



Thermographic BREEAM Compliance Survey

SAMPLE REPORT

By

ITC Certified Level 2 Thermographer

Pixel Thermographics

Pixel Thermographics Ltd

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REPORT DETAILS

Client
Address
Contact Person
Phone Number
Email Address

Thermographer
Thermographer Certification ITC Level 2 Certified Thermographer

Survey Equipment Flir Thermacam SC640 Infrared Camera
Reporter 9.2 Software

Inspection Date
Start Time 06:30
Finish Time 08:30

ENVIRONMENTAL DETAILS

Internal Temperature 22°C
External Temperature 4°C
Relative Humidity 91%RH
Wind Speed & Direction 2 Mph from the North East



SURVEY INFORMATION

Infrared Thermography has been employed as a non-destructive inspection procedure for inspecting the building for defects in relation to gaining a credit towards BREEAM accreditation.

The survey was a qualitative inspection and the thermal imaging cameras emissivity was set at 0.94

The inspection was carried out by an ITC Certified Level 2 Professional Thermographer using a FLIR Systems Thermacam SC640 thermal imaging camera.

Inspected by:

ITC Level 2 Certified Thermographer
Certification No.:

Date:

DISCLAIMER

Please note that the report contained herein represents the observed conditions at the time of inspection. Pixel Thermographics Ltd accepts no liability for faults that have occurred during or after the completion of the inspection. The recommendations given in this report are intended as a guide only. By issuing this report neither Pixel Thermographics Ltd or any of its employees make any warranty, expressed or implied, concerning the contents of this report. Pixel Thermographics Ltd cannot accept responsibility for inappropriate actions taken as a result of this report.

	Thermographic BREEAM Compliance Survey SAMPLE REPORT	Date:
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INTRODUCTION

To ensure delivery of a functional and sustainable asset designed and built in accordance with performance expectations and as part of the BREEAM accreditation process, a Thermographic survey has been undertaken by a suitably qualified professional Thermographer to assess the following:

- Continuity of insulation in accordance with the construction drawings.
- Avoidance of excessive thermal bridging.
- Avoidance of air leakage paths through the fabric (except through intentional openings).

The accreditation procedure requires that any defects identified via the post construction inspections are rectified by the client.

SURVEY CONDITIONS

To ensure the survey is carried out in accordance with the appropriate standards, the following atmospheric conditions have been observed:

- A temperature differential between internal and external areas of at least 10°C exists.
- Heating systems within the building are operational.
- Necessary surfaces free from direct solar radiation for at least four hours.
- No precipitation either just prior to or during the survey.
- Building surfaces to be inspected are dry.
- Wind speed to be less than 10 mph.

SURVEY EQUIPMENT

Infrared cameras for this type of survey must have sufficiently high resolution to detect small anomalies at a reasonable distance. Typically cameras use detectors with 320 x 240 (=76,800) pixels.

Pixel Thermographics Ltd use high resolution thermal imaging equipment with 640 x 480 (307,200) pixels.

The camera should have a temperature sensitivity of at least 0.2°C (usually specified as NETD or noise equivalent temperature difference) so that surface anomalies with small temperature differences can be detected.

SURVEYOR CERTIFICATION

It is a requirement for a formal BREEAM accreditation that a certified professional Thermographer with at least an ITC Level 2 Thermography certification carries out the thermographic survey and produces the report.

All Thermographers employed by Pixel Thermographics Ltd have ITC Level 2 Thermographer Certification and a copy of the Thermographer certification is included at the back of this report.

SURVEY SUMMARY

The objective of the inspection was to check that:

- Continuity of thermal insulation is of a standard that would satisfy UK Building Regulations Part L2, 2013 Edition.
- Excessive thermal bridging has been avoided.
- The avoidance of air leakage paths through the fabric (except through intentional openings) has been achieved.

The survey was carried out on the morning of when the environmental conditions were best suited.

There is no definition of acceptable standards of continuity of insulation in the Approved Document L2 of the Building Regulations as revised in 2013. The requirement is for insulation to be 'reasonably continuous over the whole visible envelope'. Acceptance criteria will depend on at least two factors. The seriousness of any defect and the proportion of the fabric element affected by this defect

The seriousness of a defect is shown in a thermal image by the difference between temperatures of good and bad areas. Pixel Thermographics Ltd has adopted a method of differentiating serious from non-serious defects. In the absence of any recommendations, Pixel Thermographics Ltd considers that no more than one square meter in every thousand should be affected by serious defects, i.e. 0.1%.

	Thermographic BREEAM Compliance Survey SAMPLE REPORT	Date:
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SURVEY CRITERIA

Fsi or critical temperature factor is a given constant outlined in paper IP17/01 written by BRE. The use of a surface temperature factor allows thermal imaging surveys, under normal conditions, to identify thermal anomalies. In this case we are using Fsi=0.75 which is considered appropriate across all new commercial buildings.

The survey was conducted externally and all elevations of the building were imaged under appropriate conditions.

Internal and external temperature information was gathered at the time of the survey and used in conjunction with the Fsi to identify areas of the building fabric which fall outside the Threshold external temperature (TCso)

Threshold external temperature (TCso) = Fsi (Tso-Tsi) + Tsi

Where:

*TCSO = Threshold External Temperature
Fsi = Critical Temperature Factor = 0.75
Tso = Outside Surface Temperature
Tsi = Internal Surface Temperature*

The proportion of external surface temperature higher than the threshold temperature (TCso) should not be greater than 0.1% of the total surface area of the building.

Where anomalies outside the threshold temperature were identified, they have been analysed and commented upon within the survey report.

Reflected apparent temperatures were measured throughout the survey and adjusted within the camera to compensate for this radiation.

Threshold external temperature (TCso) = 0.75*(4.0-22.0)+22.0 = 8.5°C

EXECUTIVE SUMMARY

The survey was carried out early morning before sunrise to ensure no solar loading was present on the building.

All elevations of the building were imaged and are included within this report:

The survey highlighted 2 key areas of concern:

- Air Leakage / Heat Build Up within Void Above WC adjacent the staff room
- Air Leakage Due to heat Build Up in Roof Void



The areas circled above highlight the areas where air leakage was noted and which should be investigated and prevented.

All other areas were inspected and confirmed that:

- Continuity of insulation is in accordance with the construction drawings.
- Avoidance of excessive thermal bridging.
- Avoidance of air leakage paths through the fabric (except through intentional openings).

Assuming that the remedial work is carried out to the areas of concern then this will assure conformation of compliance with the requirements for a thermographic survey in relation to BREEAM accreditation.

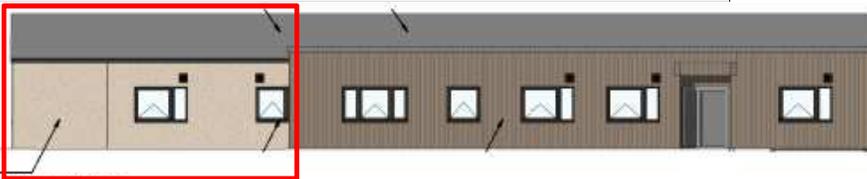
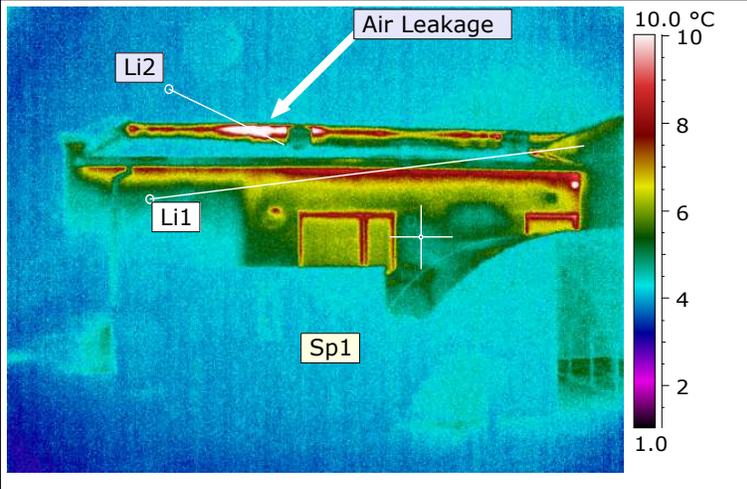
Images of all elevations and any anomalies were gathered during the course of the survey.

The following results pages of the report have been split into 2 sections to allow the client to easily review any anomalies and additionally have a full library of all images acquired.

