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EXPLANATORY REPORT ON EXTERNAL CLADDING

for

SHEFFIELD CITY COUNCIL

18 August 2020

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1 INTRODUCTION

1.1 I am Bartholomew Joseph Kavanagh, MA (Arch) LLM RIBA FCIArb MAE, Chartered Architect, Barrister (non-practising) and Associate Director of Probyn Miers Limited.

1.2 I am an architect with over 35 years' experience in the construction industry. During this time, I have been involved with the design and construction of a wide variety of building types. I have also provided expert advice and evidence on issues relating to design and construction defects, fire safety and professional negligence.

1.3 A copy of my curriculum vitae is attached at **Appendix A**.

1.4 I am instructed by Geldards, solicitors for Sheffield City Council, ("**SCC**"), as an independent expert architect to provide a report regarding external cladding consisting of Aluminium Composite Material ("**ACM**") panels in combination with thermal insulation, and the use of such cladding on high-rise residential buildings prior to 2017. I am specifically asked to consider:

i. whether this type of cladding would have breached Building Regulations at the time of its design, and

ii. if so, what liabilities may exist in relation to its design.

1.5 This report takes into account the particular instructions and requirements of our clients Geldards and Sheffield City Council. It is not intended for, and should not be relied upon, either in part on in its entirety, by any third party. Probyn Miers undertakes no responsibility to any third party for such reliance.

1.6 The Report begins by providing an overview of the relevant section of the Building Regulations, considers the design obligations typically imposed on Architects before going on to consider the specific questions posed.

2 REGULATORY CONTEXT

2.1 Part B of Schedule 1 of the Building Regulations 2000 (as amended) sets out a series of functional requirements regarding fire safety under the following five subsections:

B1 – means of warning and escape;
B2 – internal fire spread (linings);
B3 – internal fire spread (structure);

B4 – external fire spread;
B5 – access and facilities for the fire service.

2.2 Guidance on how these functional requirements might be achieved is provided by a series of Approved Documents. Approved Document B volume 2, ("**AD B**"), applies to the functional requirements of Part B of Schedule 1 as they apply to residential developments.

2.3 Between 2000 and 2019, AD B was updated through a series of editions. For the purposes of this report I have referred to AD B Volume 2, 2006 edition incorporating the 2007 amendments, ("**AD B - 2007**"). The requirements of AD B regarding external cladding remained essentially the same between 2007 and 2017.

2.4 Further amendments to AD B were made in November and December 2018, and in 2019. The requirements of these later amendments are not applicable retrospectively and I do not consider them further in this report.

2.5 Buildings are required to comply with all subsections of Part B, but the requirements for external cladding are covered in part B4.

AD B 2007 - Part B4 External fire spread

The Functional Requirement

2.6 The functional requirement is stated as:

"External fire spread

B4. (1) The external walls of the building shall adequately resist the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building.

(2) The roof of the building shall adequately resist the spread of fire over the roof and from one building to another, having regard to the use and position of the building."

AD B 2007 Guidance

2.7 AD B 2007 provides guidance on complying with the requirements of Part B4 in Sections 12, 13 and 14.

Buildings over 18m high

2.8 Section 12 of AD B considers the construction of external walls. Paragraph 12.3 requires that;

> *"The external walls of the building should have the appropriate fire resistance given in Appendix A, Table A1, unless they form an unprotected area under the provisions of Section 13".*

2.9 Table A1 item 5 requires external walls with any part 1000mm or more from the relevant boundary to have a minimum insulation value of 15 minutes. Table A2 specifies minimum periods of fire resistance (integrity) for elements of structure according to the height (in metres) of the top floor above ground. However, these requirements apply to the walls as a whole, rather than to individual components within the wall assembly.

2.10 Paragraph 12.5 requires that;

> *"The external envelope of a building should not provide a medium for fire spread if it is likely to be a risk to health or safety. The use of combustible materials in the cladding system and extensive cavities may present such a risk in tall buildings."*
>
> It then proceeds to set out how that risk can be mitigated;
>
> *"External walls should either meet the guidance given in paragraphs 12.6 to 12.9 or meet the performance criteria in the BRE Report Fire performance of external insulation for walls of multi storey buildings (BR 135) for cladding systems using full scale test data from BS 8414-1:2002 or BS 8414-2:2005."*

2.11 Meeting the guidance given in paragraphs 12.6 to 12.9 of AD B 2007 is commonly referred to as the *'linear route'* to compliance. Meeting the performance criteria of BR 135 is commonly referred to as the *'performance-based route'* to compliance; this is an alternative to meeting the guidance given in paragraphs 12.6 to 12.9 not an additional requirement. AD B also offers a third route to compliance, which relies on a fire engineering assessment of the construction. This is normally used for specialised buildings and is not considered further here.

