

## **BUILDING ACT 1984 – SECTION 16(10)(a)**

### **DETERMINATION OF COMPLIANCE WITH REQUIREMENT L1(a)(i) IN PART L (CONSERVATION OF FUEL AND POWER) OF SCHEDULE 1 TO THE BUILDING REGULATIONS 2000 (AS AMENDED) IN RESPECT OF THE USE OF MULTI-FOIL INSULATION IN THE PROPOSED ROOF CONSTRUCTION, FORMING PART OF A LOFT CONVERSION**

#### **The proposed work and question arising**

5. The papers submitted indicate that the building to which this determination relates is a two-bedroom late 1950s bungalow constructed with a traditional pitched roof. The proposed building work involves the conversion of the existing roof/loft space into a habitable room by modification within the existing roof void and provision of a stair to access the newly created habitable space. The proposal in question is your intention to use YBS SuperQuilt multi-foil insulation of 25mm thickness to insulate the roof at rafter level, in order to maximise the usable space.

6. The above proposal was the subject of a full plans application deposited on 20 May 2008, which was rejected by the Council on 22 July 2008 on the grounds of lack of information to determine compliance with Requirement L1(a)(i) in Part L (Conservation of fuel and power) of Schedule 1 to the Building Regulations 2000 (as amended). It is in respect of this question that you have applied for a determination.

#### **The requirements of the Building Regulations 2000 (as amended)**

7. Regulation 4(1)(a) of the Building Regulations 2000 requires building work to be carried out so that it complies with the applicable requirements contained in Schedule 1 to those regulations. The applicable requirement in this case relating to your proposal in question is paragraph L1(a)(i) of Schedule 1. This requires that “reasonable provision shall be made for the conservation of fuel and power in buildings by...limiting heat gains and losses...through thermal elements and other parts of the building fabric”. As your roof space is currently unheated, it is not a “thermal element” as defined in regulation 2(2A) of the Building Regulations 2000. However, the proposed conversion of the roof space, including provision for heating, means that the roof will become a thermal element, and so its construction will need to comply with the requirement in paragraph L1(a)(i) of Schedule 1.

8. Section 6(1) of the Building Act 1984 allows the Secretary of State to approve and issue any document for the purposes of providing practical guidance with respect to the provisions of building regulations. For this purpose, the Secretary of State adopts ‘Approved Documents’ (ADs), and the relevant one for Requirement L1(a)(i) in an existing dwelling is Approved Document L1B (ADL1B), “Conservation of fuel and power in existing dwellings”. The guidance in paragraph 50 and Table 4 of the April 2006 edition of ADL1B for such construction is that on completion of the work the roof structure should have a U-value of no greater than 0.20W/m<sup>2</sup>K. Paragraph

11 of ADL1B states that “U-values must be calculated using the methods and conventions set out in BR443, ‘Conventions for U-value calculations’”.

### **The applicant’s case**

9. You suggest that you will have to abort your plans to convert the loft space in your two-bedroom bungalow into a habitable room because of the Council’s rejection of your proposal to use multi-foil insulation as a stand-alone product. You believe that the Council’s insistence that multi-foil insulation should be used in conjunction with rigid board insulation would reduce the headroom clearance to the proposed stair and room to levels below the “regulation limits”, and that only the use of multi-foil insulation would provide both the required headroom and roof structure U-value.

10. You state that, to maintain the external character, shape and style of your bungalow, small 540mm x 780mm Velux roof windows were included and accepted in your plans. Your style of bungalow cannot take a dormer, as this would project too high above the ridge line, and raising the whole roof would be impractical for such a modest conversion.

11. You mention that you have contacted various manufacturers who have expressed "astonishment" at the Council’s decision to reject your plans. You say that the rafter roof area to be covered by multi-foil insulation is only 9m<sup>2</sup> each side and that your plans were rejected for no other reason than the planned use of this insulation. You consider the Council's position to be inflexible and in contrast with other local authorities.

