Technical Report

Energy House, University of Salford

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Issued by
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Date of Issue:
26/03/14

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Client: Stormguard Ltd

Testing of Stormguard Secondary Glazing Film

Introduction

We were asked to test this product in the Energy House over all of the windows in the house. The house currently has 5 main windows (windows to the front bay were not tested). The test consisted of two parts: a control test with no film on the windows and a test with the film installed in line with the manufacturer's instructions.

Testing Method

The testing methodology that was used to measure, collect and analyse the data was *ISO 9869*:1994. Thermal insulation - Building elements - In-situ measurement of thermal resistance and thermal transmittance. We have made no deviations from the method specified in this document.

The Living room was heated to 21C, all other rooms were heated to 18C (as in the SAP methodology). These temperatures were kept in place for each part of the test (24 hours for each measure, however steady state was achieved before these measurements were taken).

Measurements were taken using the air to air methodology as laid down in ISO 9869; as such no correction was made for the internal or external surface resistance of the window. Measurements were taken on a window a central pane U value was measured, **which does not include for the performance of the frame**

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Measured values

- Air temperature in the room
- Heat flux across each window
- Outside air temperature
- Surface temperature inside

Commentary

We assume that the claimed savings made by Stormguard "a double glazing effect" are founded on the fact that the film creates a layer of still and a well performing insulative layer in front of the window. We also note that they are advertised as having a draught proofing effect. We were only, in this test able to verify the insulative claim. Draught proofing and airtightness is a different type of test that was not carried out.

It should also be noted that we did not include the Living Room measurement as the film was difficult to fit around the bay window

Purpose of test:
To measure retrofit performance of Glazing film sealing installed over single glazed windows

Measuring institution	Energy House Consultancy University of Salford, Manchester
Measuring technician	Richard Fitton
Measuring Equipment	Graphtec Logger and Hukseflux HFP01 Heat Flux Transducers. Type T Thermocouples
Date of Measurement	5/4/14
Method used to fix the sensors	The HFT were fixed to the window using tape and a thin layer of thermal paste to ensure a good contact.
Location of the sensors	1. Kitchen window 2. Bedroom 1 window 3. Bedroom 2 window 4. Bathroom window
Measurements taken	Heat flux X4 Internal surface temperatureX4 Internal air temperatureX4 External air temperature
Sampling intervals	1 minute
Raw Data	To be sent in Excel Format

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	Windows measured U value Without Glazing film	Windows measured U value With Glazing film	Reduction
Sensor Location	**W/m2.K**	**W/m2.K**	**%**
Kitchen Window	4.18	3.00	28.18%
Bedroom 1 Window	4.06	3.01	25.83%
Bedroom 2 Window	4.12	3.03	26.47%
Bathroom Window	4.18	3.21	23.21%

Estimation of accuracy, error analysis	**Error between**
HFM sensors= 5%	$(\sqrt{5^2+0.75^2+0.1^2+0.1^2+3^2+10^2+5^2})\%$
Temperature Sensors = 0.75% Above 0°C	= **12.6%**
Data logger Voltage reading = 0.1%	and
Data logger Temperature reading = 0.1%	$(5+0.75+0.1+0.1+3+10+5)\% =$
HFM induced modifications to the isotherms = 3%	**23.95%**
Temperature change over time = 10%	
Random Variation due slight difference in thermal contact between sensor and surface = 5%	

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Appendix C: Images of HFT sensors placed on windows