2.12 Paragraph 12.6 deals with external surfaces, stating that *"The external surfaces of walls should meet the provisions in Diagram 40."* The relevant part of Diagram 40 is reproduced at **figure 1** below. As the Property is more than 1 metre away from any neighbouring buildings, the diagram on the right is applicable.

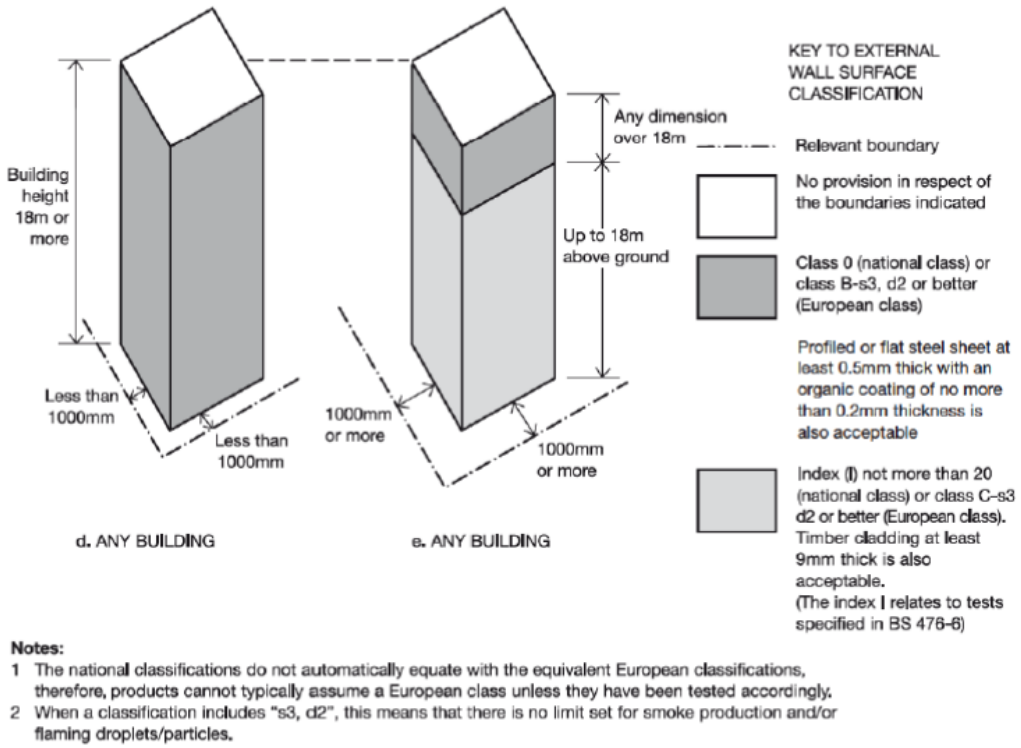

Figure 1 AD B Diagram 40

2.13 Diagram 40 stipulates that for any building more than 18m in height, that part of the external surface which is up to 18m above ground requires a surface classification of index (I) not more than 20 (national class) or class C-s3, d2 (European class) – index (I) relates to tests specified in BS 476-6. Timber cladding at least 9mm thick is also acceptable.

2.14 The European classification system ranges from class A to F. In essence, class A1 means 'non- combustible', class A2 means 'limited combustibility' and classes B to F mean the product is progressively 'combustible'. On buildings that were not above 18m in height, therefore, AD B 2007 permitted the use of external surface materials which were neither non-combustible nor of limited combustibility.

2.15 However, any part of the external walls that were more than 18m above ground required a surface classification of Class 0 (national class) or class B-s3, d2 or better (European class). Class 0 is essentially a measure of a product's surface spread of flame.

