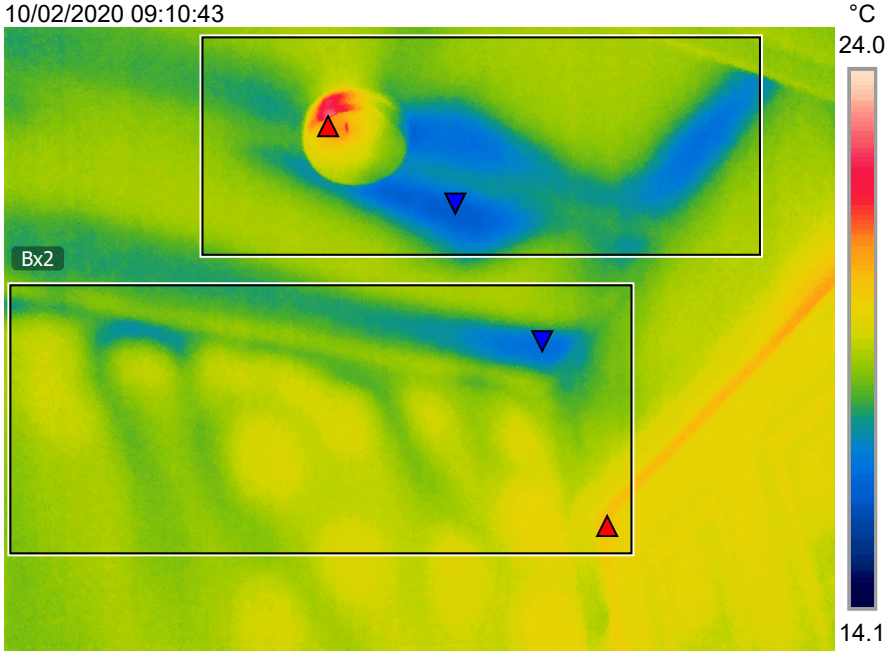
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

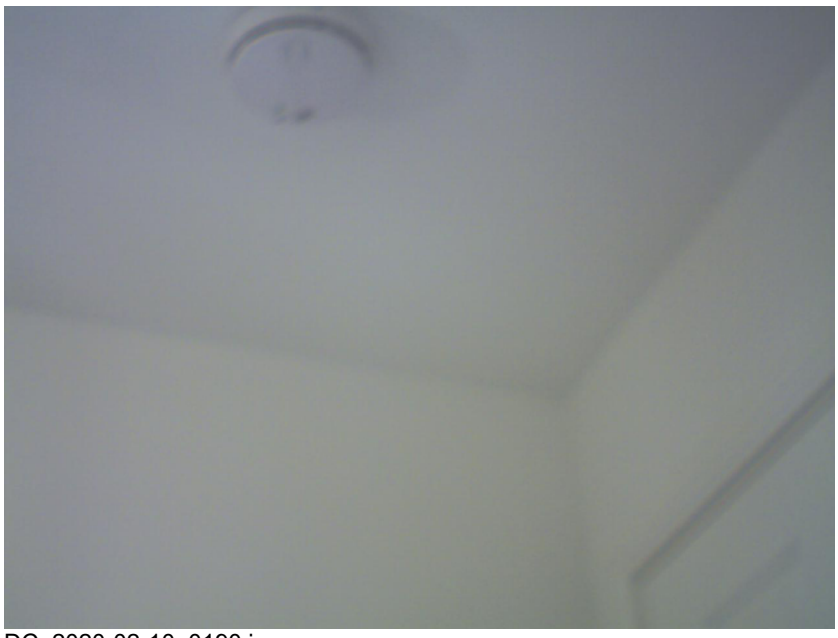
Missing insulation above the ceiling at the top of the stairs and air flow behind the dry lining of the side wall.

10/02/2020 09:10:43



IR_2020-02-10_0189.jpg ThermaCAM P640 West 309001108

10/02/2020 09:10:43



DC_2020-02-10_0190.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	18.5 °C
	Min	13.5 °C
	Average	16.9 °C

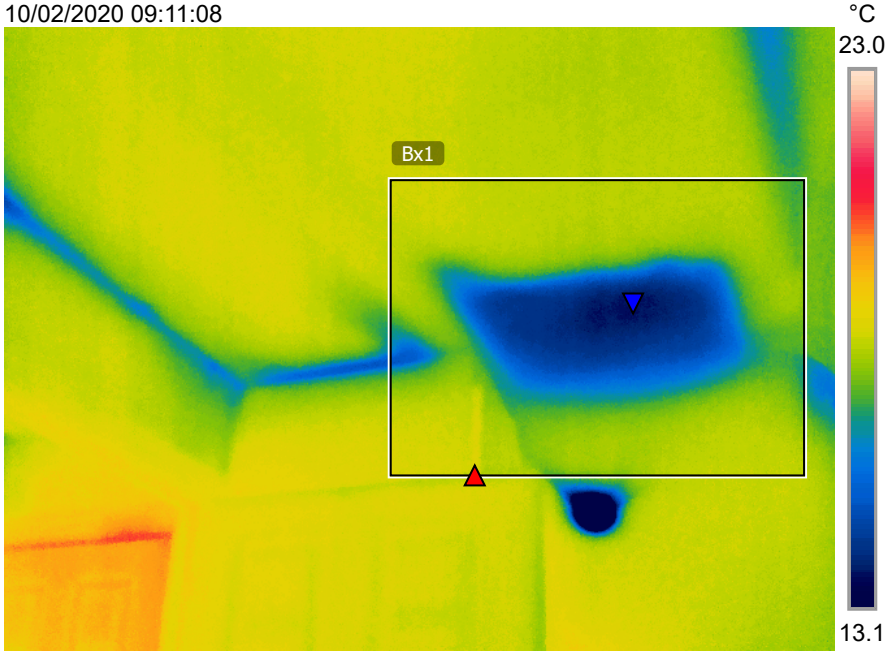
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

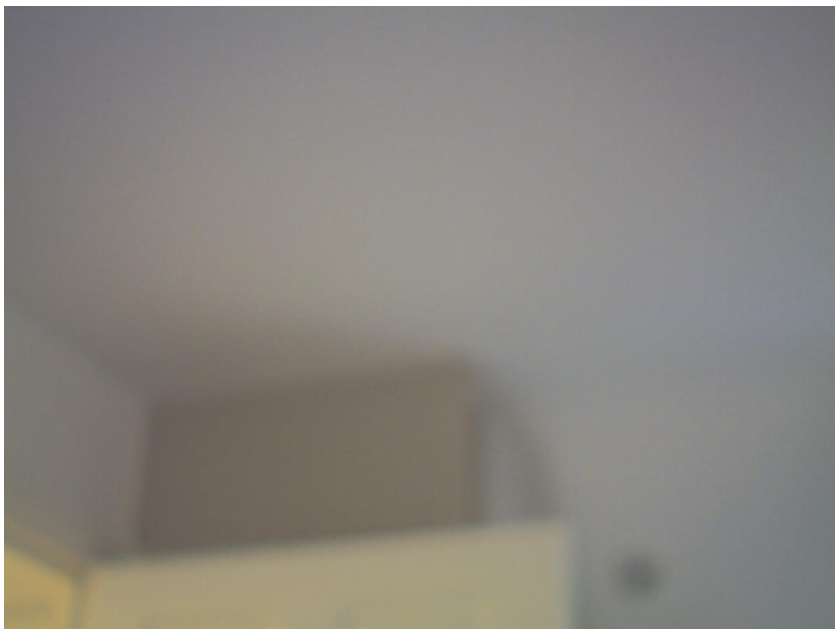
Missing insulation above the ceiling on the top floor.

