

## **MODULE 2 OPENING SUBMISSIONS ON BEHALF OF BINDMAN, HICKMAN & ROSE AND HODGE JONES ALLEN**

### **1. Preface**

1.1 An element of the construction products industry within the sector responsible for cladding, insulation and cavity barriers is clearly untroubled by the safety of their products in fire. The manufacturers cannot claim ignorance given their state of knowledge and the deliberate nature of their actions. This calls for a radical re-think of the efficacy of current regulations and standards governing fire safety and the way products which are to be used in buildings may be marketed. The role of seemingly independent certifiers and test houses in upholding such standards and regulations inevitably also falls to be questioned. The role of culture and competence within both manufacturers and independent test/certification bodies cannot be ignored, since it seems to have dominated the story which leads to the products being used at Grenfell Tower. The failings/susceptibility to abuse of the test regimes described below are of the most pressing importance, since they underlie the current Government *Building Safety Programme* governing the identification and removal of dangerous cladding but also the preservation of that which is prescribed by the programme as safe. That prescription includes FR polyethylene cored cladding (albeit to be used only in conjunction with mineral wool),<sup>1</sup> which may not be safe, even if used with mineral wool, for reasons explained below.

1.2 Each of the primary products comprising the over-cladding system at Grenfell, namely Celotex RS5000 and Kingspan K15 insulation, Arconic's Reynobond PE 55 Polyethylene (PE) cladding panels and Siderise Lamatherm cavity barriers were not in fact fit for use on a high-rise building, despite marketing literature suggesting that they were. None of Kingspan's, Celotex's and Arconic's products had been the subject of a genuinely executed test demonstrating them suitable for use above 18m within any cladding system. As for Siderise, its Lamatherm cavity barriers had not, at the time of installation in Grenfell, been tested at all within a rainscreen cladding system, and yet its marketing suggested, and continues to suggest, that its cavity barriers are suitable for use in rainscreen cladding. As at the time of the Grenfell fire its product had apparently tested successfully in a system specific BS8414-1 test in the UAE, but prior to that its only successful BS8414 test was Celotex's 2014 test<sup>2</sup> which we now

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<sup>1</sup> Par 4.7.2 MHCLG Advice for Building Owners of Multi-storey Multi-occupied Residential Buildings January 2020:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/869532/Building\\_safety\\_advice\\_for\\_building\\_owners\\_including\\_fire\\_doors\\_January\\_2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/869532/Building_safety_advice_for_building_owners_including_fire_doors_January_2020.pdf)

<sup>2</sup> Swales par 61{[SIL00000306\\_0016](#)}

know was illegitimately carried out as explained below. It has since been subject to various tests BS8414 tests in both the UK and UAE.<sup>3</sup>

1.3 Neither the cladding panels nor insulation were of Limited Combustibility as required if the linear route to compliance was being followed<sup>4</sup> and none had the classifications they were advertised as having. The BBA certificate for Kingspan and Arconic's products were flawed in various respects as explained below, but in particular because in both cases the certificates indicated that the products were National Class 0 when in fact they were not. It was all too well understood by Kingspan, Celotex and Reynobond and reflected in their marketing, that Class 0 was more relevant in the UK than the Euro-classifications.

1.4 This widespread lack of probity amongst manufacturers was compounded by the complicity and/or incompetence of the testing houses and independent certifiers who are tasked with protecting the public and demonstrating the potential of a product to comply, but failed to do so in the case of Kingspan K15, Celotex RS5000 and Reynobond PE 55 ("RB55"). Siderise's Lamatherm cavity barriers are certified non-combustible under BS476 Part 20, but open state cavity barriers cannot be effectively so tested and are subject to other guidance which does not test the barriers in a condition which equates to use within rainscreen. The BRE test reports for both types of insulation did not reflect the actual test and the BBA certificates for both K15 and RB55 were materially inaccurate and misleading in a variety of respects.