The results section is split into the following sections:

1. Part 1: Thermal Anomalies
2. Part 2: Archive Images

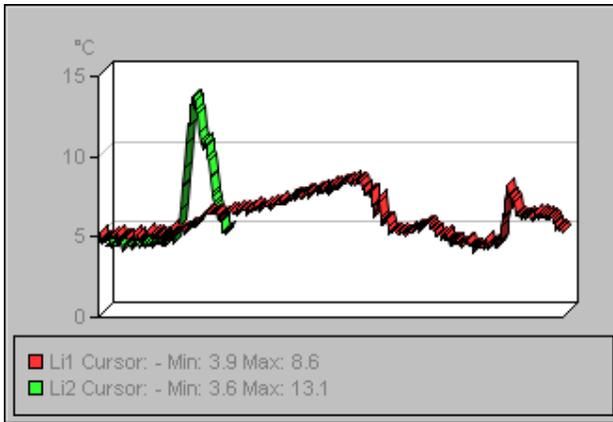
Part 1: Thermal Anomalies



West Elevation

Building	
Location	
Section	
Elevation	West
Anomaly (%)	

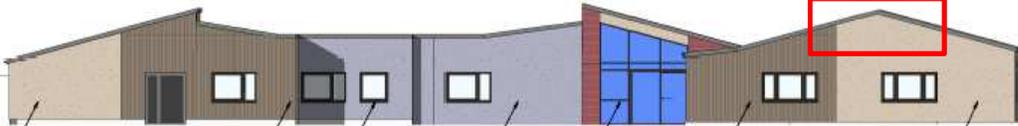
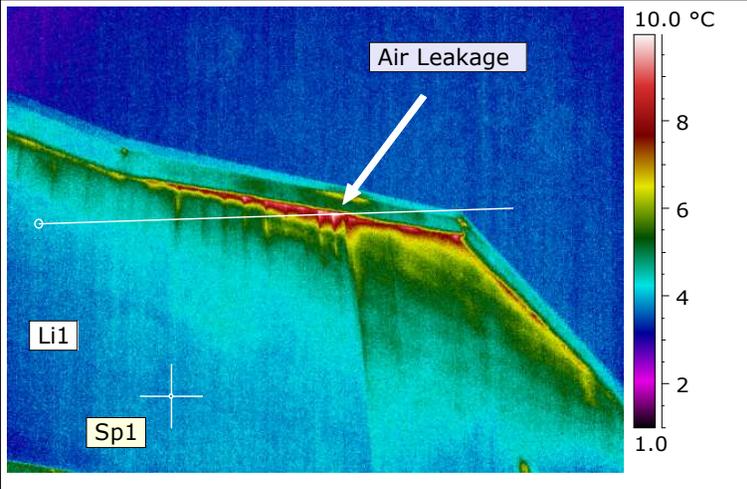
Date	07/02/2017
Filename	IR_15237.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	6.0 °C
Li1 Max. Temperature	8.6 °C
Li1 Min. Temperature	3.9 °C
Sp1 Temperature	5.0 °C

OBSERVATIONS

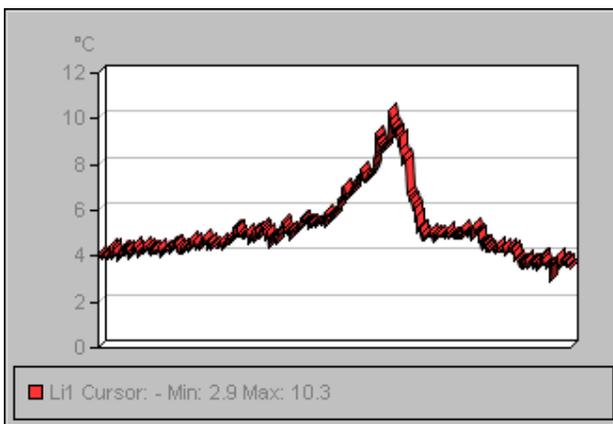
Suspected air leakage noted from upper ridge of roof which should be investigated to ascertain source of heat in this roof void. This should be prevented.



North Elevation

Building	
Location	
Section	
Elevation	North
Anomaly (%)	

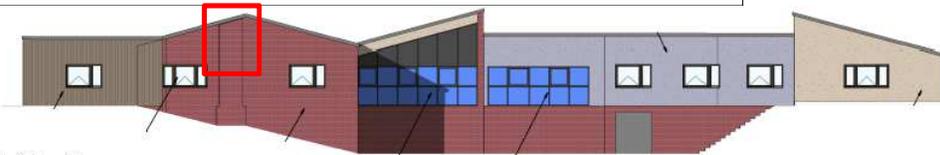
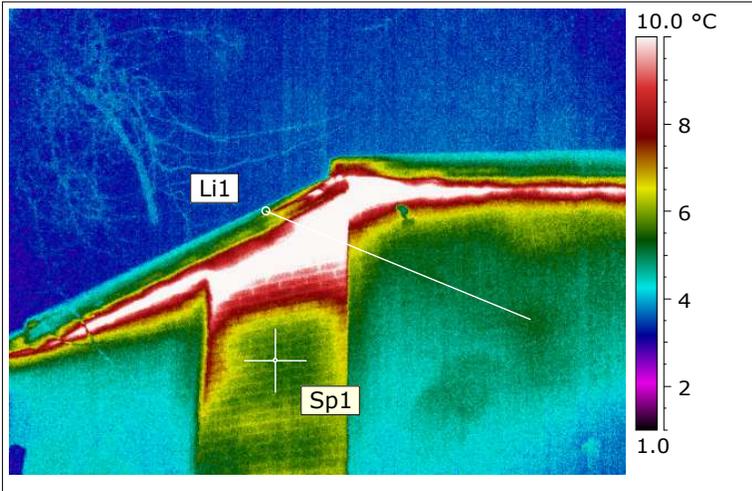
Date	07/02/2017
Filename	IR_15277.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	10.3 °C
Li1 Min. Temperature	2.9 °C
Sp1 Temperature	3.7 °C

OBSERVATIONS

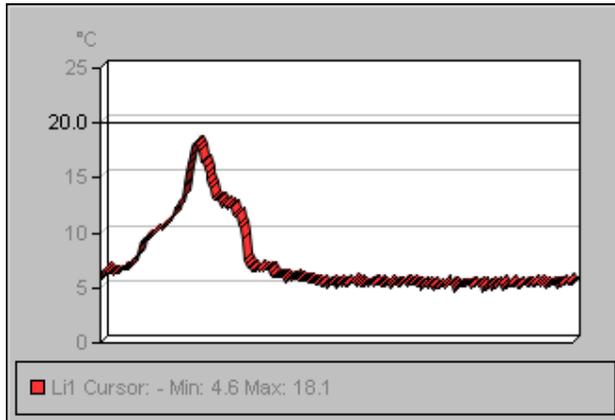
Suspected air leakage noted from upper ridge of roof which should be investigated to ascertain source of heat in this roof void. This should be prevented.



South Elevation

Building	
Location	
Section	
Elevation	South
Anomaly (%)	

Date	07/02/2017
Filename	IR_15249.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94

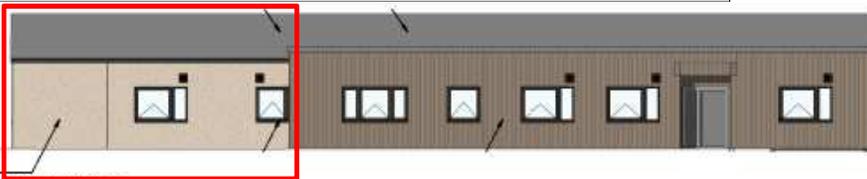
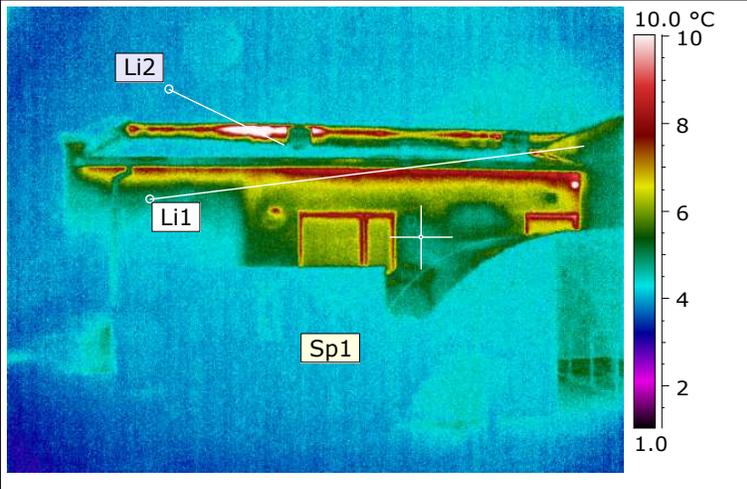


Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	18.1 °C
Li1 Min. Temperature	4.6 °C
Sp1 Temperature	5.5 °C

OBSERVATIONS

Thermal image highlights air leakage from soffit area. Heat build-up noted within the void behind this wall. Internal inspection (in WC) revealed radiant panel in ceiling with no insulation above resulting in heating of the void and heat escape from soffit as seen in thermal image.

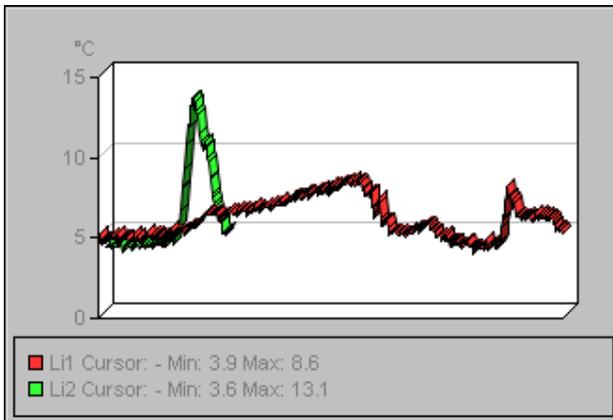
PART 2 – ARCHIVE IMAGES



West Elevation

Building	
Location	
Section	
Elevation	West
Anomaly (%)	

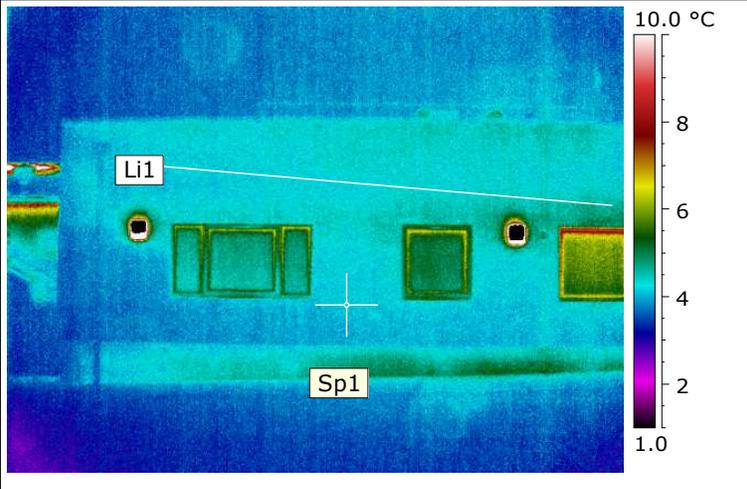
Date	
Filename	IR_15237.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	6.0 °C
Li1 Max. Temperature	8.6 °C
Li1 Min. Temperature	3.9 °C
Sp1 Temperature	5.0 °C

OBSERVATIONS

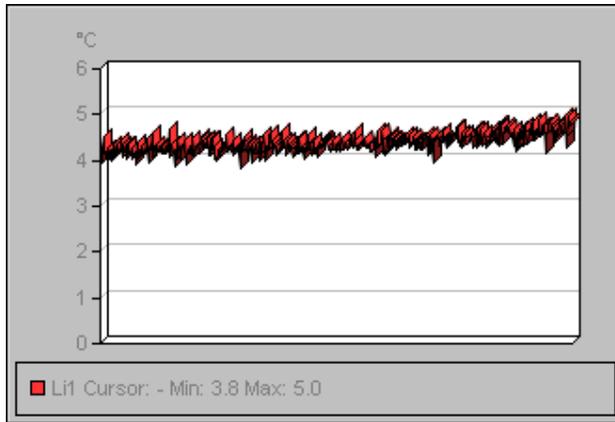
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
Suspected air leakage noted from upper ridge of roof which should be investigated to ascertain source of heat in this roof void.