10/02/2020 09:11:08



IR_2020-02-10_0191.jpg ThermaCAM P640 West 309001108

10/02/2020 09:11:08



DC_2020-02-10_0192.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	18.5 °C
	Min	11.3 °C
	Average	16.5 °C

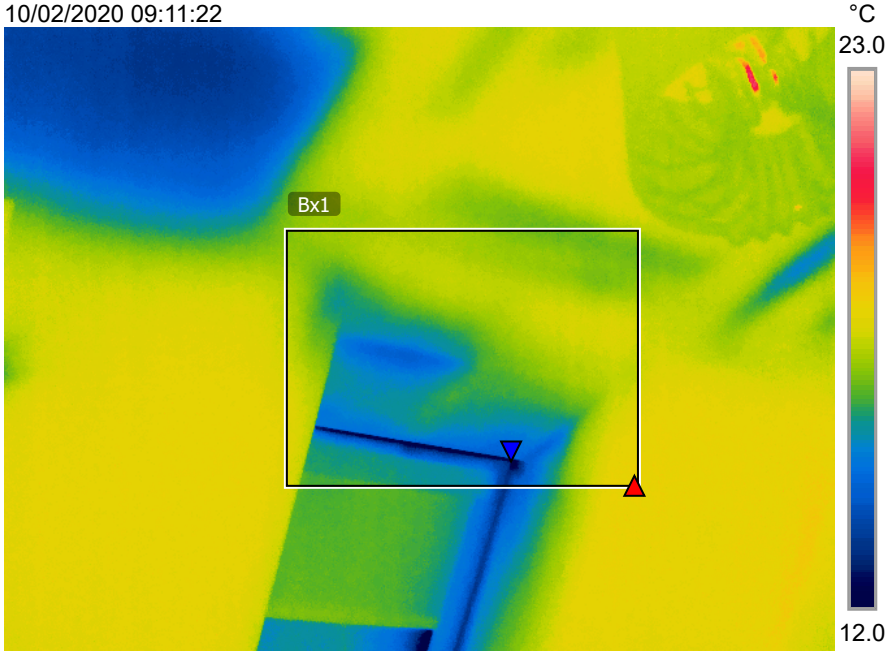
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

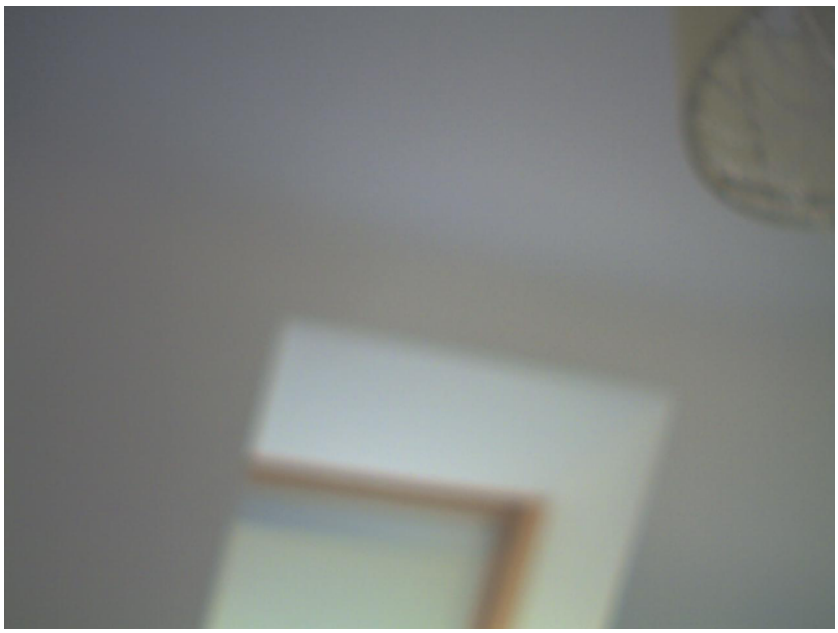
Missing insulation or air flow bypassing the insulation of the top reveal of the rear roof light.

10/02/2020 09:11:22



IR_2020-02-10_0193.jpg ThermaCAM P640 West 309001108

10/02/2020 09:11:22



DC_2020-02-10_0194.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	21.9 °C
	Min	10.6 °C
	Average	16.8 °C

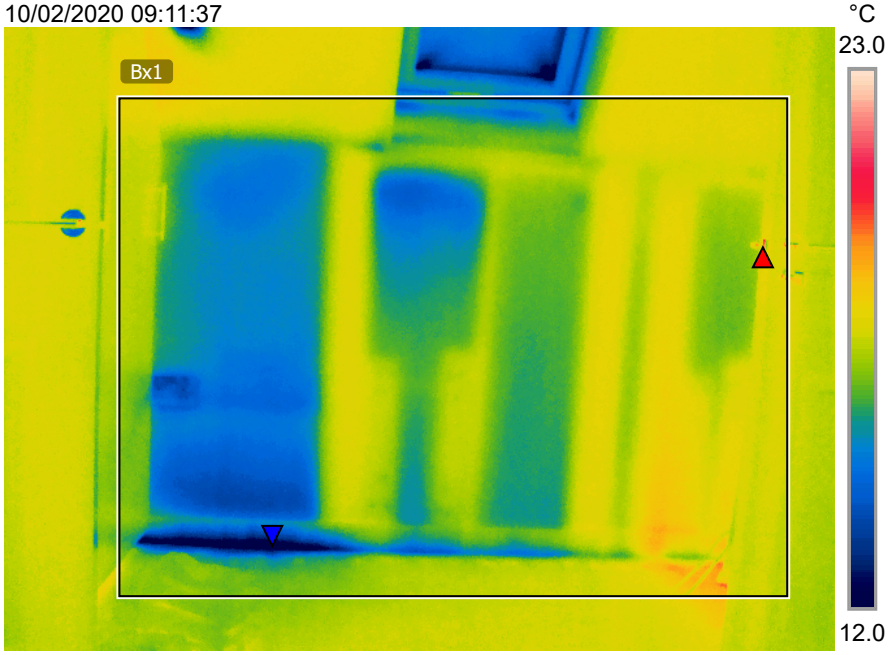
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Ne effective insulation present on the rear knee wall fof the top floor. There are also draughts flowing from under the skirting.