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Appendix E: Graphs

Without Glazing Film (HFT Data)
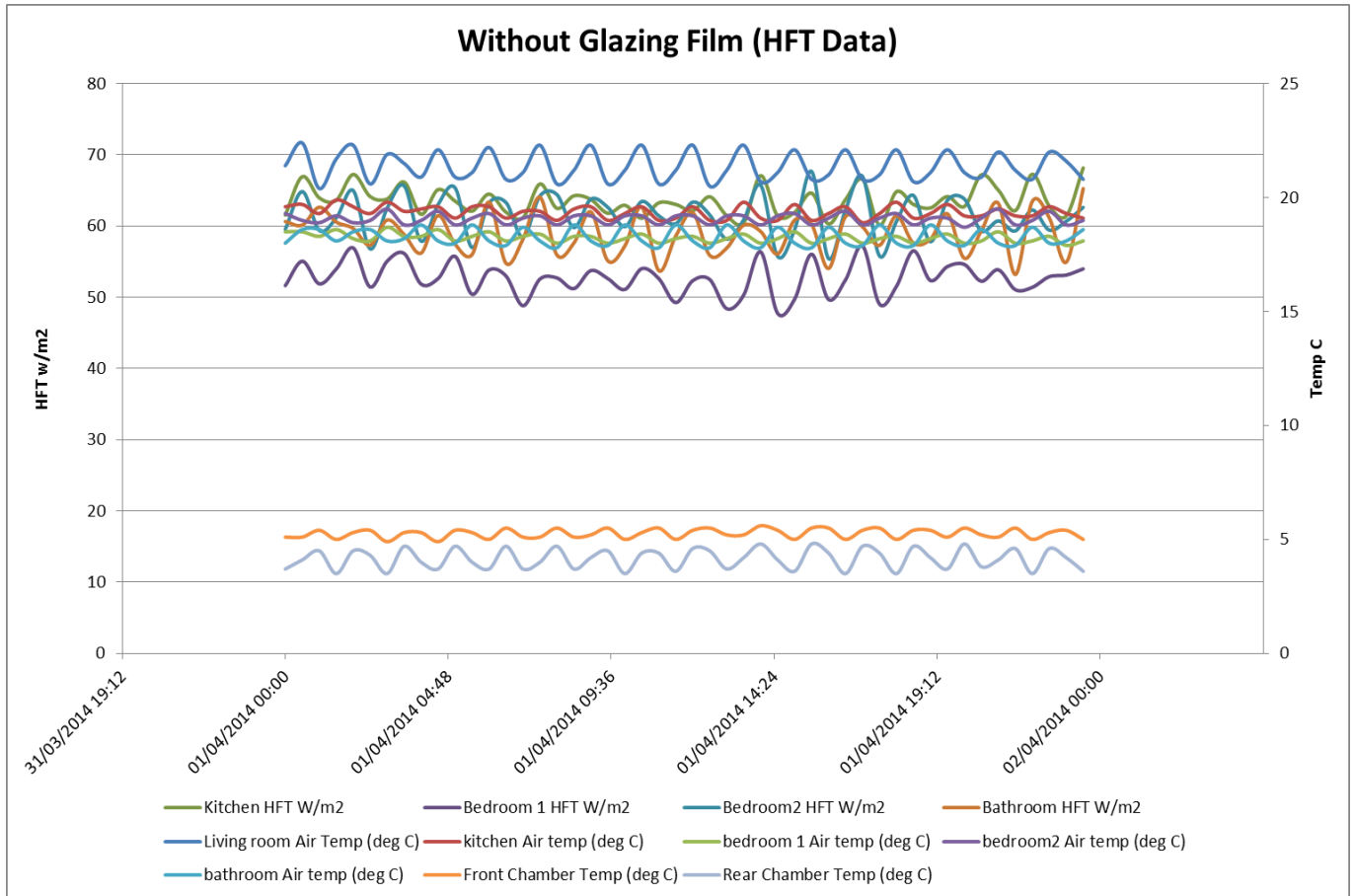
Sensor Location	Windows measured U value Without Glazing film	Room Air Temperature	External Air Temp	Delta T
	W/m2.K	C	C	C
Kitchen	4.18	19.36	4.14	15.22
Bedroom 1	4.06	18.24	5.26	12.98
Bedroom 2	4.12	19.07	4.14	14.92
Bathroom	4.18	18.26	4.14	14.11

Average Data over 24 hours

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With Glazing Film (HFT Data)