West Elevation
1:100

Building	
Location	
Section	
Elevation	West
Anomaly (%)	

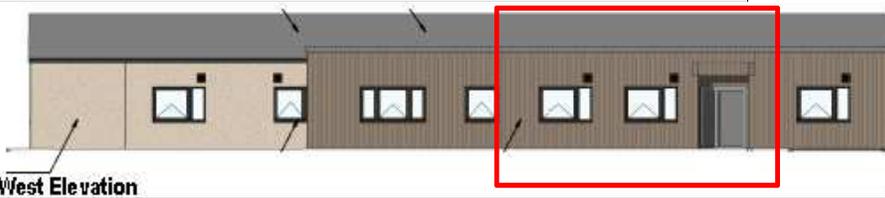
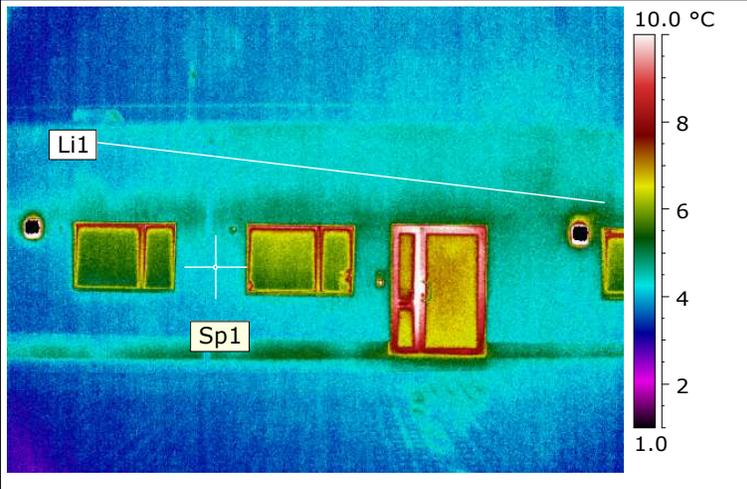
Date	
Filename	IR_15239.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	5.0 °C
Li1 Min. Temperature	3.8 °C
Sp1 Temperature	4.2 °C

OBSERVATIONS

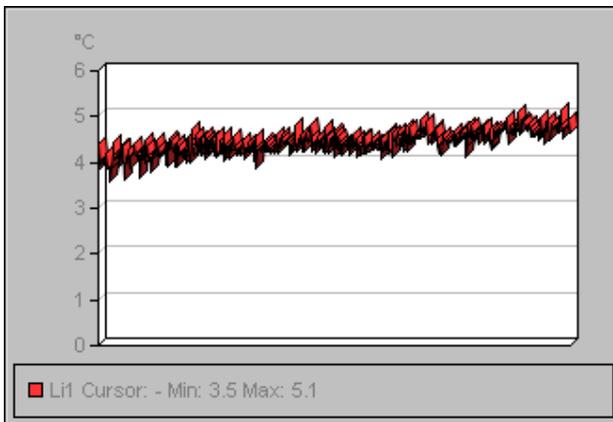
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



West Elevation

Building	
Location	
Section	
Elevation	West
Anomaly (%)	

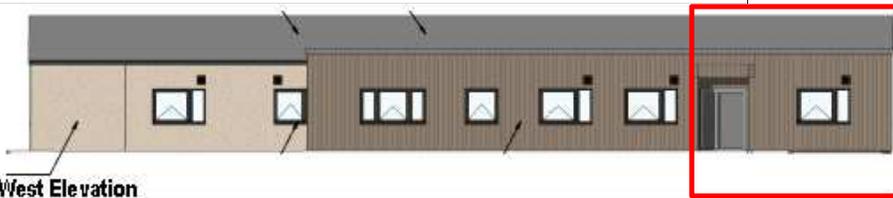
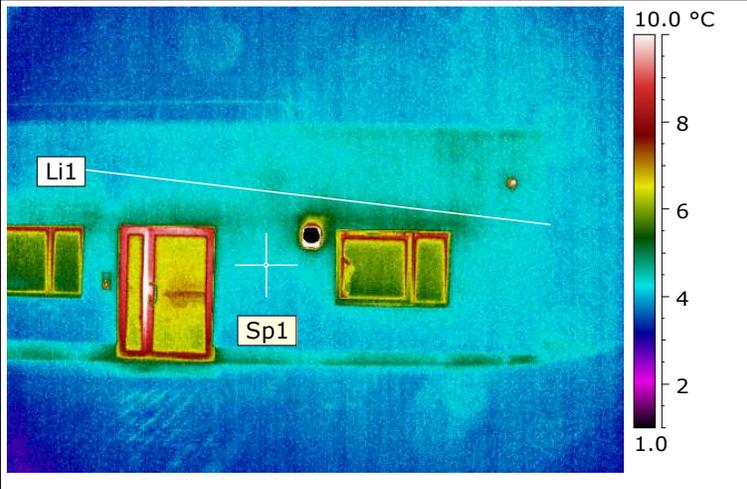
Date	
Filename	IR_15241.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	5.1 °C
Li1 Min. Temperature	3.5 °C
Sp1 Temperature	4.3 °C

OBSERVATIONS

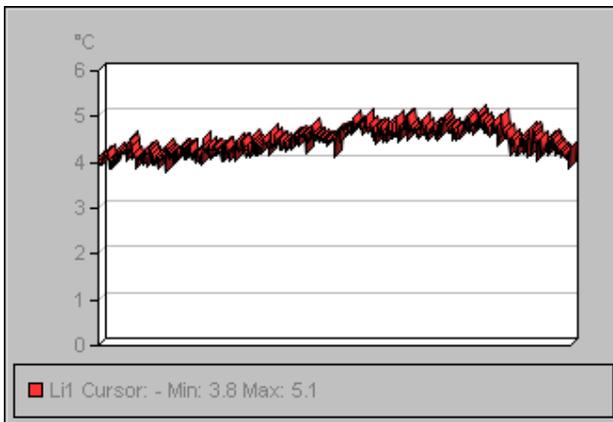
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



West Elevation

Building	
Location	
Section	
Elevation	West
Anomaly (%)	

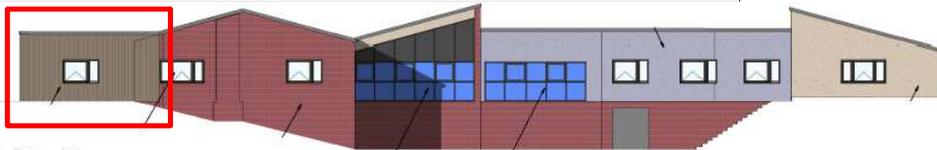
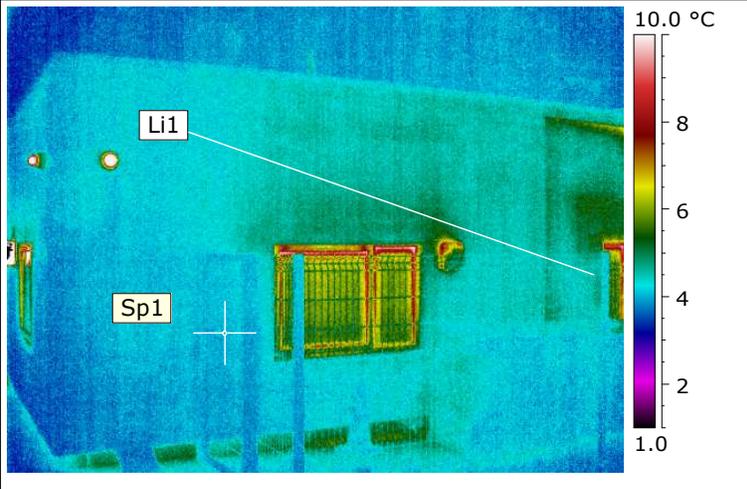
Date	
Filename	IR_15243.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	5.1 °C
Li1 Min. Temperature	3.8 °C
Sp1 Temperature	4.2 °C