10/02/2020 09:11:37



IR_2020-02-10_0195.jpg ThermaCAM P640 West 309001108

10/02/2020 09:11:37

DC_2020-02-10_0196.jpg

Sustainable Lifestyles Limited

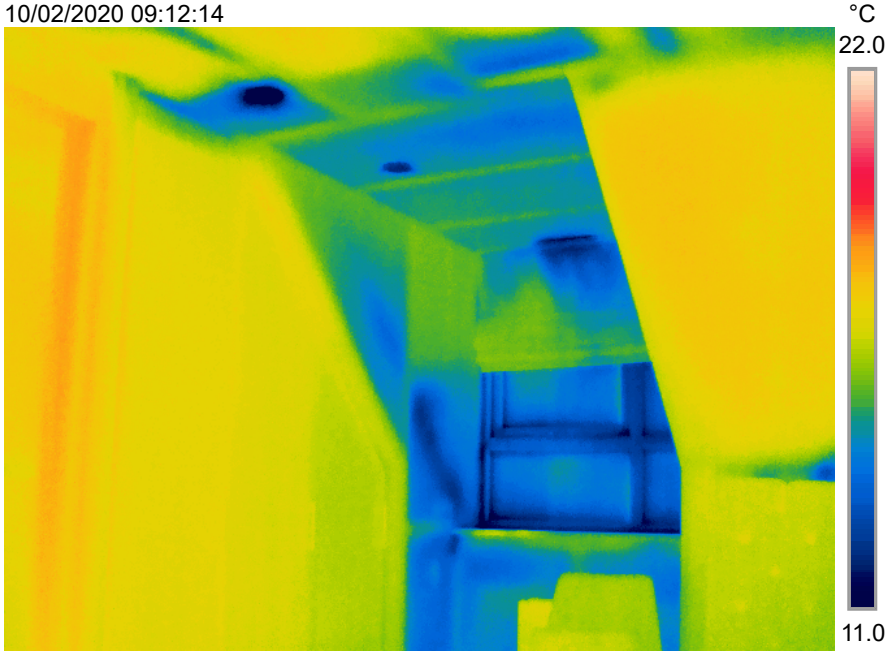
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

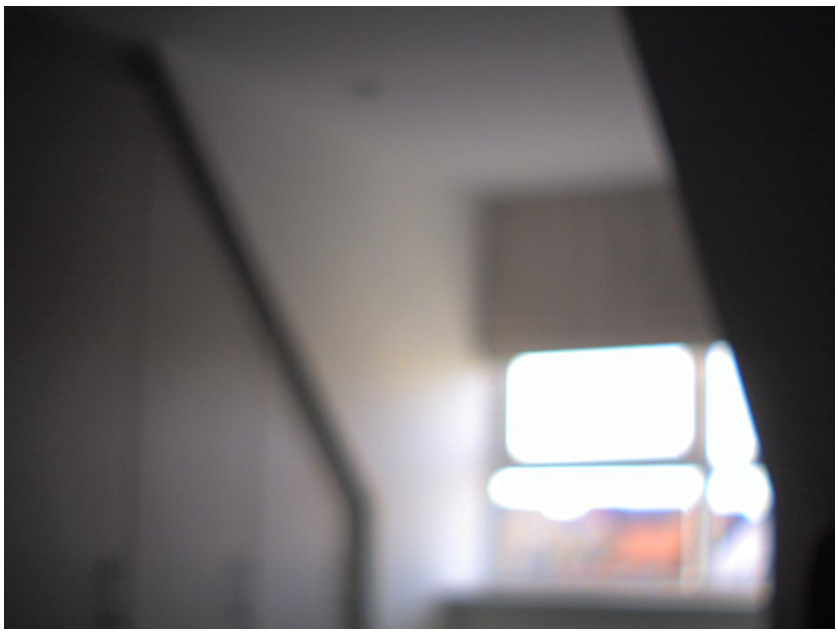
Front dormer showing little or no insulation above the ceiling or on the side walls.

10/02/2020 09:12:14



IR_2020-02-10_0197.jpg ThermaCAM P640 West 309001108

10/02/2020 09:12:14



DC_2020-02-10_0198.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	17.7 °C
	Min	10.2 °C
	Average	15.2 °C

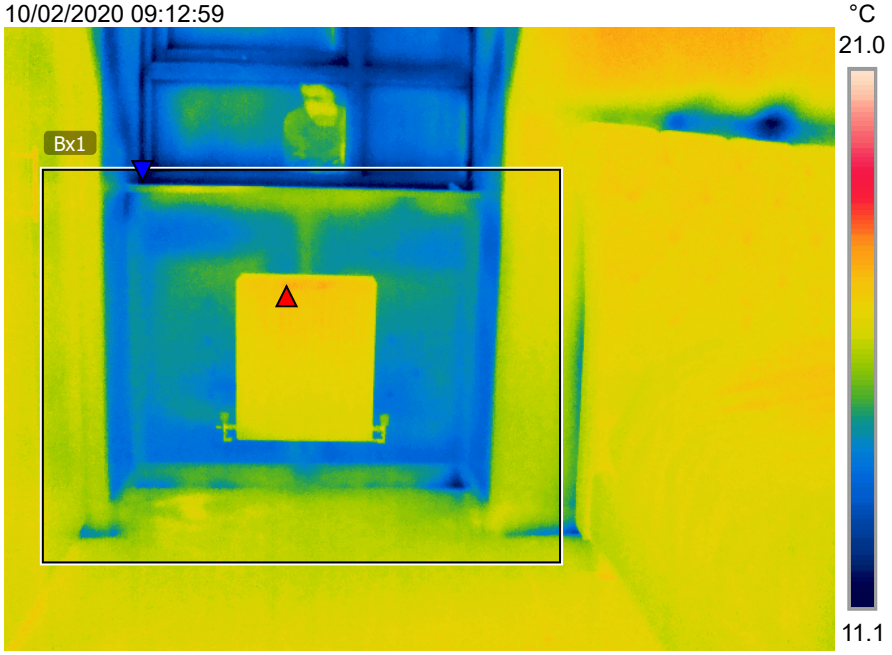
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