Legend: Kitchen HFT W/m2 · Bedroom 1 HFT W/m2 · Bedroom2 HFT W/m2 · Bathroom HFT W/m2 · Living room Air Temp (deg C) · kitchen Air temp (deg C) · bedroom 1 Air temp (deg C) · bedroom2 Air temp (deg C) · bathroom Air temp (deg C) · Front Chamber Temp (deg C) · Rear Chamber Temp (deg C)
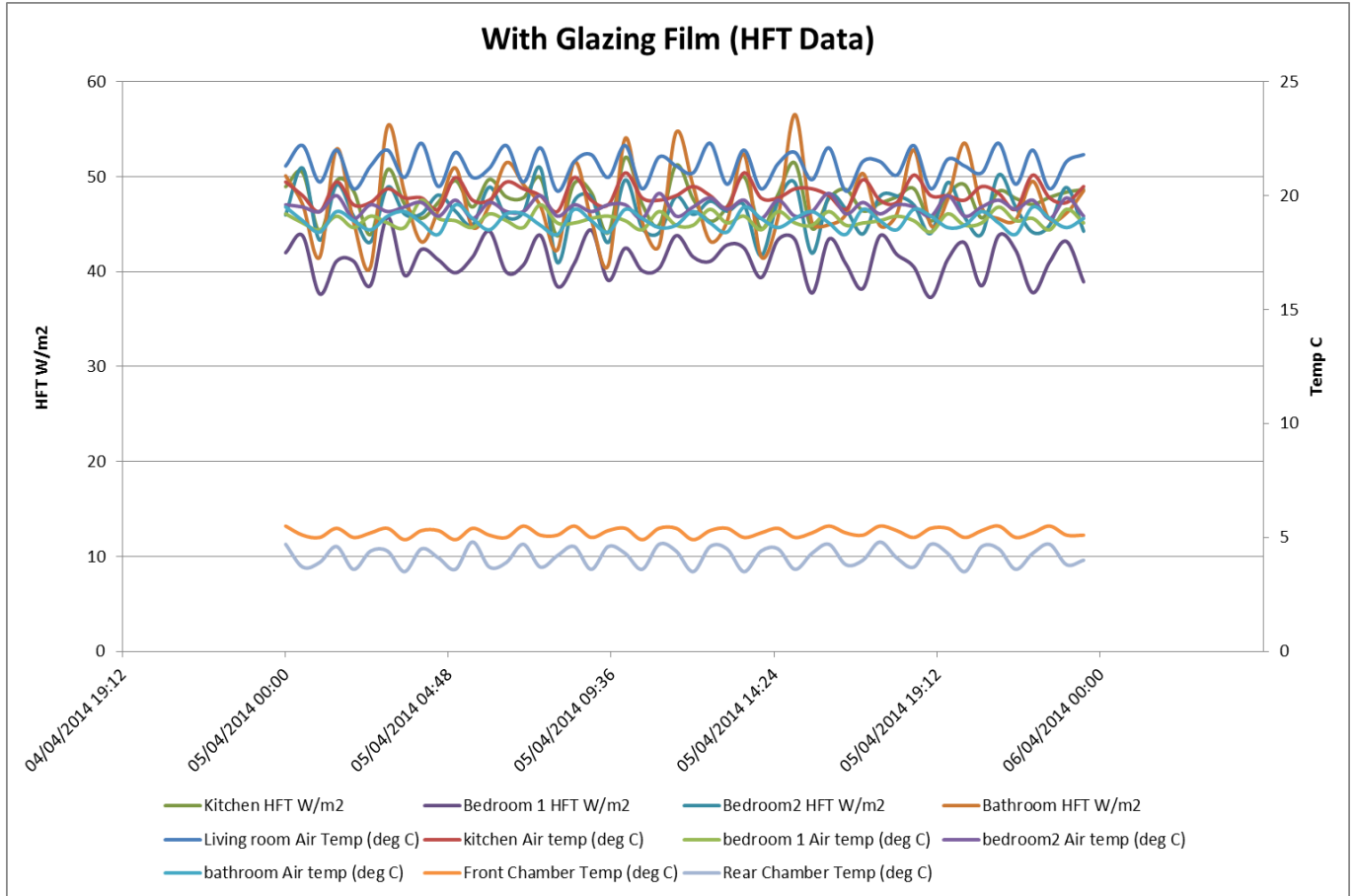
Sensor Location	Windows measured U value With Glazing film	Room Air Temperature	External Air Temp	Delta T
	W/m2.K	C	C	C
Kitchen	3.00	20.07	4.16	15.90
Bedroom 1	3.01	18.93	5.22	13.71
Bedroom 2	3.03	19.48	4.16	15.31
Bathroom	3.21	18.92	4.16	14.75

Average Data over 24 hours

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