12. In further correspondence, you have reiterated your concerns about the Council’s decision and raised questions about the validity of research into the thermal performance of multi-foil insulation carried out by BRE Scotland in 2004/5 and most recently by Professor Philip Eames of Loughborough University. You also ask why there has been no reference to tests by the Centre for Infrastructure Management (CIM) at Sheffield Hallam University comparing the thermal performance of multi-foil with glass wool insulation. Lastly, you have also suggested that the Council’s rejection of your proposal is a breach of the right to respect for private and family life and home, set out in Article 8 of the European Convention on Human Rights (ECHR).

### **The Council’s case**

13. The Council states that your full plans application was rejected on the grounds of lack of information and non-compliance with Requirement L1(a)(i) of Schedule 1 to the Building Regulations.

14. The Council notes that, from a visual inspection of the exterior, the ridge line of your property is between 1 and 2m in length, which would mean that the headroom within the roof space would be very restricted. It appears to the Council that other properties of similar construction on the same road with a loft conversion have had to provide a dormer to gain sufficient usable space.

15. The Council therefore acknowledges that, in order to maximise the usable space within the existing roof void without adding a dormer, you have proposed the use of YBS multi-foil insulation to achieve the roof structure U-value of no more than

0.20W/m<sup>2</sup>K given as guidance in ADL1B for the purposes of achieving compliance with Requirement L1(a)(i).

16. The Council contends that although YBS multi-foil insulation has a Local Authority Building Control (LABC) system approval this does not mean that its use as an insulating product will ensure that the roof structure achieves the U-value required to meet the guidance in ADL1B. In coming to this conclusion the Council has referred to guidance offered by the following documents:-

- Communities and Local Government Circular 06/2007
- Letter dated 7/12/07 from the Department for Communities and Local Government following the Judicial Review of November 2007
- LABC technical guidance note April 2008
- Part L of the Building Regulations, proposed new editions of the Approved Documents L: Consultation [June 2008].

17. The Council believes that methods for measuring the thermal performance of materials and products should be British Standard tests based on Standardised European Norms or tests to a European Technical Approval (ETA) standard. The values for the thermal performance of insulating products provided by these tests enable the accurate assessment of conformity with the guidance given in Approved Documents L when use of the products is proposed. The Council asserts that comparative testing used by many multi-foil manufacturers to indicate the performance of their product is not covered by any national or European standard, and consequently the results obtained cannot be used to accurately assess conformity with the guidance in the Approved Documents L.

18. The Council concluded that, as the thermal performance of YBS SuperQuilt multi-foil insulation had not been assessed using a test method based on Standardised European Norms or tests to a ETA standard, it was unable to determine whether or not the product's use as proposed would show compliance with Requirement L1(a)(i).

### **The Secretary of State's consideration**

19. The Secretary of State has given careful consideration to the particular circumstances of this case and the arguments presented by both parties. He considers that the question referred to him for determination is whether the proposed roof construction on the plans for the loft conversion, incorporating the use of multi-foil insulation, demonstrates compliance with Requirement L1(a)(i) of Schedule 1 to the Building Regulations. As noted above, the guidance in Approved Document L1B for such construction is that the U-value should be no greater than 0.20W/m<sup>2</sup>K.

20. Before considering the question of whether your proposed roof construction complies with building regulations, the Secretary of State will respond to three specific issues you have raised. The first is your concern that unless you can have a roof construction incorporating your proposal for multi-foil insulation of 25mm thickness, you would not be able to proceed with your conversion, as all other solutions are impractical and/or too expensive for your home. You consider that your scheme is the best possible balance between the need to comply with building regulations and the need for the scheme to be affordable and realistic.

21. The Secretary of State understands your concern. However, under section 16(10)(a) of the Building Act, his duty is to determine whether your proposal is in conformity with building regulations, not whether it is reasonable in the circumstances of your case.

22. The second preliminary issue is your view that the Council's position contrasts with that of other building control bodies (BCBs). The Secretary of State wishes to make clear that legally it is the function of individual BCBs to determine whether building work complies with building regulations, and in particular in this case with the energy efficiency requirements, including Requirement L1(a)(i). Consequently, BCBs are free to decide for themselves whether or not to accept that construction details put to them comply with the regulations, and whether claims about the thermal performance of products are correct. This means that it is possible, and within the legislation, that different BCBs will make different assessments and decisions about similar circumstances.