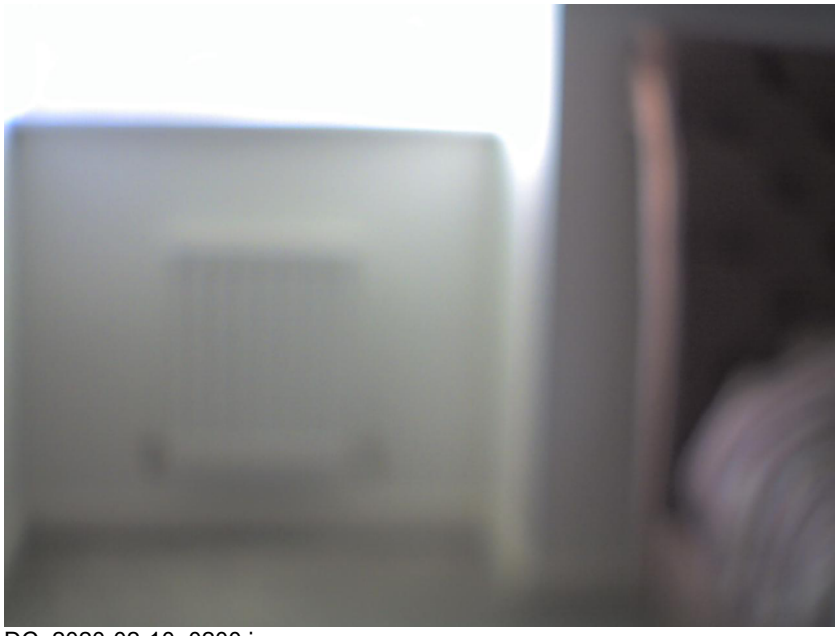
Knee wall below the dormer window showing no effective insulation.

10/02/2020 09:12:59



IR_2020-02-10_0199.jpg ThermaCAM P640 West 309001108

10/02/2020 09:12:59



DC_2020-02-10_0200.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	17.7 °C
	Min	10.3 °C
	Average	14.8 °C

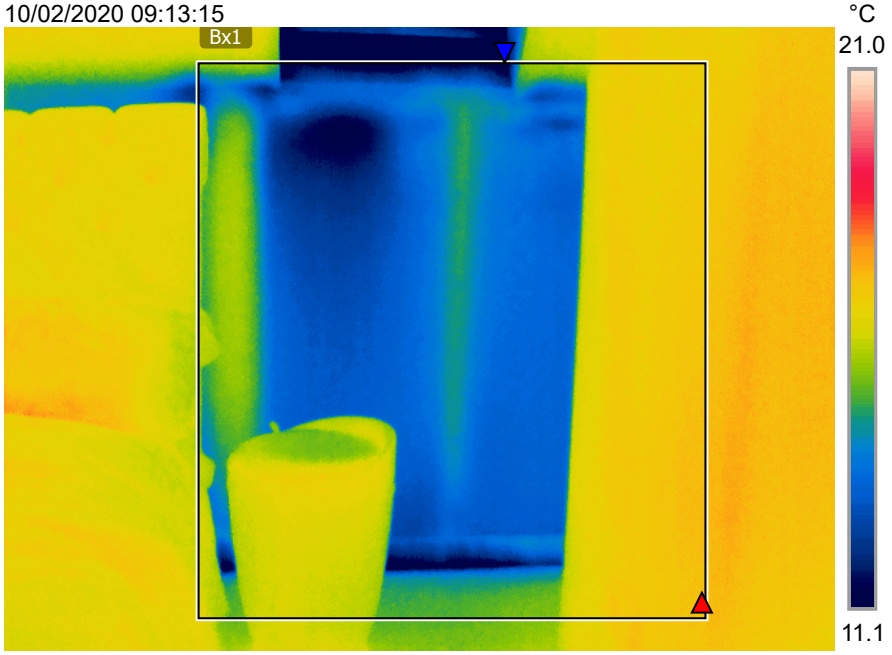
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

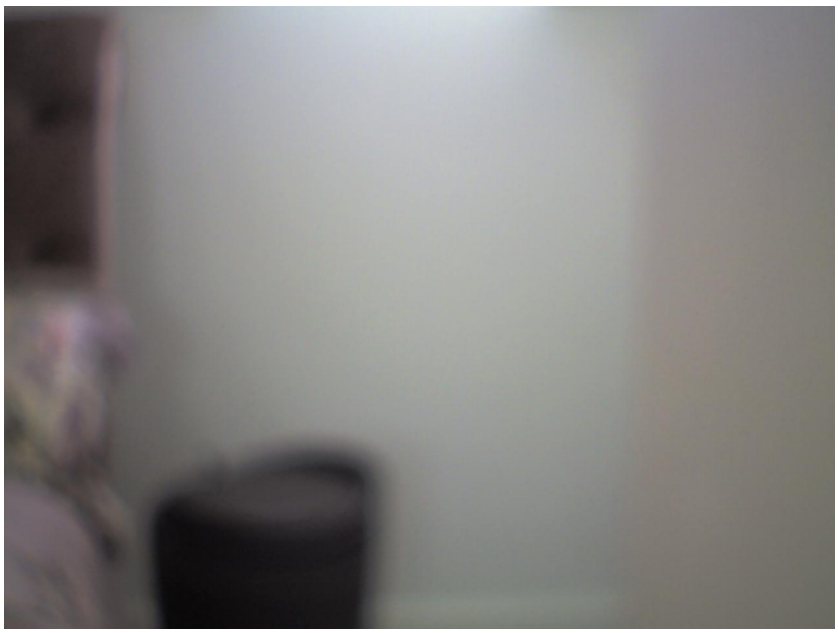
Knee wall below the front roof light showing no effective insulation. Also draughts from under the skirtings again.

10/02/2020 09:13:15



IR_2020-02-10_0201.jpg ThermaCAM P640 West 309001108

10/02/2020 09:13:15



DC_2020-02-10_0202.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	20.8 °C
	Min	12.8 °C
	Average	16.1 °C

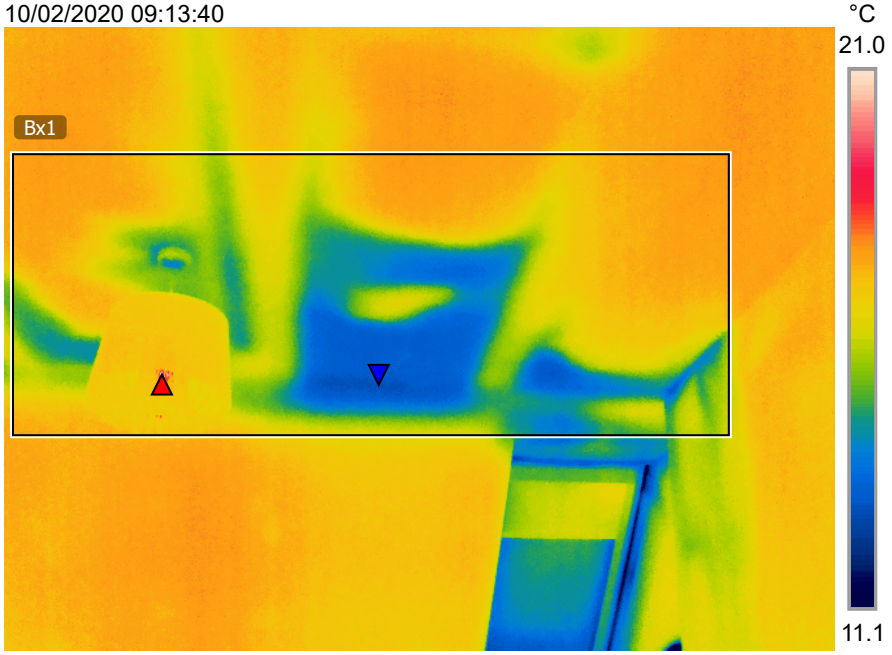
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