OBSERVATIONS

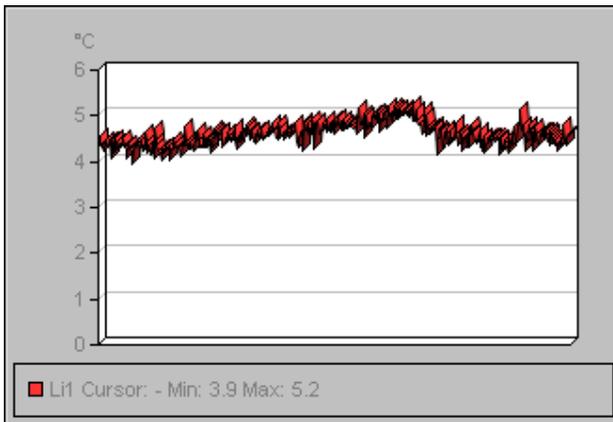
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



South Elevation

Building	
Location	
Section	
Elevation	South
Anomaly (%)	

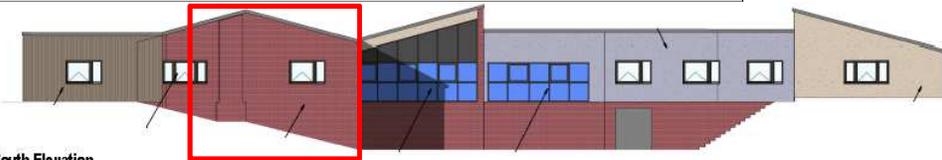
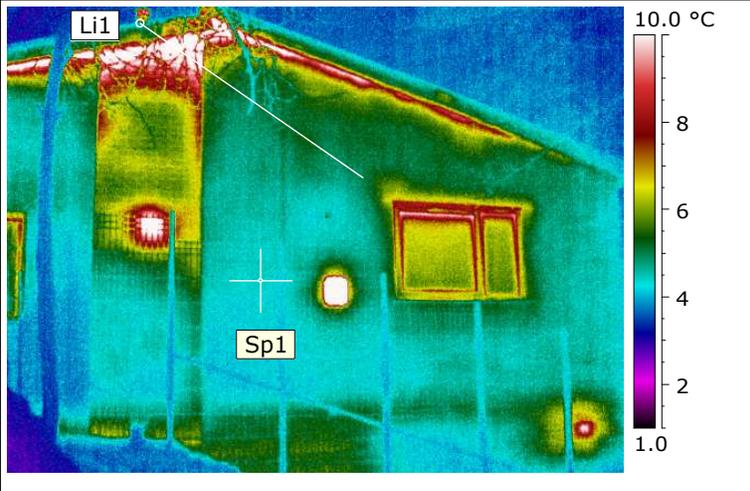
Date	
Filename	IR_15245.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	5.2 °C
Li1 Min. Temperature	3.9 °C
Sp1 Temperature	3.9 °C

OBSERVATIONS

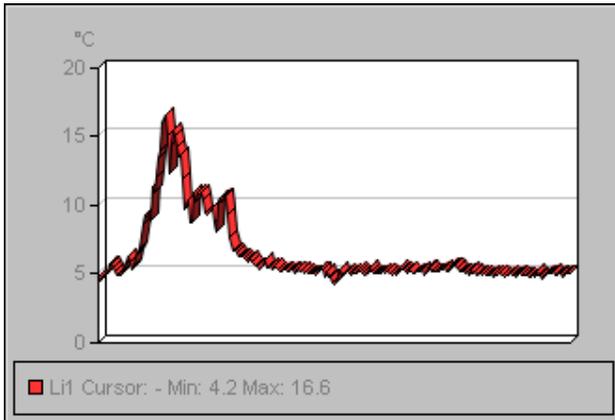
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



South Elevation

Building	
Location	
Section	
Elevation	South
Anomaly (%)	

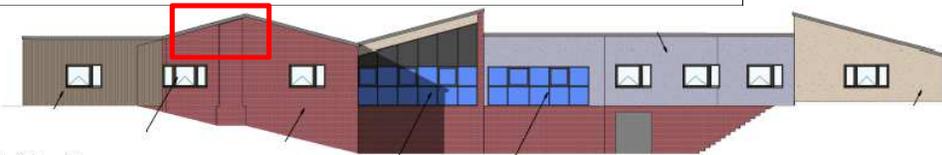
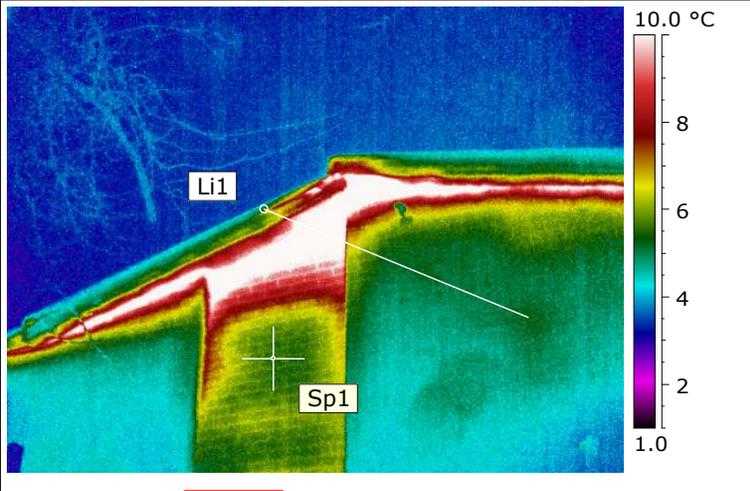
Date	
Filename	IR_15247.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	16.6 °C
Li1 Min. Temperature	4.2 °C
Sp1 Temperature	4.3 °C

OBSERVATIONS

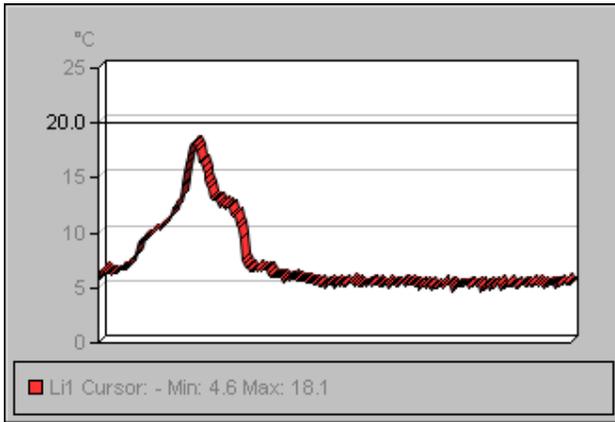
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
Air leakage noted from area of wall where void is located.



South Elevation

Building	
Location	
Section	
Elevation	South
Anomaly (%)	

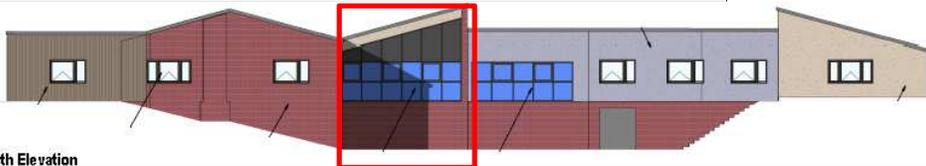
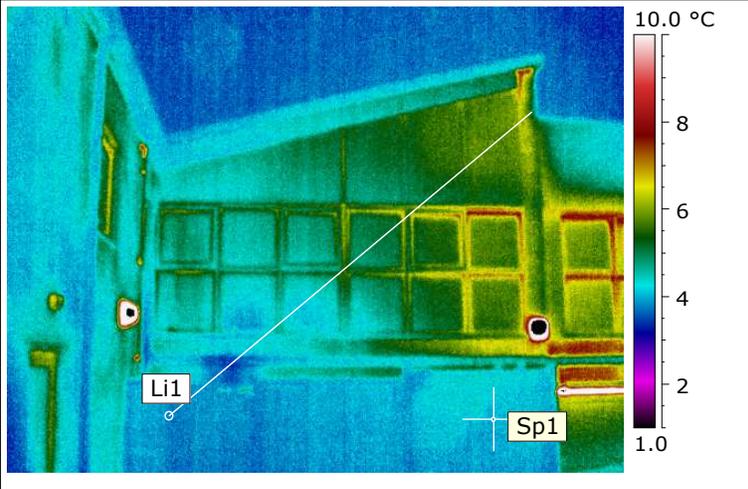
Date	
Filename	IR_15249.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	18.1 °C
Li1 Min. Temperature	4.6 °C
Sp1 Temperature	5.5 °C

OBSERVATIONS

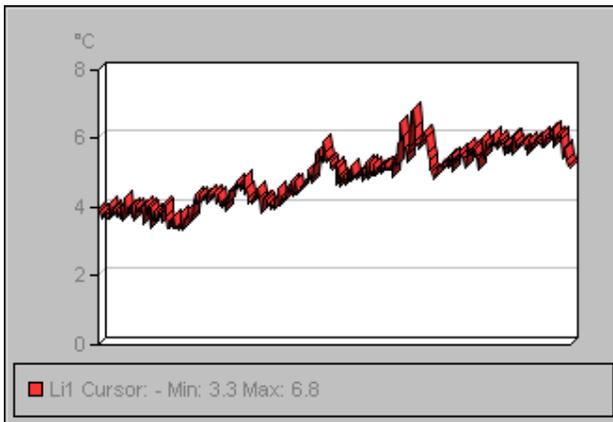
Thermal image highlights air leakage from soffit area. Heat build-up noted within the void behind this wall. Internal inspection (in WC) revealed radiant panel in ceiling with no insulation above resulting in heating of the void and heat escape from soffit as seen in thermal image.