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Insulation materials / products

2.16 AD B paragraph 12.7 deals with insulation materials, stating;

> *"In a building with a storey 18m or more above ground level any insulation product, filler material (not including gaskets, sealants and similar) etc. used in the external wall construction should be of limited combustibility (see Appendix A)."*

2.17 Appendix A addresses the performance of materials, products and structures in relation to fire. Materials of limited combustibility are defined in Table A7, which in turn refers to BS476-11:1982 (national class) and BS EN 13501-1:2007 (European class). The latter classifies limited combustibility as A2-s3, d2 or better – but some Agrement Certificates make no reference to the European classification – only to Class 0.

3 WAS THE CLADDING IN BREACH OF REGULATIONS

Requirements of AD B 2007

3.1 Paragraphs 12.5 and 12.7 set out the requirements for external wall construction.

Paragraph 12.5 states:

> *"… External walls should **either** meet the guidance given in paragraphs 12.6 to 12.9 **or** meet the criteria given in the BRE Report … (BR135) for cladding systems using full scale test data from BS 8414-1:2002 or BS8414-2:2005."*
> (Emphasis added)

Paragraph 12.7 states:

> *"In a building with a storey 18m or more above ground level any insulation product, filler material (not including gaskets, sealants and similar) etc used in the external wall construction should be of **limited combustibility** (see Appendix A)."* *(Emphasis added)*

3.2 Appendix A, at item 8, defines materials of limited combustibility as those with a fire rating of Class A2-s3, d2 or better.

Aluminium Composite Material

3.3 ACM consists of two sheets of aluminium with a non-metallic core between them. This core may be manufactured from polyethylene, which may be modified to improve its fire resistance or from mineral material which is non-combustible. Whichever core material is incorporated into the ACM, the aluminium surface will achieve a Class 0 rating. This rating indicates that the material will not support the spread of flame.

3.4 Class 0 rating also satisfies the criteria set out in Diagram 40 of AD B 2007.

Kingspan K15 insulation

3.5 Kingspan K15 insulation consists of rigid phenolic foam, and is classified as C-s1, d0 in accordance with BS EN 13501-1: 2007. As noted above, Table A7 of AD B defines limited combustibility as a classification of A2-s3, d2 or better. Kingspan K15, therefore, is not a material of limited combustibility.

3.6 The use of Kingspan K15 insulation in the external cladding of buildings with a storey 18m or more above ground level will be dependent, therefore, on the successful outcome of full-scale tests in accordance with BS 8414-1 or BS 8414-2.

Mineral wool insulation

3.7 Mineral wool is manufactured from stone and mineral wool insulation products, such as those manufactured by Rockwool or Knauf, are non-combustible. They are suitable, therefore, for use in the construction of the external walls of buildings with a storey more than 18m above ground level.

Compliance with the regulations at the time of the design

3.8 According to the guidance given in paragraphs 12.6 to 12.9 of AD B, including Diagram 40, the use of insulation which is of limited combustibility and cladding panels which have a class 0 rating will satisfy the requirements of Part 4 of the Building regulations.

3.9 The use of ACM, which has a class 0 rating with Kingspan K15 would not accord with the guidance given in paragraphs 12.6 to 12.9 of AD B, including that set out in Diagram 40 because Kingspan K15 is not of limited combustibility.

3.10 The use of Alucobond, which has a class 0 rating with Rockwool would accord with the guidance given in paragraphs 12.6 to 12.9 of AD B, including that set out in Diagram 40 because the Rockwool is non-combustible.

Subsequent testing and developments

3.11 Following the fire at Grenfell Tower in June 2017, the Department of Communities and Local Government, ("**DCLG**"), ordered a series of screening tests to be carried out on cladding materials.

3.12 I have seen a copy of the results of these tests, which were carried out by Exova Warrington. These indicate that ACM with a core of unmodified polyethylene similar to the type used on Hanover Tower, falls into category Cat 3. This screening test applied only to the ACM panel and did not provide information about the full construction of the external wall.

3.13 Subsequently, the Ministry for Housing, Communities and Local Government, ("**MHCLG**"), carried out several full-scale tests, in accordance with BS 8414, of various, cladding build-ups to assess which, if any, would meet the criteria set out in BR 135, (the alternative method of demonstrating compliance with the Building Regulations set out in Paragraph 12.5 of AD B).