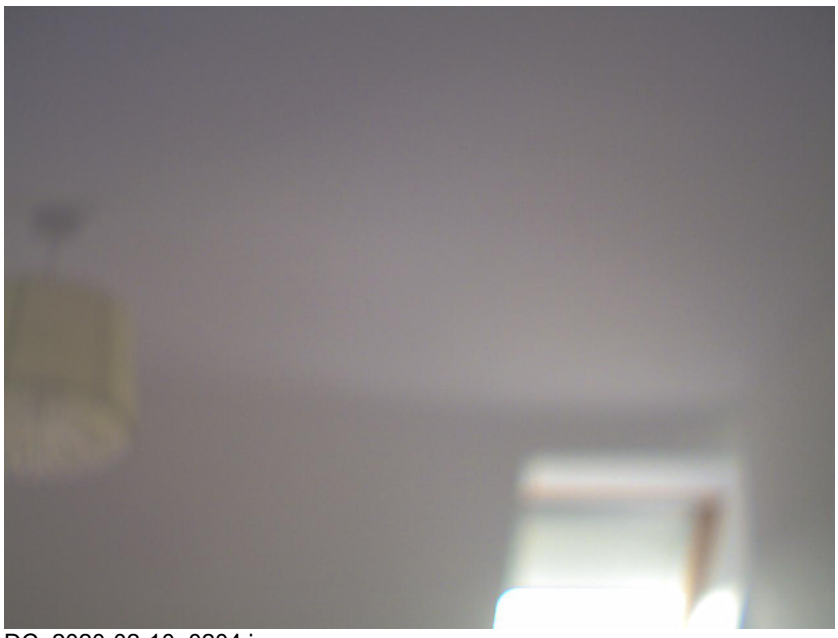
Missing insulation above the top floor ceiling.

10/02/2020 09:13:40



IR_2020-02-10_0203.jpg ThermaCAM P640 West 309001108

10/02/2020 09:13:40



DC_2020-02-10_0204.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	17.9 °C
	Min	8.9 °C
	Average	16.4 °C

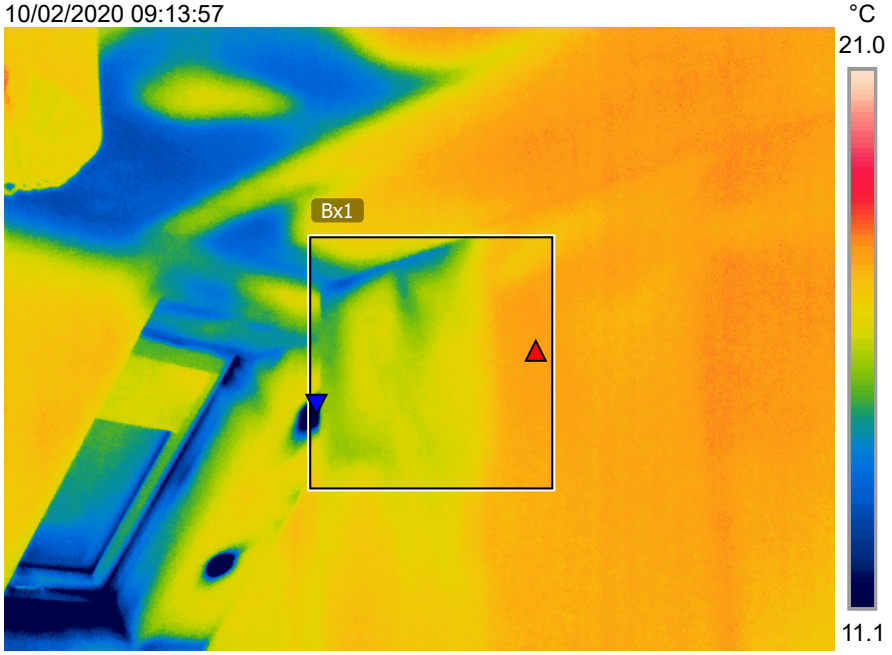
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

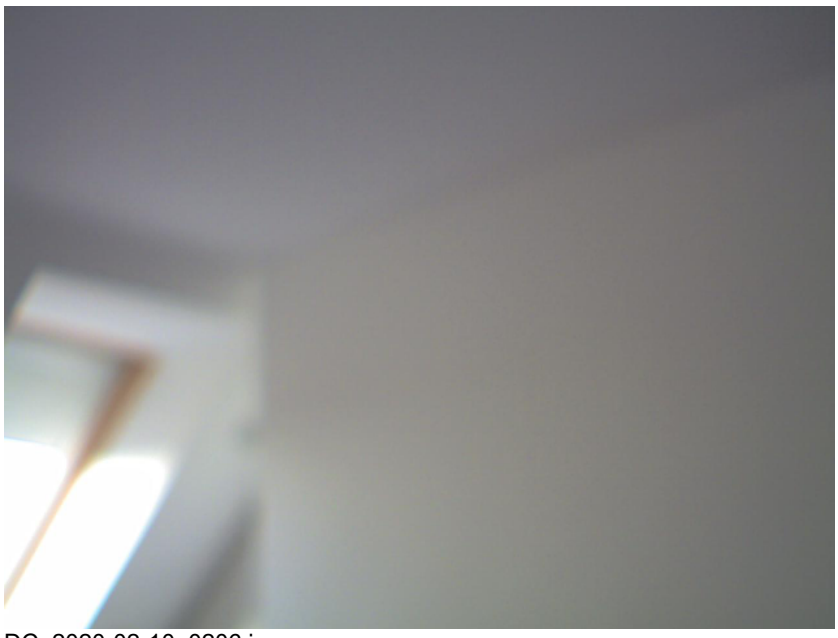
Air infiltration into the internal stud wall of the top floor.