South Elevation

Building	
Location	
Section	
Elevation	South
Anomaly (%)	

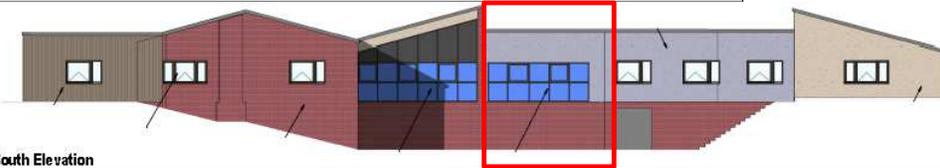
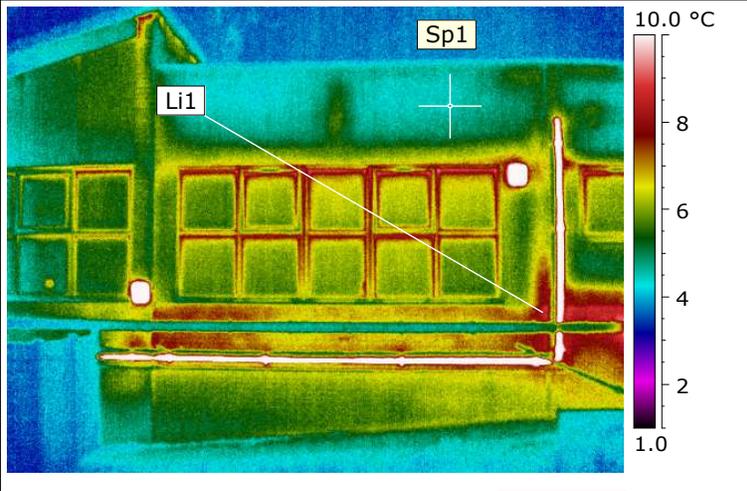
Date	
Filename	IR_15251.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	6.8 °C
Li1 Min. Temperature	3.3 °C
Sp1 Temperature	3.8 °C

OBSERVATIONS

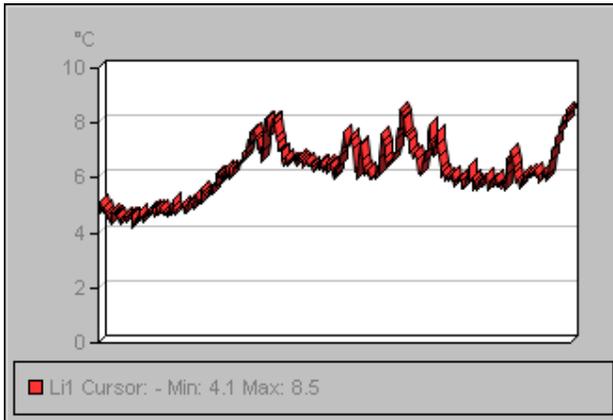
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



South Elevation

Building	
Location	
Section	
Elevation	South
Anomaly (%)	

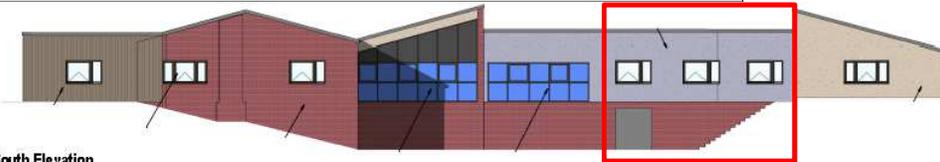
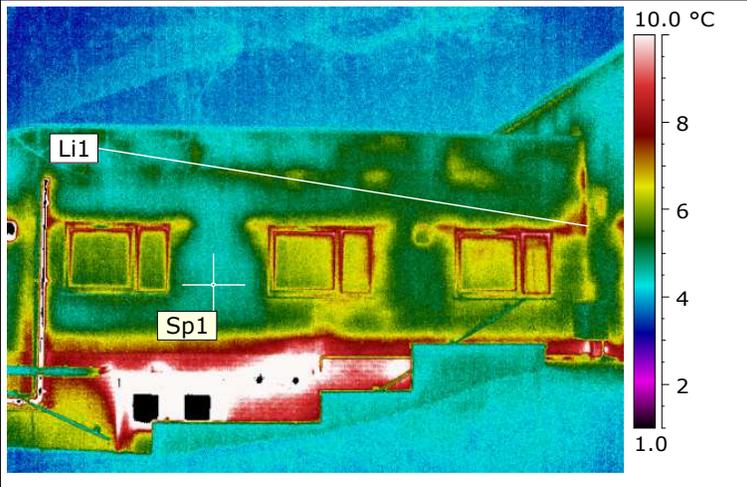
Date	
Filename	IR_15253.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	8.5 °C
Li1 Min. Temperature	4.1 °C
Sp1 Temperature	4.4 °C

OBSERVATIONS

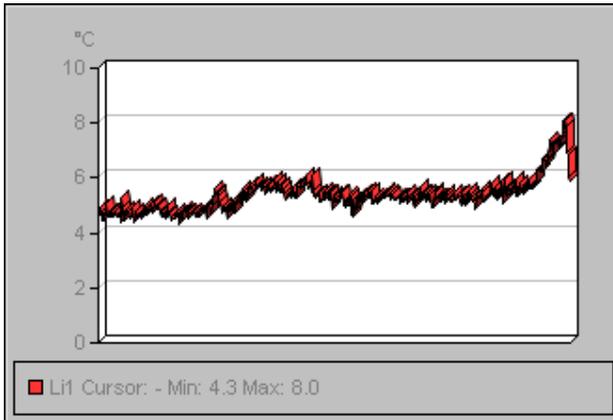
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



South Elevation

Building	
Location	
Section	
Elevation	South
Anomaly (%)	

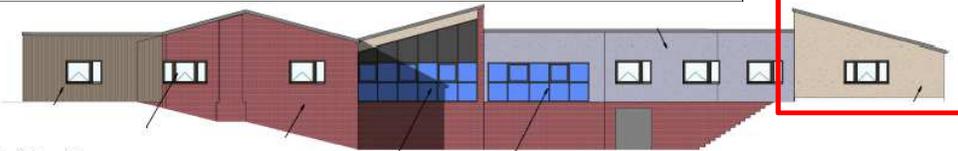
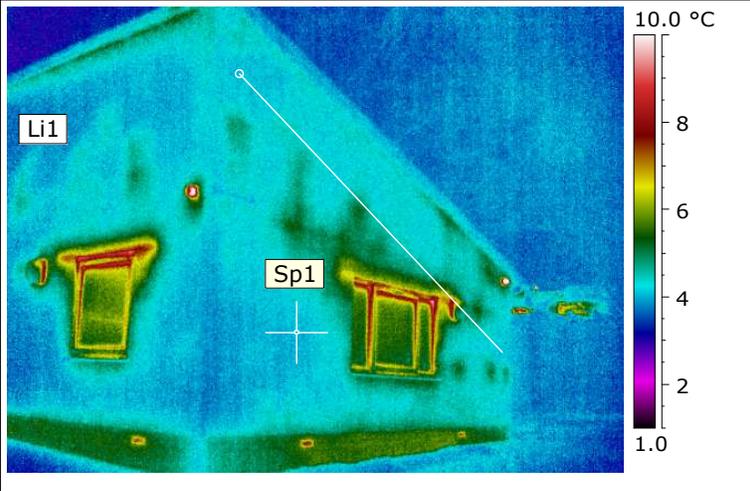
Date	
Filename	IR_15255.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	8.0 °C
Li1 Min. Temperature	4.3 °C
Sp1 Temperature	4.5 °C

OBSERVATIONS

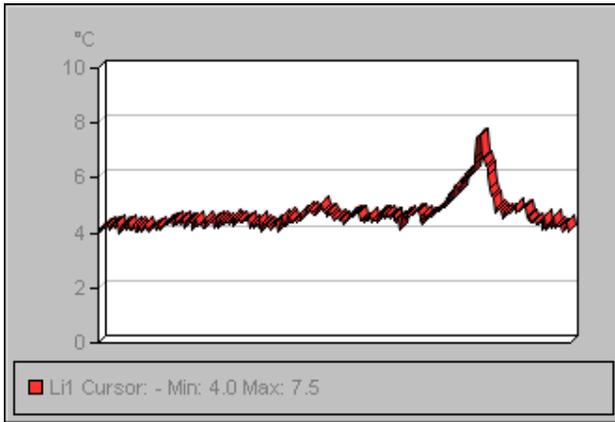
No insulated surfaces exceed the threshold temperature.
 No evidence of thermal bridging.
 No air leakage noted.
 Heat escape from boiler room noted which produces anomalies on this wall – this should be ignored.



South Elevation

Building	
Location	
Section	
Elevation	South
Anomaly (%)	

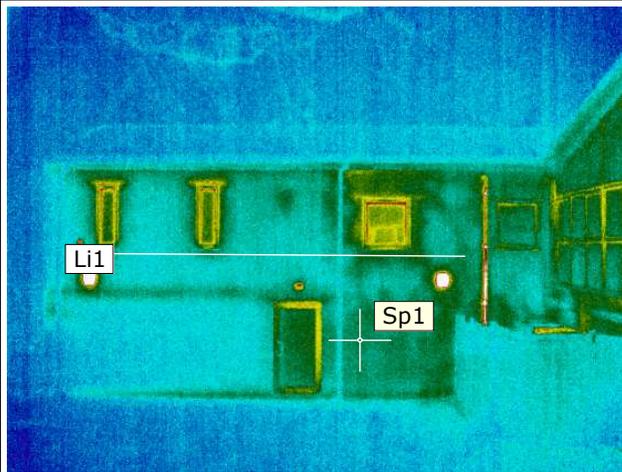
Date	
Filename	IR_15257.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	7.5 °C
Li1 Min. Temperature	4.0 °C
Sp1 Temperature	3.9 °C

OBSERVATIONS

No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.