23. The third preliminary issue is your view that the Council's rejection of your proposal is a breach of your rights under Article 8 of the ECHR. As noted in paragraphs 4 and 21 the Secretary of State's role is limited to determining whether or not your proposal is in conformity with building regulations. This does not include deciding whether the Council acted in breach of its obligations under the Human Rights Act 1998. However, even if Article 8 of the ECHR were to be engaged the Council is bound to act in a lawful and proportionate manner and in the view of the Secretary of State the requirements of the building control system would meet that test.

24. Returning to the determination, as noted above paragraph 11 of the April 2006 edition of ADL1B states that "U-values must be calculated using the methods and conventions set out in BR443..." Paragraph 3.10.2 of BR443 sets out the standard tests to be used for the purposes of determining the U-values of multi-foil products, i.e. those based on Standardised European Norms or tests which form part of a relevant agreed ETA.

25. Please note that the requirement to calculate U-values in accordance with BR443 only applies to those wishing to follow the guidance in ADL1B. It is open to any person proposing to carry out building work to seek to persuade the relevant BCB that an alternative to the guidance shown in an Approved Document will comply with building regulations.

26. The Secretary of State is aware that there is a dispute over the appropriate test method for measuring the thermal performance of multi-foil insulation products and that some multi-foil insulation manufacturers consider that the most appropriate method is comparative 'in situ' testing. In a case brought by a multi-foil manufacturer challenging the failure of the UK to notify paragraph 3.10.2 of BR443 to the European Commission as required by an EC Directive, the paragraph became unenforceable pending notification to the Commission. The Department subsequently notified the paragraph to the Commission and at the same time carried out full consultation on whether this paragraph was appropriate.

27. Following that process, paragraph 3.10.2 has been reinstated and the Secretary of State has concluded that currently for multi-foil insulation, results from tests based on Standardised European Norms or tests which form part of a relevant agreed ETA should continue to form the only results which carry with them a presumption of validity under the Building Act. This was explained in circular 06/2009 dated 18 June 2009, a copy of which is enclosed with this letter.

28. The Secretary of State notes that neither you nor the Council have provided any information obtained from tests based on Standardised European Norms or tests which form part of a relevant agreed ETA in relation to the thermal performance of the multi-foil insulation you propose to use. However, the Department has both commissioned and contributed to research into the thermal performance of multi-foil insulation in recent years. The following paragraphs explain how the Secretary of State has used information from that research in his determination, and should help to answer the questions you have raised about the research.

29. Initial research, part funded by this Department's predecessor, was the subject of a report published in 2005 by BRE Scotland<sup>1</sup>. BRE noted that widely differing values had been given for the thermal performance of multi-foil insulation. For example, a TRADA test commissioned by a multi-foil manufacturer had indicated that the thermal performance of multi-foil was equivalent to 200mm of mineral (glass) wool insulation. This was a comparative test that contrasted two insulation systems, but did not provide any actual U-values and was not carried out in accordance with any agreed standard. In contrast, a laboratory "hot-box" test carried out for another manufacturer by the National Physical Laboratory (NPL) to the British, European and international standard BS EN ISO 8990 had indicated that the thermal performance of multi-foil was only about one-third of that given by TRADA's comparative test. (Comparative tests carried out later by CIM at Sheffield Hallam University on another manufacturer's multi-foil product indicated that its thermal performance in an enclosure replicating a roof space was equivalent to 270mm of glass wool insulation.)

30. To try to resolve the discrepancy between the results obtained from comparative tests and hot box tests, BRE carried out direct measurements of the in-situ U-value of walls, roofs and floors in completed buildings incorporating multi-foil insulation. The measurements were made in accordance with the international standard ISO 9869. BRE concluded that the U-values measured in this way were broadly similar to the results obtained by NPL using the laboratory hot box method.

