

BRITISH BOARD OF AGRÉMENT ASSESSMENT REPORT Ref: S253542

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Executive summary

The measured results from NPL tests indicate, when Gapotape is installed with no air gaps and a tight fit on all four sides, the correction level 0 for air voids can be used when calculating U values to BS EN ISO 6946.

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Date: 8 April 2015

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Date: 8 April 2015

On behalf of the British Board of Agrément

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Client: Gapogroup Ltd

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Job No: S253542

Report by: Gayetree Ramkorun

Work period: April 2014 to March 2015

1 Introduction

Gapotape consists of latex foam sheet covered with a fiberglass reinforced aluminium adhesive tape. The product is designed to be firmly fixed around the perimeter of the rigid PIR boards. The rigid PIR with the Gapotape installed is then pushed between the rafters making a good airtight seal.



The aim of this assessment was to establish whether using Gapotape will make a significant difference in reducing the thermal transmittance across a construction element.

The product was assessed for use in a pitched roof construction with plasterboard. Tests were carried out with and without the tape, and also with and without plasterboard internal lining. This testing was carried out at a UKAS accredited laboratory, the National Physics Laboratory (NPL). The installation was witnessed by BBA, during two visits to the laboratory.

2 FIRST VISIT TO NPL

The first visit to NPL was to witness the construction of the roof structure without the Gapotape being included (See photos 1 & 2). The test roof had Kingspan TP10 installed between the rafters. In the opinion of the BBA, the standard of installation of the Kingspan board realistically represented the quality anticipated when correctly installed on site (see photos 3 & 4). The test roof structure matched the drawings supplied by Gapotape, reflecting a typical existing pitched roof construction.

3 SECOND VISIT TO NPL

The second visit was carried out to witness the Gapotape being installed onto the Kingspan TP10 insulation. On this occasion, the insulation was cut 8mm short (4 mm each side) creating a gap around the perimeter. The Gapotape was wrapped around all sides of the insulation in one piece. At the corners the aluminium tape was cut, folded and stuck down to the outer faces of the insulation board, this made a neat seal at the corners. Where the two ends of the Gapotape met, the edges were tightly butted together and a piece of aluminium adhesive tape was then stuck over the joint. (See photos 5 to 8)

The insulation with the Gapotape fitted was then installed in the test roof, and achieved a tight fit so that once installed, the Gapotape appeared to fill all the gaps around the board (see photos 9 and 10)

The roof structure had a single layer of 100 mm rigid PIR foam insulation board, between 150 mm deep rafters at 400 mm centres, with a 50 mm fully ventilated cavity above the insulation.

The orientation of the test was changed from the programmed 45° to the horizontal to 90°.

The intention was originally to use plastic tiles, with a non-ventilated air cavity between the tiles and insulation. However the roof structure would in practice be fully ventilated, and therefore the cavity between the slates and the insulation would be fully exposed to the cold chamber air flow. To achieve this, 10 mm slots at the top and bottom of the roof structure were incorporated, to allow forced convection through the cavity.

In non-ventilated air cavities natural convection occurs, and the orientation of the cavity will have a significant effect on the thermal resistance. In contrast, the orientation of a fully ventilated cavity with forced convection has no significant effect on the cavity's thermal resistance.

NPL received the roof structure from GapoGroup Ltd. which was delivered with real slate installed, rather than the expected plastic. The real slate tile made the structure very heavy and difficult to secure in the expanded polystyrene surround panel when in the 45 degree tilted position. The roof structure was therefore installed and the measurements were taken in the vertical position, making the installation easier.

In the opinion of the BBA, these amendments, which were discussed and agreed with NPL, will have no significant effect on the test results, nor on the subsequent U-values achieved.

5 PICTURES

Photo 1 (Kingspan insulation between rafters)



Photo 2 (Tiled outer surface)



Photo 3 hand cut insulation



Photo 4 ventilated air cavity



Photo 5 installation of Gapotape



Photo 6 start of the Gapotape application



Photo 7 Corner finish



Photo 8 Joint where the ends meet



Photo 9 installed board



Photo 10 all boards installed



6 TESTING

NPL carried out a series of tests to measure the U-value of roof sections, with PIR insulation between rafters with and without Gapotape installed. The thermal transmittance measurements were made using NPL's rotatable wall Guarded Hot Box. The equipment and measurement procedure were in accordance with the requirements of BS EN ISO 8990.

Test 1 – Roof with plasterboard and no Gapotape

The roof element comprised of solid PIR insulation installed between the rafters using normal practice. In the opinion of the BBA the standard of installation of the insulation board realistically represented the quality anticipated when correctly installed on site (see photos 3 & 4). Plasterboard was then fixed on internal face. The whole structure was mounted in the hot box surround panel and the U-value measured.

As measured Thermal Transmittance - 0.65 W/(m²K)

Test 2 – Roof without plasterboard and No Gapotape

The roof element comprised of the structure from test one with the plasterboard removed. The whole structure was remounted in the hot box surround panel and the U-value measured.

As measured Thermal Transmittance – 1.51 W/(m²K)

Test 3 – Roof with plasterboard and Gapotape fixed around the perimeter of the PIR boards

The roof element comprised of solid PIR insulation with Gapotape fixed around the perimeter, then installed between the rafters creating a tight fit, plasterboard was then fixed on the internal face. The whole structure was mounted in the hot box surround panel and the U-value measured.

As measured Thermal Transmittance – 0.31 W/(m²K)

Test 4 – Roof without plasterboard and Gapotape fixed around the perimeter of the PIR boards

The roof element comprised of the structure from test three with the plasterboard removed. The whole structure was mounted in the hot box surround panel and the U-value measured.

As measured Thermal Transmittance – 0.31 W/(m²K)

7 CONCLUSION

The measured results from the NPL test indicates that, when Gapotape is installed around the perimeter of PIR ridged insulation boards, with no air gaps and a tight fit on all four sides (photos 9 and 10), the correction level 0 for air voids (see Table D.1 – BS EN ISO 6946) can be used when calculating U values to BS EN ISO 6946. Without Gapotape installed a correction for air voids level of 1 or 2 may need to be added to the U-value calculation giving a poorer result.

Also the Gapotape helped to take up any small unevenness from the cut surfaces on the insulation board and or the timber rafters.

A BBA Quality Plan (which describes the production process) was sent to the client to complete, as part of this contract. However at the time of issue of this report, GapoGroup were manufacturing the product for testing from a pilot plant production. This means that there is little point in completing a Quality plan. When Gapotape have a manufacturing facility up and running, should BBA Certification be sought, a Quality Plan will need to be fully completed. It will also be necessary for the client to demonstrate, through retained production and quality control records, that the samples used to generate the data presented in this report are fully representative of the final production material.

GapoGroup requested a quotation for full Certification of the Gapotape product, however this can only be progressed once GapoGroup has a manufacturing facility producing the Gapotape product.