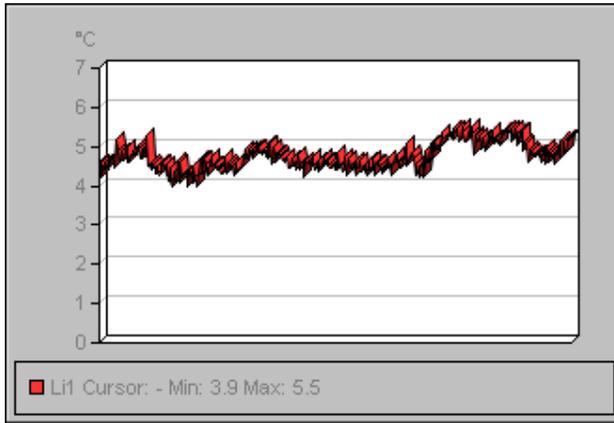


Internal East Elevation

1 : 100

Building	
Location	
Section	
Elevation	Internal East
Anomaly (%)	

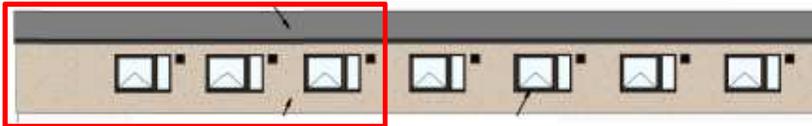
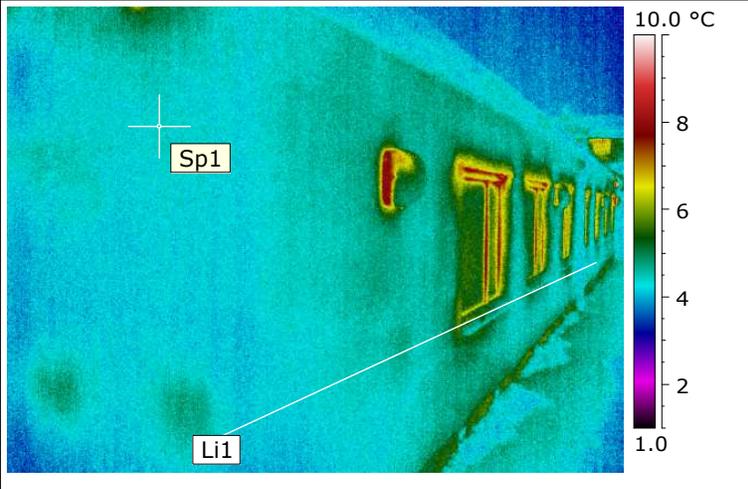
Date	
Filename	IR_15259.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	5.5 °C
Li1 Min. Temperature	3.9 °C
Sp1 Temperature	5.0 °C

OBSERVATIONS

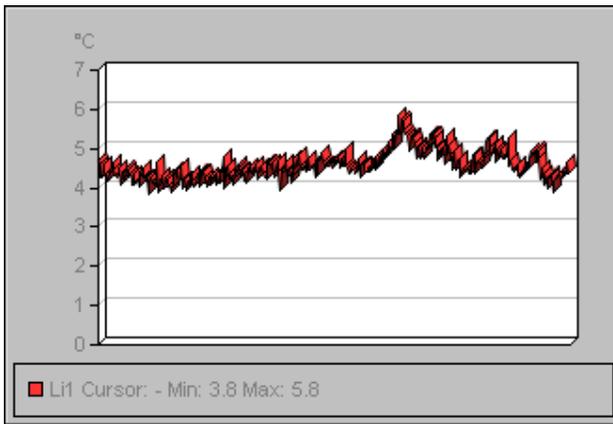
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



East Elevation

Building	
Location	
Section	
Elevation	East
Anomaly (%)	

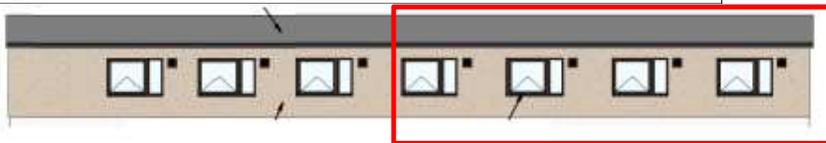
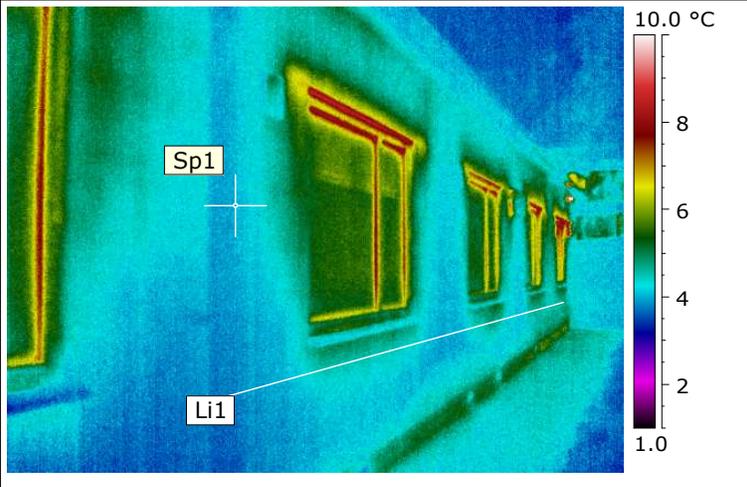
Date	
Filename	IR_15261.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	5.8 °C
Li1 Min. Temperature	3.8 °C
Sp1 Temperature	4.3 °C

OBSERVATIONS

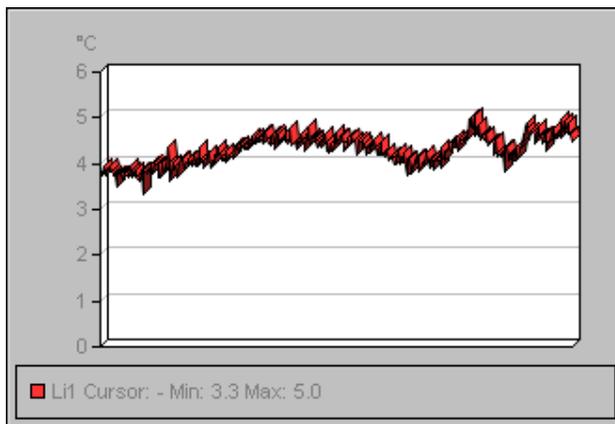
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



East Elevation

Building	
Location	
Section	
Elevation	East
Anomaly (%)	

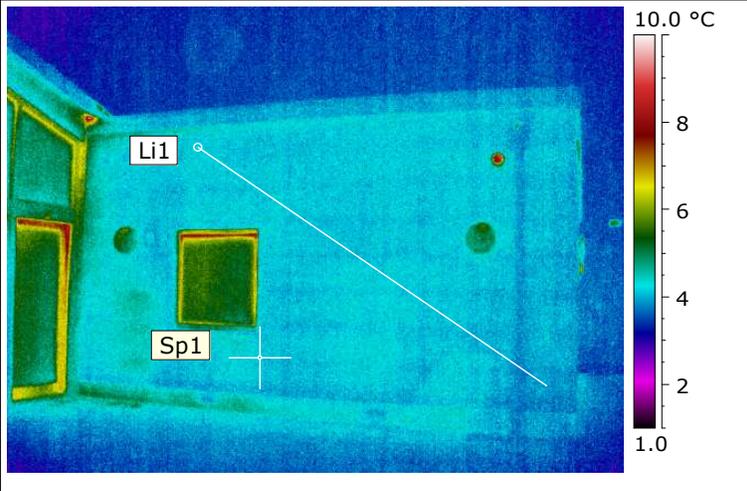
Date	
Filename	IR_15263.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	5.0 °C
Li1 Min. Temperature	3.3 °C
Sp1 Temperature	4.2 °C

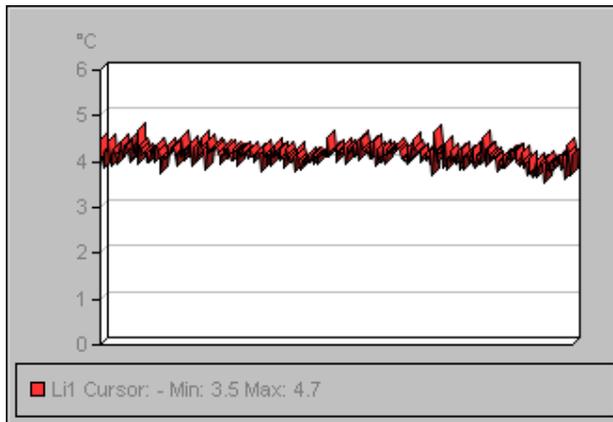
OBSERVATIONS

No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



Building	
Location	
Section	
Elevation	East
Anomaly (%)	

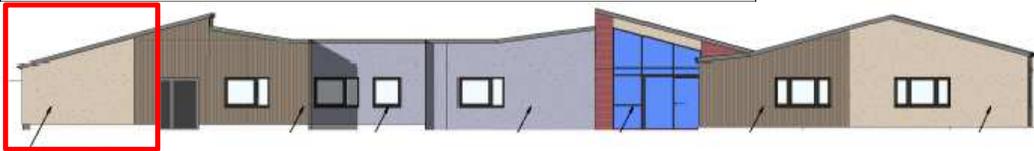
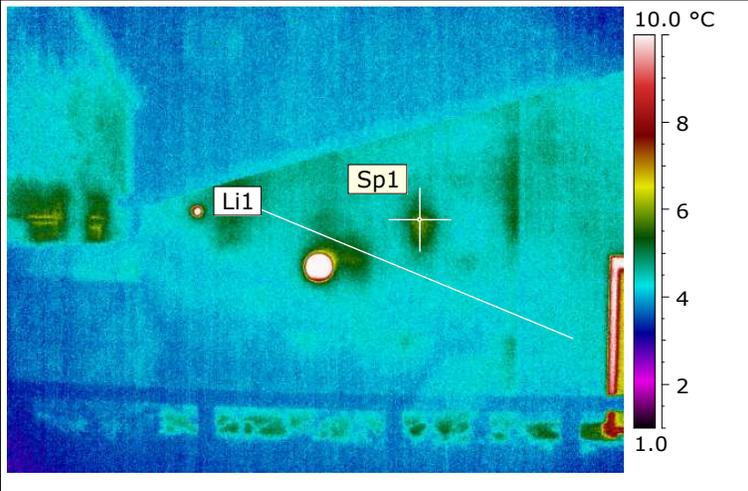
Date	
Filename	IR_15279.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	4.7 °C
Li1 Min. Temperature	3.5 °C
Sp1 Temperature	3.9 °C