10/02/2020 09:13:57



IR_2020-02-10_0205.jpg ThermaCAM P640 West 309001108

10/02/2020 09:13:57



DC_2020-02-10_0206.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	16.1 °C
	Min	10.4 °C
	Average	13.8 °C

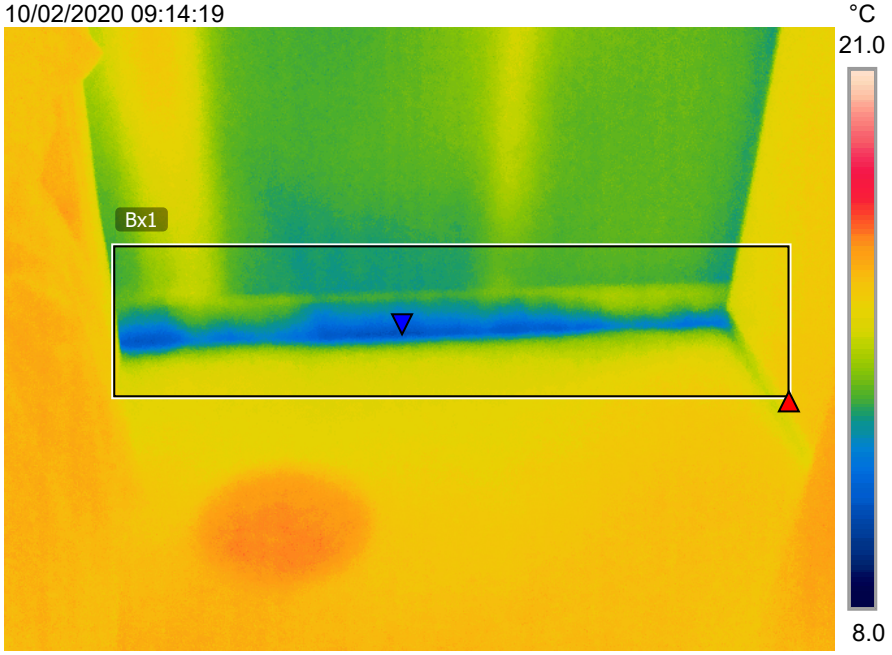
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

Draughts flowing from under the skirting of the front top floor knee wall.

10/02/2020 09:14:19



IR_2020-02-10_0207.jpg ThermaCAM P640 West 309001108

10/02/2020 09:14:19

DC_2020-02-10_0208.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	18.6 °C
	Min	13.7 °C
	Average	16.8 °C

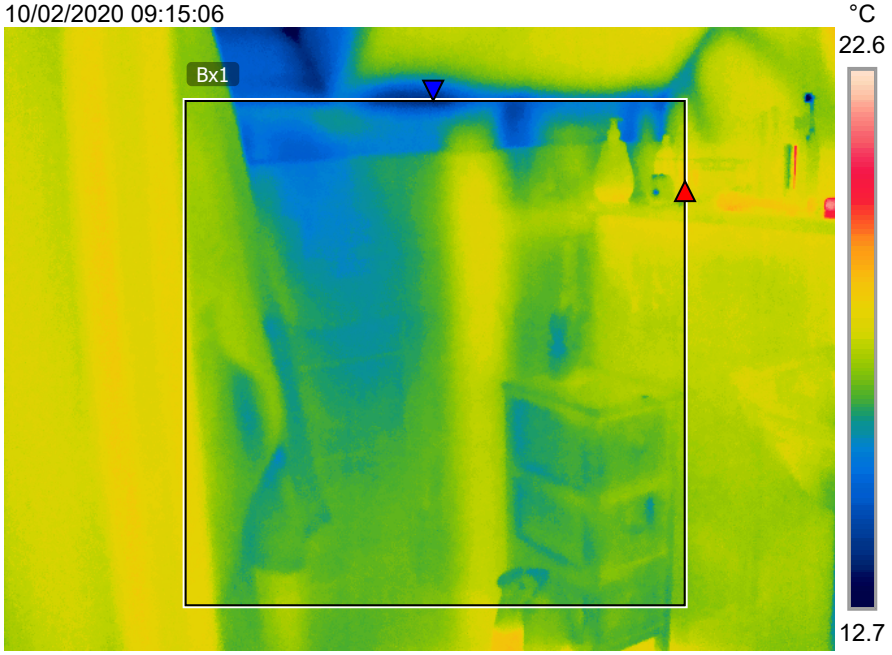
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

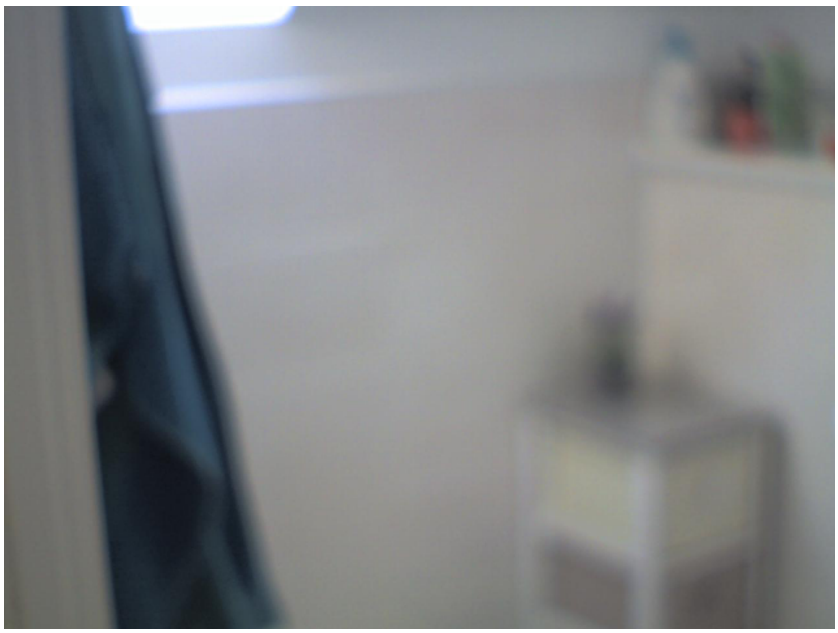
Top floor en-suite knee wall showing ineffective insulation.