31. More recent theoretical research by Professor Philip Eames of Loughborough University<sup>2</sup>, carried out for the Department after your full plans application was made, lends support to BRE's conclusions. Professor Eames calculated the U-value of a typical roof construction insulated with multi-foil and compared it with the U-value of the same roof insulated with mineral wool – in effect modelling the comparative tests carried out by TRADA and CIM. To do the calculations, Professor Eames assumed values for reflectivity (which is independent of thickness) and thermal resistance (which is dependent on thickness) corresponding to bright aluminium foil and foam layers respectively. To determine the best possible system performance that could be achieved using the best materials currently available, he repeated the calculations

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<sup>1</sup> [www.planningportal.gov.uk/uploads/br/multi-foil-insulation\\_july2005.pdf](http://www.planningportal.gov.uk/uploads/br/multi-foil-insulation_july2005.pdf)

<sup>2</sup> [www.communities.gov.uk/publications/planningandbuilding/multifoil](http://www.communities.gov.uk/publications/planningandbuilding/multifoil)

for multi-foil comprising polished silver foil and aerogel layers. The predicted U-values were:

- 200mm mineral wool (no reflective backing): 0.17 to 0.19 W/m<sup>2</sup>K
- 100mm mineral wool (no reflective backing): 0.33 to 0.34 W/m<sup>2</sup>K
- Multi-foil – typical (aluminium foil and foam): 0.35 to 0.50 W/m<sup>2</sup>K
- Multi-foil – best possible (silver foil and aerogel): 0.23 to 0.27 W/m<sup>2</sup>K

Professor Eames therefore calculated that the predicted thermal performance of typical multi-foil material is worse than that of 100mm of mineral wool insulation; and even if made from silver foil and aerogel, it is worse than that of 200mm of mineral wool insulation.

32. Professor Eames noted that unwanted air movement through mineral wool could reduce its thermal performance. When carrying out practical tests to compare the thermal performance of multi-foil with mineral wool insulation, the potential for unwanted air movement through the mineral wool insulation should be minimised.

33. You have argued that to use Professor Eames's research would be to use new information retrospectively, and so against natural justice, presumably on the basis that had the information been known at the time the decision making process may have been different. However, it must be emphasised that the Secretary of State's duty is not to decide whether the Council's decision was correct. His duty is to decide whether the proposal was in conformity with building regulations at the time. This research is only being used to help to decide that question, not to retrospectively consider whether the Council's decision was correct.

34. In the absence of any measurements (apart from those mentioned in paragraph 36 below) of the thermal performance of 25mm thick YBS multi-foil insulation obtained from tests based on Standardised European Norms or tests which form part of a relevant agreed ETA, the Secretary of State has analysed all of these research findings, and concludes from that analysis that your proposed use of multi-foil insulation will not achieve a U-value of 0.20W/m<sup>2</sup>K.

35. Your view that the proposed use of YBS multi-foil insulation in the roof construction of your loft conversion would comply with building regulations is based on figures for the thermal performance of the product derived from comparative tests that have not been carried out in accordance with a Standardised European Norm. The Department has made clear on a number of occasions that it does not consider these tests produce accurate results.

36. Although in the light of your objections he has not used the information when making his decision, the Secretary of State notes that the current data sheet for YBS SuperQuilt multi-foil insulation on the YBS website<sup>3</sup> advises that, when using only a single layer of SuperQuilt as you propose, extra insulation is needed to give a roof construction of a similar type to your roof a U-value of no more than 0.20W/m<sup>2</sup>K. This is based on a thermal performance value for SuperQuilt derived from recent hot-box tests, i.e. a test based on a Standardised European Norm.

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<sup>3</sup> [http://www.ybsinsulation.com/products\\_roof\\_superquilt.htm](http://www.ybsinsulation.com/products_roof_superquilt.htm)

## **The determination**

37. Under section 7(1) of the Building Act, compliance with the guidance in an Approved Document is not definitive, and only tends to show conformity with building regulations. Nonetheless, the Secretary of State considers that the conservation of fuel and power in buildings is an essential element in reducing the demand on scarce resources, improving fuel security and reducing the effects of climate change, and that it would not in this case be appropriate to accept a lower standard of insulation than that set out in the guidance in ADL1B.

38. Consequently, following the conclusion reached in paragraph 34 above, the Secretary of State hereby determines that the plans of your proposed building work, relating to the use of multi-foil insulation in the proposed roof construction, are not in conformity with Requirement L1(a)(i) in Part L (Conservation of fuel and power) of Schedule 1 to the Building Regulations 2000 (as amended).

39. You should note that the Secretary of State has no further jurisdiction in this case and that any matters that follow should be taken up with the building control body.