OBSERVATIONS

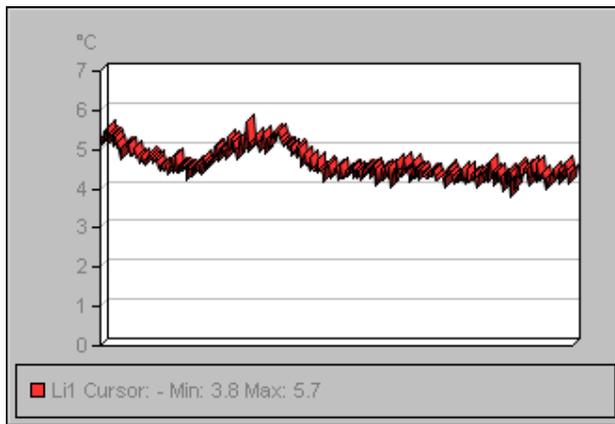
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



North Elevation

Building	
Location	
Section	
Elevation	North
Anomaly (%)	

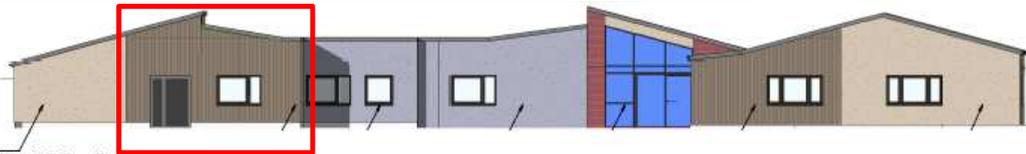
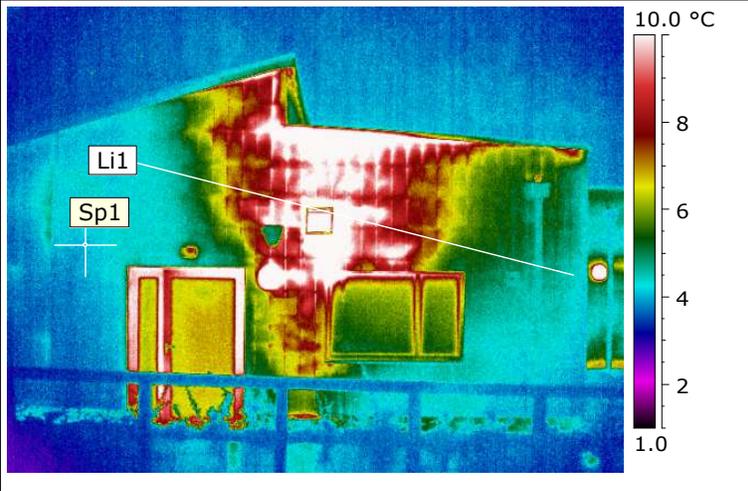
Date	
Filename	IR_15265.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	5.7 °C
Li1 Min. Temperature	3.8 °C
Sp1 Temperature	5.9 °C

OBSERVATIONS

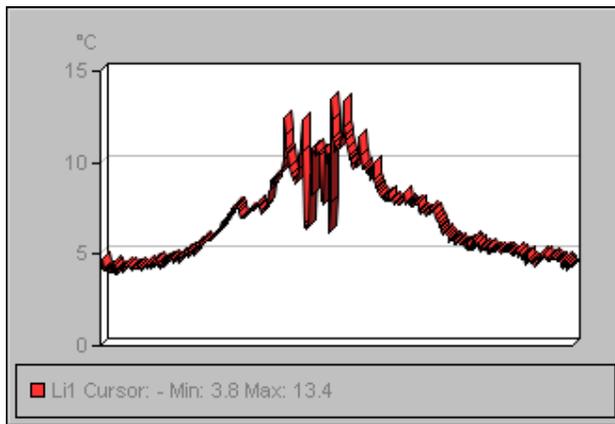
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



North Elevation

Building	
Location	
Section	
Elevation	North
Anomaly (%)	

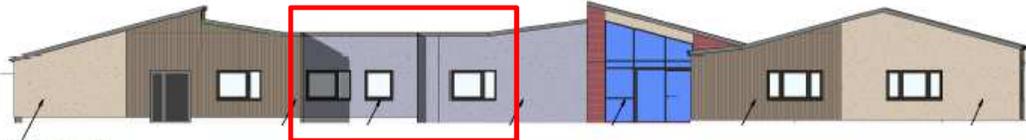
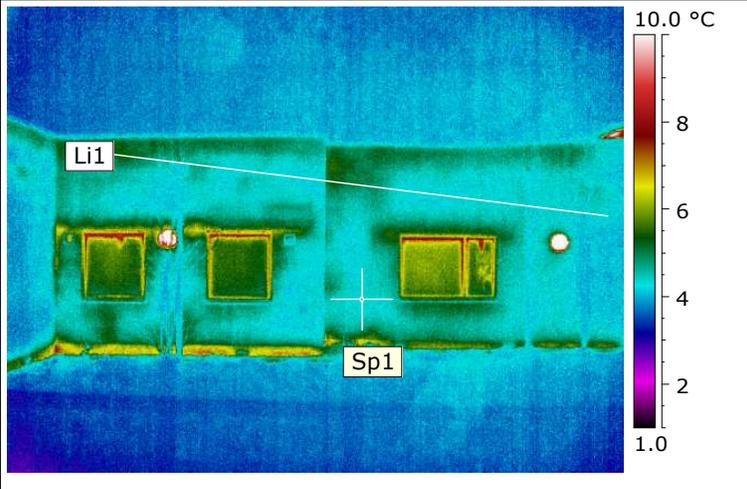
Date	
Filename	IR_15267.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	13.4 °C
Li1 Min. Temperature	3.8 °C
Sp1 Temperature	4.2 °C

OBSERVATIONS

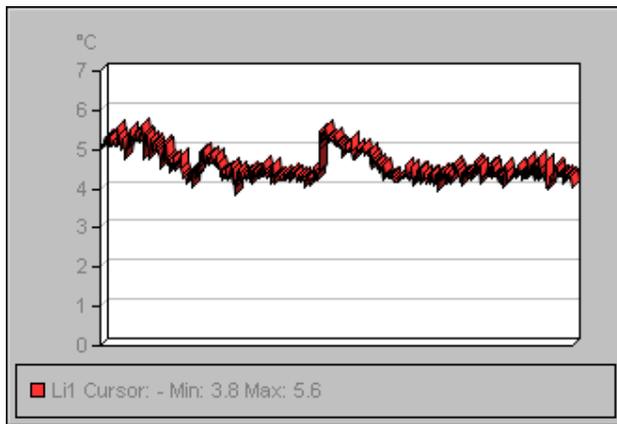
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.
Effects of extract air from extract system on wall should be ignored.



North Elevation

Building	
Location	
Section	
Elevation	North
Anomaly (%)	

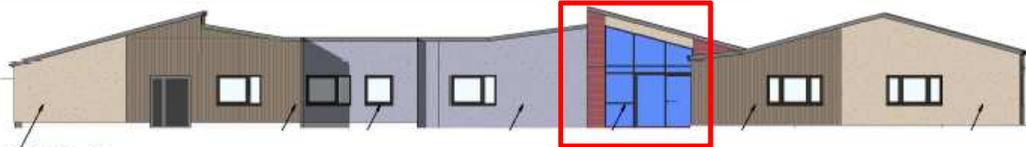
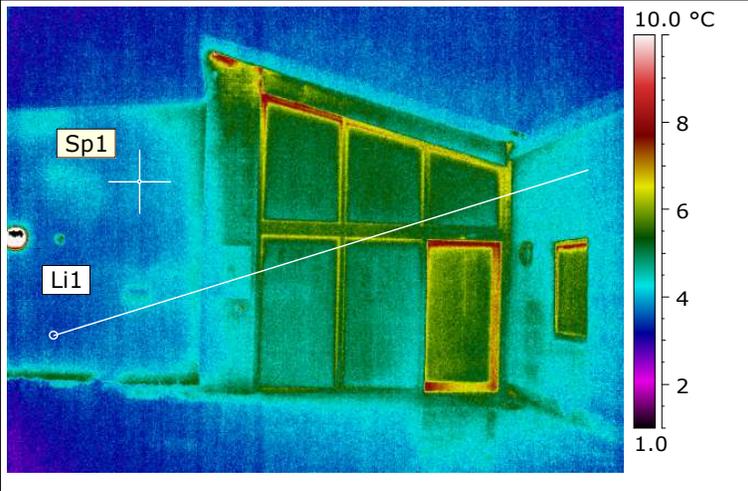
Date	
Filename	IR_15269.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	5.6 °C
Li1 Min. Temperature	3.8 °C
Sp1 Temperature	4.3 °C

OBSERVATIONS

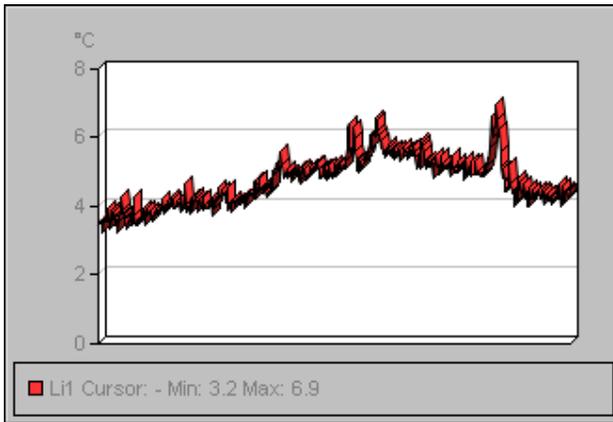
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