1.5 The behaviour of the manufacturers also appears to have inappropriately influenced institutions which give guidance to the industry such as the National House Building Council, (which also itself acts as an Approved Inspector ("AI") for the purposes of the Building Regulations) ("NHBC") and also the Building Control Alliance ("BCA"), "...representing the building control sector and producing guidance on the application and interpretation of the building regulations..."<sup>5</sup>. This interference by manufacturers with institutions who published advice which was relied on by all local authority building control bodies and AI's led very directly to the products in question being used at Grenfell, but it had yet wider and sinister implications. The interference by Kingspan with NHBC and BCA and certainly duping of NHBC by Celotex caused those bodies to introduce the concept of compliance with Building Regulations by means of a desktop study (a concept not included in either the Regulations or ADB) and to advocate the use of a fire safety engineering approach to compliance (beyond the

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<sup>3</sup> Swales 88{S11.00000306\_0023}

<sup>4</sup> B4 12.5-12.9 ADB {CLG00000224\_0095} and also implicitly by the Building Regulations Functional Requirement B4(1)

<sup>5</sup> Menzies {BMER0000004\_0039} par 139 footnote 3

ambit proposed by ADB: see par 3.2.1 below) and latterly to abandon even the need for a desktop, have allowed the manufacturers to (in effect) re-write ADB themselves in such a way as to provide two routes for complete circumvention of the Regulations/ADB. We see this very clearly in the strategies of both Kingspan and Celotex (paras 5.2.4 and 6.1.1 below).

## **2 Overview**

2.1 Kingspan and Celotex carried out BS8414 tests, and Arconic carried out tests under the European EN13501-1 Standard, in a manner which they and those carrying out the tests knew/should have known, to be improper by either concealing components designed to facilitate a pass and/or using materials which were not as described in the test reports. Arconic seemingly rigged certain EN13501-1 tests at the French test house, CTSB, by an artificial construction of the rig. In each case the test results were obtained in order to put the manufacturer in a position to market the products used at GT as fit for use over 18m despite knowing they were not and despite each manufacturer fully appreciating the flammable nature of its product. Less is known about the circumstances of the CTSB tests under EN 13501-1, but as far as the UK bodies are concerned, both BRE as test house at which the BS8414 tests were carried out, and BBA as conformity assessor/certifying body, failed in their duties to ensure accuracy and impartiality within their organisations as required by the relevant International Standards implemented in the UK by British Standards<sup>6</sup>. These matters are to be more fully explored in Module 6.

### **2.2 Kingspan sets the precedent that thermosetting insulation can be used in high rise**

In 2005, Kingspan carried out a BS8414-1 test involving K15 but using cavity barriers and cladding panels wholly unrepresentative of any products typically used by the construction industry.<sup>7</sup> This created the precedent that a thermosetting foam insulation might be capable of passing a BS8414 test. Thermosetting foam insulations are Polyurethane (PUR), Polyisocyanurate (PIR) and Phenolic foam (PF). In crude summary, these are all plastic insulations. They are all organic and therefore combustible. None are of Limited Combustibility, as required by the Linear Route under ADB, which, insofar as any route to compliance was being followed, was that followed at Grenfell.

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<sup>6</sup> For test houses the relevant version is the 2005 version but not yet on Relativity. The 2017 version "General Requirements for the competence and testing of calibration laboratories" is at {BRE00005621} and for certifiers: "General Requirements for bodies operating product certification systems" 1998 {BSI00001732} and the subsequent edition "Conformity Assessment- Requirements for bodies certifying products, processes and services" 2012 {BRE00005567};

<sup>7</sup> {KIN00008925}

### 2.3 Celotex picks up the baton

Kingspan's K15 product is a Phenolic foam, which remained the only plastic foam insulation which had (seemingly) passed a BS8414 test until 2012, when Extratherm passed a BS8414-1 test (withdrawn after Grenfell) closely followed in 2014 by Celotex, which carried out an essentially copycat BS8414-2 test (inspired by Kingspan's 2005 BS8414-1 test) on its RS5000 product, a PIR foam. The K15 2005 test spawned a number of desktop studies, thereby allowing the product to be used on many buildings over 18m and furthering the impression that thermosetting insulations could safely be used above 18m.