3.14 MHCLG Advice Note 11, ("**AN 11**"), provided the results of these tests. Paragraph 23 of provides a summary of test results for buildings in England and is reproduced at **figure 1** below. It indicates that external wall constructions incorporating ACM panels with unmodified polyethylene core (Cat 3 as used at Hanover Tower) failed tests even when stone wool insulation, which is non-combustible, was used, (Test 2).

Test results for buildings in England

Aluminium Composite Material (ACM) with...	Insulation		
	PIR Foam	**Phenolic Foam**	**Stone Wool**
Unmodified polyethylene filler (Cat. 3 in screening tests)	**Test 1 failed** 81 Buildings Report and Advice	N/A	**Test 2 failed** 107 Buildings Report and Advice
Fire retardant polyethylene filler (Cat. 2 in screening tests)	**Test 3 failed** 8 Buildings Report and Advice	**Test 7 failed** 21 Buildings Report and Advice	**Test 4 passed** 12 Buildings Report and Advice
Limited combustibility filler (Cat. 1 in screening tests)	**Test 5 passed** 0 Buildings Report and Advice	N/A	**Test 6 passed** 0 Buildings Report and Advice

Figure 1 – Extract from MHCLG Advice Note 11 – Test results.

3.15 I consider that these test results demonstrate that:

1. It is highly unlikely that an external wall construction consisting of ACM and Kingspan K15 insulation would meet the criteria set out in BR 135 when subjected to a full-scale test in accordance with BS 8414.

2. Although ACM panels have a classification of Class 0, thereby meeting the requirements of paragraph 12.6 and Diagram 40, ACM with an unmodified polyethylene core fails to meet the criteria set out in BR 135 when subjected to full scale tests. This is so even when tested with, non-combustible, mineral wool insulation.

3. Whilst a cladding system comprising ACM and mineral wool insulation would accord with the guidance given in paragraph 12.6 of AD B, including that set out in Diagram 40, its failure to meet the criteria set out in BR 135 when subjected to a full scale test in accordance with BS 8414 results in a failure to satisfy the requirements of Part B4 of the Building Regulations.

3.16 In my opinion, therefore, a cladding system using ACM with either Kingspan K15 or Mineral wool insulation would not satisfy the functional requirements of Part B4 of the Building Regulations. This is despite the fact that a cladding system using ACM with mineral wool insulation satisfies the requirements of AD B 2007.

4 WAS THE SPECIFICATION OF THE CLADDING NEGLIGENT

Obligations of an Architect

4.1 The obligations of architects to their clients are set out in the terms of the architect's appointment. The Royal Institute of British Architects, ("**RIBA**"), produces standard forms of appointment. For example, Clause A2.3 of the standard form of appointment current in 2007 states:

> *"The Architect advises the Client about the application of statutory requirements to the Services and the information which must be submitted for **consents by statutory authorities**, and of any related obligations of the Client. In any conflict between the statutory requirements and this Agreement the former take precedence."* (**Emphasis** added)

4.2 Thus, architects are required to provide their clients with designs that satisfy the functional requirements of the Building Regulations. Typically, they will aim to do this by following the guidance in the relevant Approved Document.

4.3 In fulfilling their obligations architects do not undertake to achieve a perfect outcome. Rather the standard to be achieved is that of a competent member of the architectural profession acting with reasonable skill and care.

4.4 In my view, designers other than architects who provide design services related to construction, such as specialist consultants and specialist subcontractors, undertake similar obligations.

Assessment

4.5 ACM panels generally have a class 0 fire classification, which satisfies the letter of the requirements set out in Diagram 40 of ADB 2007. However, the use of Kingspan K15 insulation in buildings with a storey more than 18m above ground level would require a full-scale test in accordance with BS 8414-1 or BS 8414-2. In my view a competent architect acting with reasonable skill and care and having regard to the relevant paragraphs of ADB 2007, would ask for evidence of successful full-scale testing of any cladding system that combines these materials.

4.6 As noted above it is highly unlikely that such evidence exists. I infer from this that the designers would have been unable to satisfy themselves that the combination of Alucobond and Kingspan K15 would meet the requirements of AD B

4.7 In my opinion, therefore an architect designing cladding consisting of ACM and Kingspan K15 insulation for use on a building above 18m in height would have fallen below the standard to be expected of a competent architect acting with reasonable skill and care.