North Elevation

Building	
Location	
Section	
Elevation	North
Anomaly (%)	

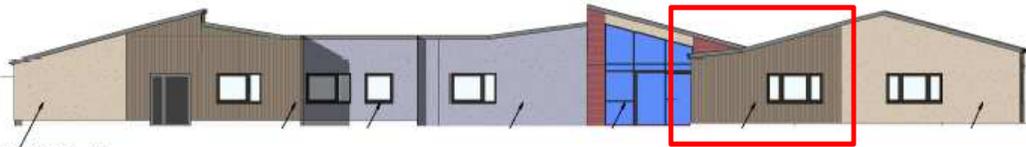
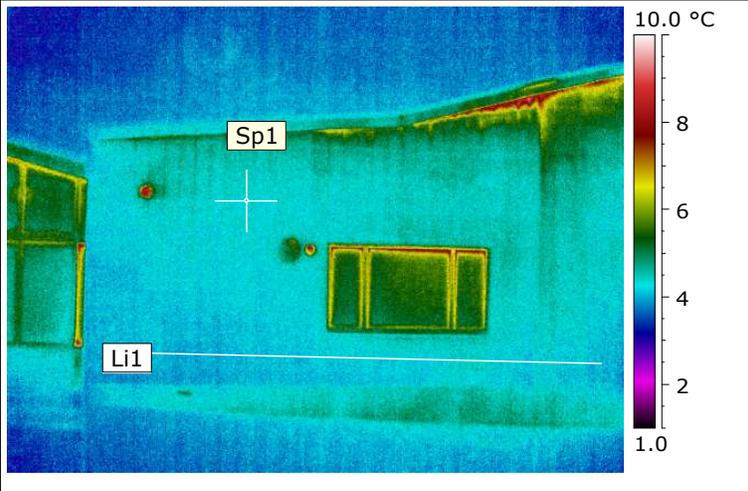
Date	
Filename	IR_15271.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	6.9 °C
Li1 Min. Temperature	3.2 °C
Sp1 Temperature	3.7 °C

OBSERVATIONS

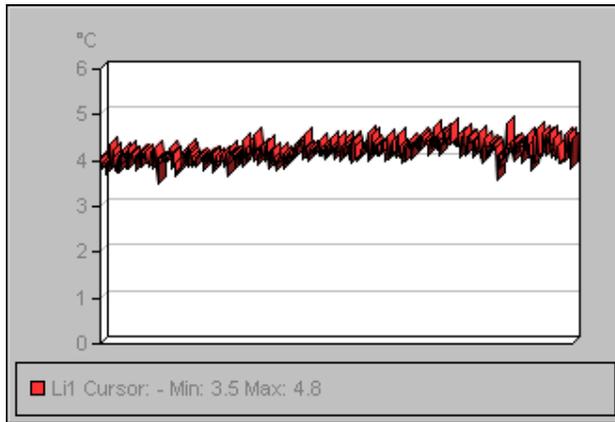
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



North Elevation

Building	
Location	
Section	
Elevation	North
Anomaly (%)	

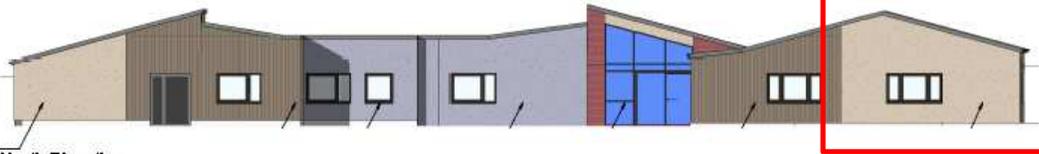
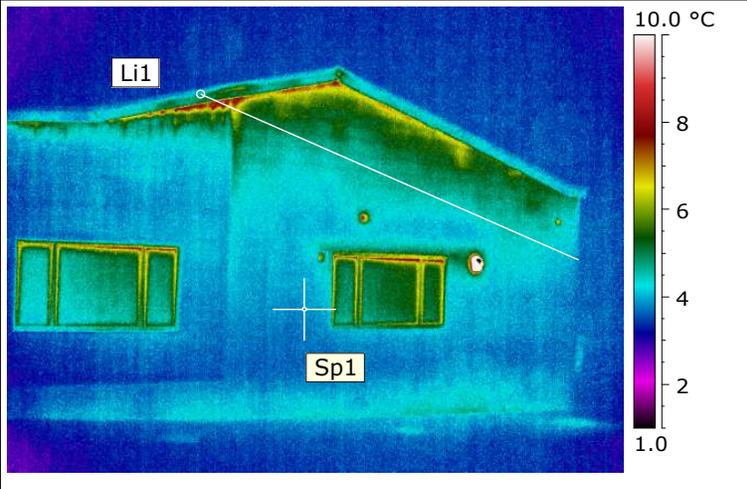
Date	
Filename	IR_15273.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	4.8 °C
Li1 Min. Temperature	3.5 °C
Sp1 Temperature	4.2 °C

OBSERVATIONS

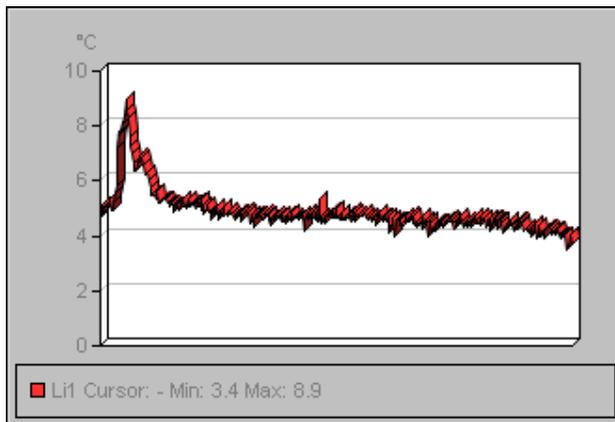
No insulated surfaces exceed the threshold temperature.
No evidence of thermal bridging.
No air leakage noted.



North Elevation

Building	
Location	
Section	
Elevation	North
Anomaly (%)	

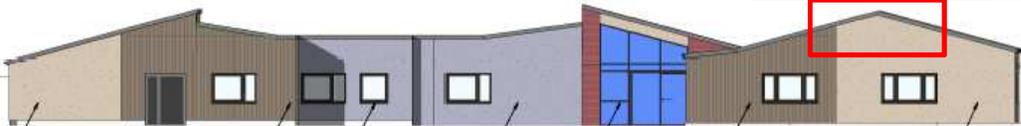
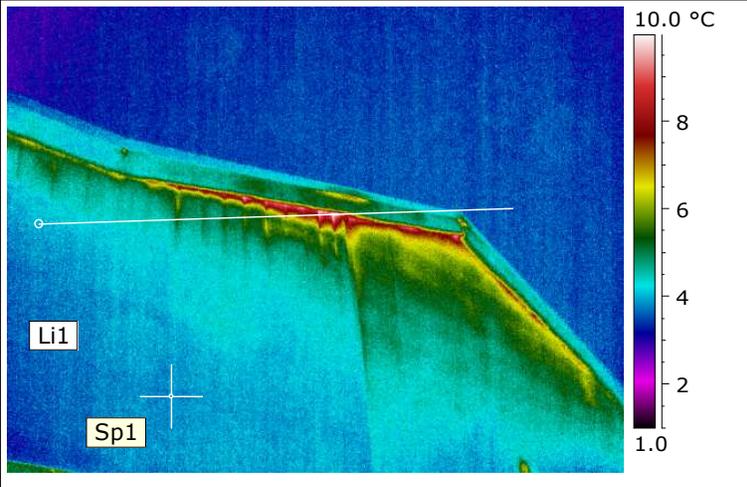
Date	
Filename	IR_15275.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	8.9 °C
Li1 Min. Temperature	3.4 °C
Sp1 Temperature	4.0 °C

OBSERVATIONS

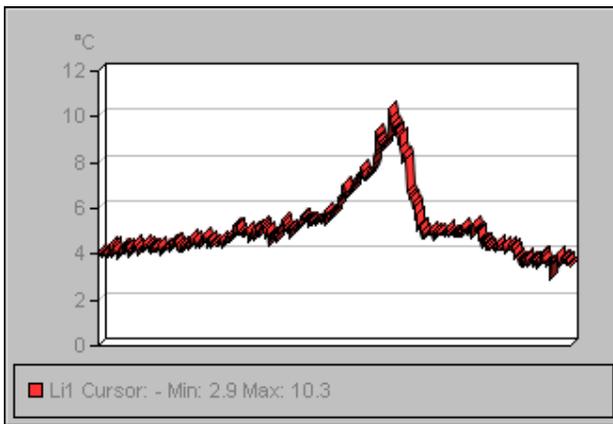
No insulated surfaces exceed the threshold temperature.
 No evidence of thermal bridging.
 Air leakage noted from soffit area.
 Investigation as to source of heat within the roof void required to prevent heat losses.



North Elevation

Building	
Location	
Section	
Elevation	North
Anomaly (%)	

Date	
Filename	IR_15277.jpg
Image Camera Type	ThermaCAM P640 West
Image Serial Number	309000233
Emissivity	0.94



Atmospheric Temperature	4.0 °C
Li1 Max. Temperature	10.3 °C
Li1 Min. Temperature	2.9 °C
Sp1 Temperature	3.7 °C

OBSERVATIONS

Thermal image highlights air leakage from soffit area of roof.
Investigation required to ascertain the source of heat within this roof void.