10/02/2020 09:15:06



IR_2020-02-10_0209.jpg ThermaCAM P640 West 309001108

10/02/2020 09:15:06



DC_2020-02-10_0210.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	19.1 °C
	Min	10.9 °C
	Average	16.9 °C

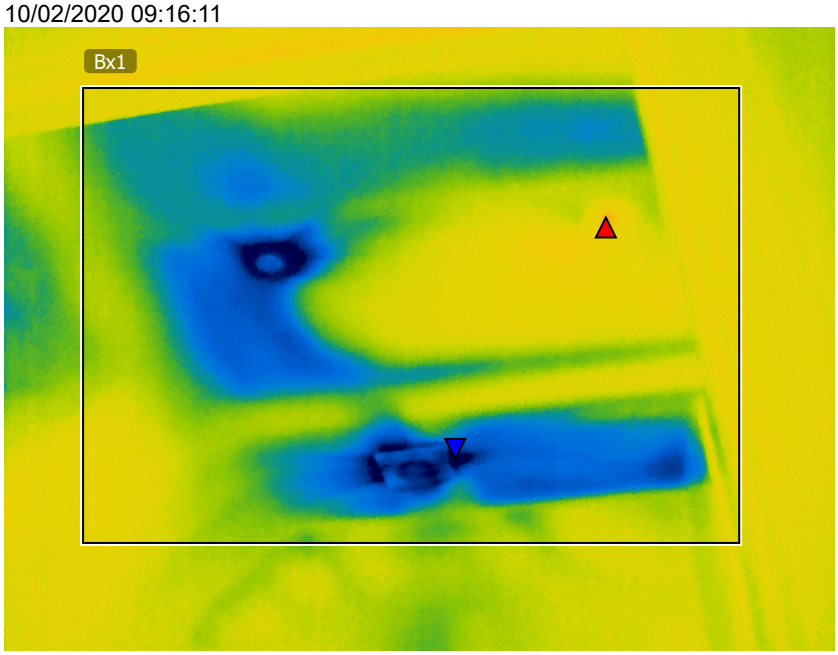
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

En-suite ceiling.

10/02/2020 09:16:11



IR_2020-02-10_0215.jpg ThermaCAM P640 West 309001108

10/02/2020 09:16:11

DC_2020-02-10_0216.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	18.4 °C
	Min	9.2 °C
	Average	16.8 °C

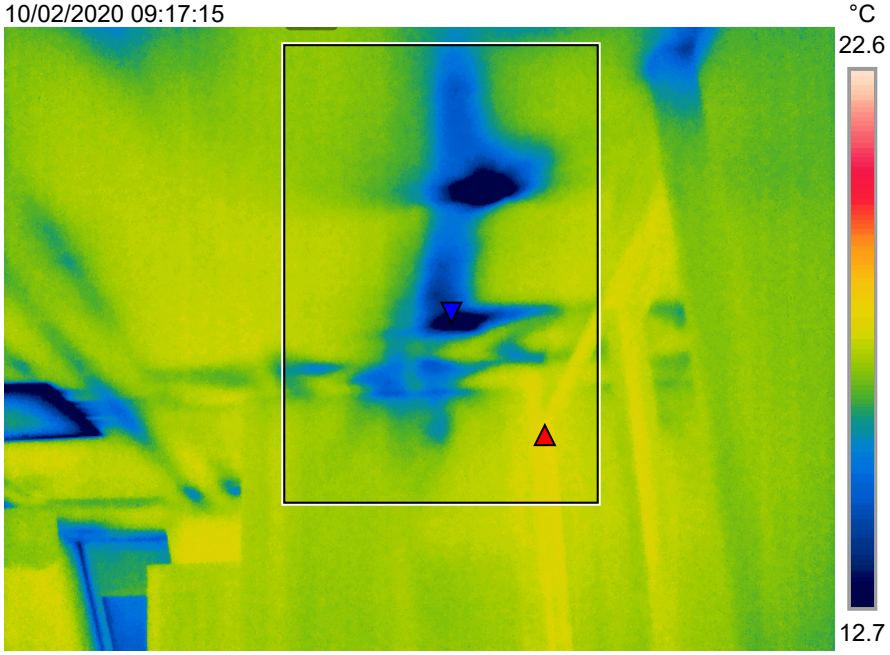
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

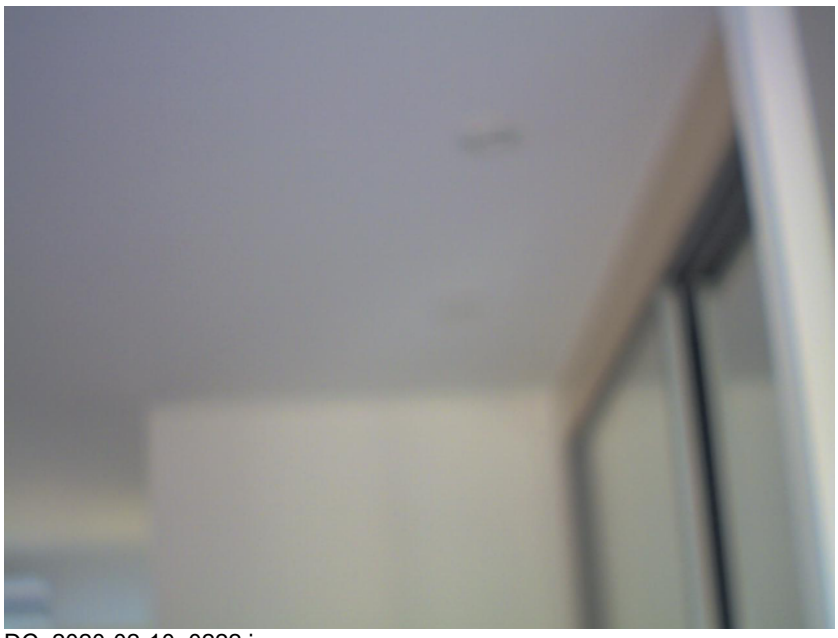
Missing or limited insulation above the top floor ceiling.

10/02/2020 09:17:15



IR_2020-02-10_0221.jpg ThermaCAM P640 West 309001108

10/02/2020 09:17:15



DC_2020-02-10_0222.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	18.2 °C
	Min	9.7 °C
	Average	15.7 °C

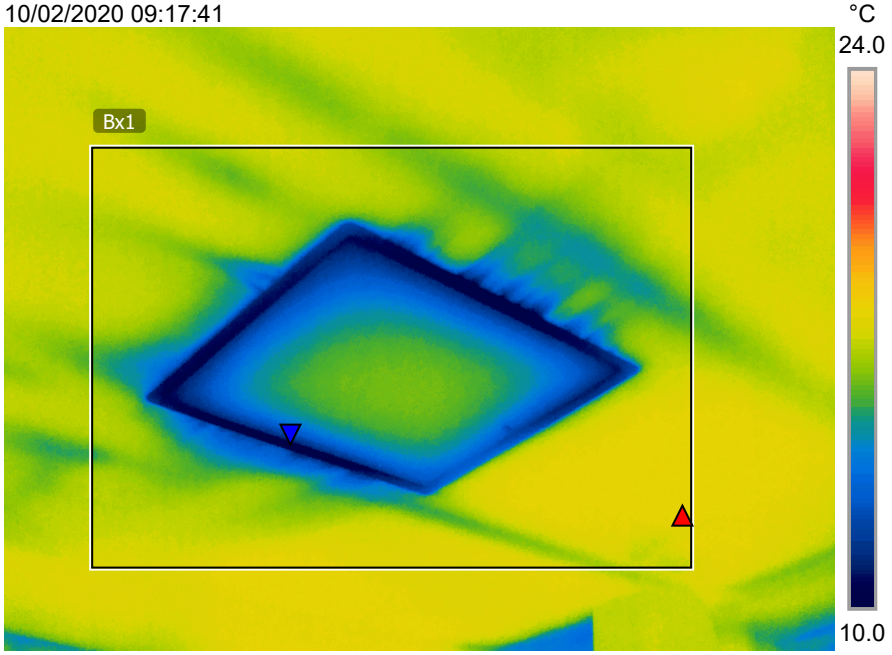
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