4.8 Conversely, an architect designing cladding consisting of ACM and Rockwool insulation for use on a building above 18m in height would have met the standard to be expected of a competent architect acting with reasonable skill and care

4.9 Following the fire at Grenfell Tower, the Government has made it clear that it considers that the provisions of paragraph 12.7 were intended to apply to the core material of ACM. If this is correct, then the use of ACM with an unmodified polyethylene core did not accord with the recommendations of paragraph 12.7.

4.10 In my view, however, prior to the fire at Grenfell Tower a large proportion of the architectural profession would not have considered the core material of ACM to fall within the category of materials described in paragraph 12.7. This view is supported in the Expert Report of Dr Barbara Lane to the Grenfell Inquiry.

4.11 In my opinion, therefore, it is likely that a designer proposing the use of a system comprising ACM and mineral wool may not be held to have fallen below the standard to be expected of a reasonable architect acting with reasonable skill and care.

5 APPENDIX A – CV of BART KAVANAGH

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Mr BART KAVANAGH

MA (Arch), LLM, RIBA, FCIArb, MAE.

Qualifications, training, accreditation

Master of Laws ("LLM")	City Law School	2014;
Diploma in International Arbitration	Chartered Institute of Arbitrators	2013;
Bar Vocational Course ("BVC")	City Law School	2010;
Graduate Diploma in Law ("GDL")	BPP Law School	2009;
Certificate of Mediation Skills for ADR	Regent's College London	2009;
RIBA Professional Practice - Part III	University of the South Bank	1995;
MA (Arch)	Kingston University	1994;
RIBA Part I Examination	Kingston Polytechnic	1975.

Past and present positions

Present:

Probyn Miers, Chartered Architects.	Associate Director	(Sep 2012 to present)

Past:

Morgan Sindall Contractors	Design Manager	(Feb 2011 - Aug 2012)
3D Reid Architects	Architect	(Sep 2010 – Jan 2011)
Arup	Architect	(Jun 2010 – Sep 2010)
Kohn Pedersen Fox Architects	Senior Architect	(Jul 2007 – Nov 2008)
Pascall + Watson Architects	Senior Architect	(May 2005 – Jul 2007)
KF Associates Architects	Partner	(Sep 1998 – Apr 2005)
Gensler Associates Architects	Associate	(Jan 1996 – Aug 1998)
GMW Architects	Associate	(Sep 1978 – Apr 1993)

Principle professional specialisms

I have extensive experience in the design and management of complex commercial, aviation and retail projects and the design and management of new-build and refurbishment projects for high quality residential accommodation; A number of these buildings have involved masonry construction and basement waterproofing. My experience includes design, design management, the production of construction information and the coordination of multidisciplinary consultant teams on both traditional and design and build forms of procurement.

I have administered construction contracts on new buildings, refurbishments and residential developments up to approximately £100m (current value).

Membership of professional organisations

I have been registered with the Architects' Registration Board and a member of the Royal Institute of Architects since 1995; was called to the Bar at Middle Temple in 2011; and was elected as a Fellow of the Chartered Institute of Arbitrators in 2014. I am also a member of the Society of Construction Law and the Adjudication Society.

Published works

I am the Author of the book, *Avoiding and Resolving Disputes; a Short Guide for Architects*, published by RIBA Publishing

In addition I have had a number of articles published in Perspective, the quarterly newsletter of Probyn Miers, which I also edit. I have also had articles published in JCT News (jointly with Mr Christopher Miers) and in Construction Law Journal.

Training, qualifications and accreditation as an expert witness

I became a Full Practising Member of the Academy of Experts in 2013. Whilst undertaking the BVC, I studied the requirements of the Civil Procedure Rules and Practice Directions as they apply to Expert Witnesses. In addition, my LLM dissertation was entitled *'A Critical Analysis of the Use of Expert Evidence as it Applies to Construction Cases'*. I have received further informal training from experienced Expert Witness colleagues at Probyn Miers.

I regularly attend teaching and update conferences and seminars on all aspects of architectural and construction law practice. I also regularly attend update events organised by the Academy of Experts; most recently (01 July 2020) a presentation on the management and use of joint expert meetings and statements given by Mr Jeremy Nicholson QC an experienced advocate and tribunal member.