### 2.4 Arconic

Arconic had in spring 2004 begun the process of applying for a BBA certificate, and in order to bolster that application, was desirous of obtaining a Euro-classification. In 2005, its RB55 riveted PE panel appeared to have achieved a Euro-classification B-s2,d0 under the European test standard<sup>8</sup> at the same time as the cassette version of the product obtained results showing Class F behaviour<sup>9</sup>. Arconic's Claude Wehrle would later (in 2015) suggest that the French fire test which gave both FR and PE the same classification should have been discontinued in about 2005<sup>10</sup>. There is real doubt as to the circumstances in which this test and a subsequent test in 2011<sup>11</sup> were carried out (see par 7.1.2 below) but, unabashed, Arconic has nevertheless relied on these tests to demonstrate that the PE product could have obtained a Class B had it been correctly fabricated. This is to overlook two vital points

- (1) that the (no doubt correctly fabricated) cassette panels which were subjected to the tests have consistently obtained an E since 2005 and indeed the riveted panels have not achieved better than C-s2,d0 since 2014; and
- (2) that the BBA certificate 08/4510 sent to the designers of Grenfell, on its face appears to apply to both the rivet and cassette system and this interpretation of it is supported by Dr Lane.<sup>12</sup> The BBA certificate was therefore misleading in that it indicated both the rivet and cassette panels had a B-s2,d0. BBA was assisted by Arconic in reaching this clearly wrong conclusion, as Arconic chose not to share its cassette Euro-classification tests with BBA. There are further fundamental flaws in the BBA certificate for RB 55 as explained at par 7.2 below.

<sup>8</sup> {ARC00000358}

<sup>9</sup> {ARC00000536}

<sup>10</sup> Manager of Arconic's Sales Technical Assistance Team to Marchez 19.6.15 "The NF P92 standard should have been discontinued over 10 years ago!" {MET00053158\_P05\_0014} Under NF P92 both products were classified M1 {MET00053158\_P03\_0121}

<sup>11</sup> Also resulted in a B-s1,d0 classification {ARC00000383}

<sup>12</sup> Par 013.1.3 {BLAS00000036\_0058} and par 19 {\_0078} and par 31[-0081]



## 2.5 Knowledge of flammability of products

Arconic, Kingspan and Celotex were aware of the flammability and unsuitability of their products for use at height. Kingspan and Arconic were aware from as early as 2005 hence in Kingspan's case having to manipulate the 2005 test to achieve a pass and in Arconic's case "arranging" the Euro-classification test such that the riveted system achieved a B even though in a test at the same time the cassette only achieved an E. Celotex was also aware, in 2013 before it embarked on its BS8414 tests of RS5000, that its product would burn and was unsuitable for use in high rise buildings<sup>13</sup>.

## 2.6 Marketing strategies: Manufacturers actively targeting specific projects, including Public Sector Projects

Each of Arconic, Kingspan and Celotex have at one time expressed dismay and surprise that their products were used at Grenfell. That is wholly disingenuous given the marketing strategies of each of these were aimed at concealing the potential flammability of their products and at circumventing the Building Regulations. Each targeted public sector work in the UK because it represented a large sector of the market. Arconic and Celotex targeted Grenfell specifically in Arconic's case by using its own UK sales representative Deborah French in conjunction with Arconic's distributor, Geoff Blades who was in touch with Studio E as early as 29.3.12<sup>14</sup>. Celotex/St Gobain had a list of "Must Win Projects" on which GT was number 1<sup>15</sup>.

## 3. The regulatory framework: product compliance

### 3.1 Compliance by manufacturers

Manufacturers wishing to sell products in the UK must comply with the Construction Products Regulations 2013 "CPR 2013" which in turn incorporates by reference EU Regulation No 305/2011 "the Construction Products Regulation 2011" which establishes harmonised conditions for the marketing of construction products. Essentially the 2011 Regulation defines a list of "Basic Requirements for Construction Works"<sup>16</sup> which include fire safety. Those *Basic Requirements* form the basis for harmonised standards<sup>17</sup> known as hEN (harmonised European Norms/standard) such as the standard for *Fire classification of construction products and*