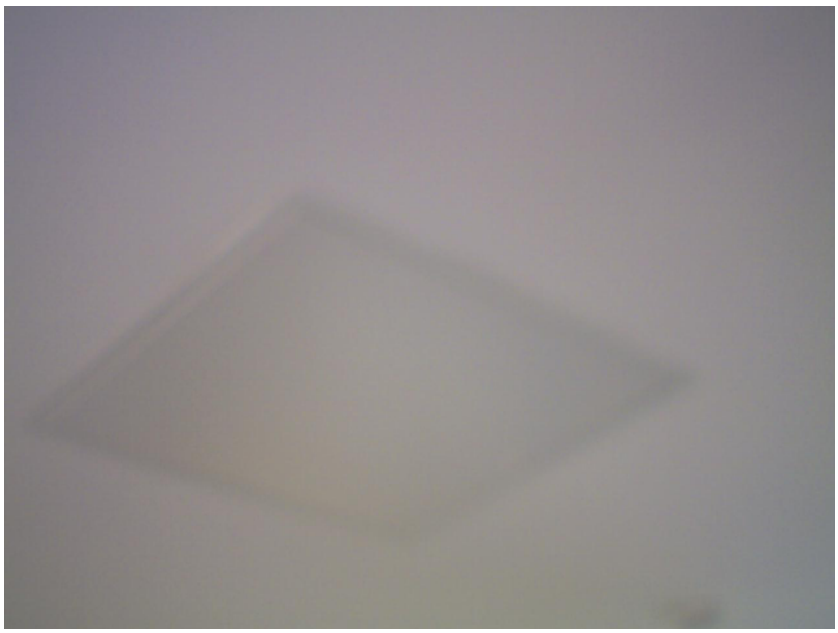
Draughts flowing from under the loft hatch frame.

10/02/2020 09:17:41



IR_2020-02-10_0223.jpg ThermaCAM P640 West 309001108

10/02/2020 09:17:41



DC_2020-02-10_0224.jpg

Sustainable Lifestyles Limited

Measurements

Bx1	Max	18.8 °C
	Min	12.7 °C
	Average	17.1 °C

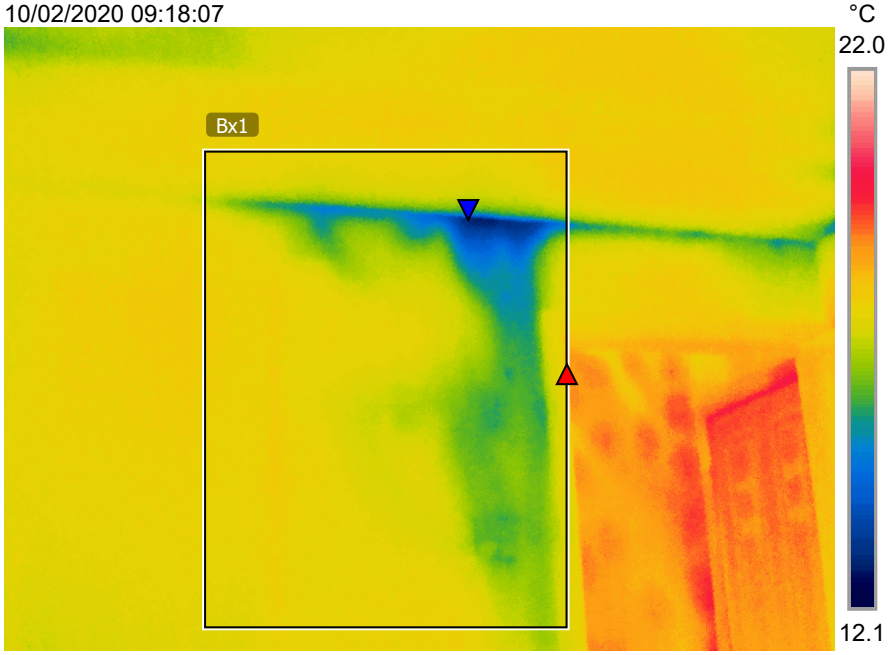
Parameters

Emissivity	0.95
Refl. temp.	20.5 °C

Note

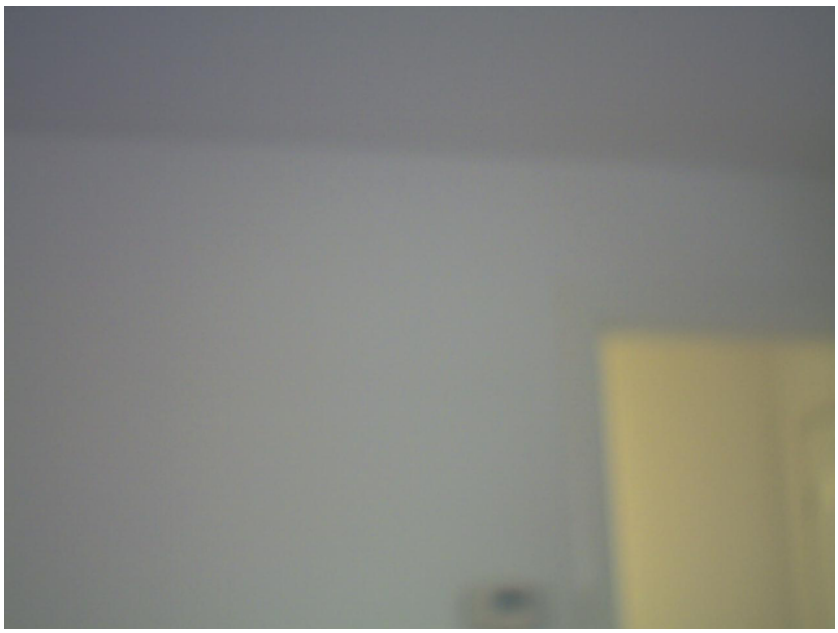
Air infiltration into the top floor internal stud wall to the stairwell.

10/02/2020 09:18:07



IR_2020-02-10_0225.jpg ThermaCAM P640 West 309001108

10/02/2020 09:18:07



DC_2020-02-10_0226.jpg