<sup>13</sup> As at 1.11.13 {CEL00000716}

<sup>14</sup> {CEP00000043} and T41//74:25 – T41/75:24

<sup>15</sup> See internal email chain dated 17.11.14 {CEL00000555} and the list itself {CEL00000556}

<sup>16</sup> Article 3(1) and annex I

<sup>17</sup> Article 3(1) and 2(10)

*building elements* BS EN 13501-1:2007<sup>18</sup> “**BSEN13501-1**”. If a product is covered or partly covered by a harmonised standard or conforms to a European Technical Assessment which has been issued for it then the manufacturer must draw up a declaration of performance “**DoP**” for the product unless it is exempt (by virtue of being a bespoke product)<sup>19</sup>. By drawing up a DoP, the manufacturer becomes responsible for such conformity. Critically, by article 11(12) a manufacturer who becomes aware that one of their products is not in conformity with the DoP must immediately take the necessary corrective measures to bring the product into conformity. The CPR 2013 gives the 2011 Regulation the force of law in England & Wales: it is an offence<sup>20</sup> to supply a product covered by a hEN or a product which conforms to a European Technical Assessment without providing a DoP and CE marking<sup>21</sup> or to fail to bring a product into conformity having had reason to believe it is not<sup>22</sup>.

### 3.2 Product Compliance by the specifiers and contractors

3.2.1 The Building Act 1984, “**the Act**” provides for Building Regulations to be published governing health and safety and sustainability issues arising from the construction of buildings. Those Regulations provide that the work must comply with the Functional Requirements in Schedule 1 of the Regulations<sup>23</sup>. Practical guidance as to how Functional Requirements are to be achieved is in the form of Approved Documents (“**AD**”). The Act provides that compliance with AD is not an absolute defence to liability for non-compliance<sup>24</sup>.

#### 3.2.2 Routes to compliance

There are three routes to compliance proposed by ADB: (1) linear route; (2) satisfying the performance criteria of BR135 by data from a BS8414 test which justifies the use of the precise system tested; (3) by a fire safety engineering approach. This latter proposal contemplates such an approach either for a specific element of the design which is problematic, or for complex buildings such as airport terminals which do not lend themselves to conventional approaches<sup>25</sup>. It should be noted at once that ADB does not stipulate that desktop studies may be used to

<sup>18</sup> {BS100000122}

<sup>19</sup> Articles 4 & 5.

<sup>20</sup> Punishable on summary conviction to a 3 month custodial sentence or fine not exceeding level 5.

<sup>21</sup> Regulation 4. CE marking means the product's manufacturer has checked it meets EU safety, health/environmental requirements and allows free movement of the product within the European market.

<sup>22</sup> Regulation 5(2)&(4)

<sup>23</sup> Regulation 6

<sup>24</sup> Building Act 1984 S7(1)

<sup>25</sup> 0.30 ADB {CLG00000224\_0015}

demonstrate compliance. On the contrary, as explained immediately below, if a product does not have a test to show its compliance with a performance standard set by a British or European standard, there must be an assessment of such performance by an accredited body applying relevant design guides and standards.

3.2.3 Products and materials are required by the Regulations to be “...*appropriate for the circumstances in which they are used*”<sup>26</sup>. If and insofar as a product is covered by a relevant British/European Standard or European Technical Assessment, the product must (by Appendix A of ADB) either be in accordance with a specification or design which has been shown by test to be capable of meeting that performance, or have been assessed from test evidence by a United Kingdom Accreditation Service (“UKAS”) accredited laboratory using appropriate standard/design guidance, which it is submitted means the European Technical Specification which provides for rules extending the applicability of tests to establish fire performance of products only within a product group or family<sup>27</sup>. These have been referred to as *extended application* or *EXAP* rules.<sup>28</sup> AD7 provides further guidance as to how product suitability may be verified, including by the product being CE marked under the Construction Products Regulation 2011<sup>29</sup> and being subject to independent certification schemes such as BBA which are accredited by UKAS and “*certify that a material complies with the requirements of a recognised document*” such as a Technical specification/ hEN.<sup>30</sup> It follows from the above that such UKAS bodies must apply the rules as prescribed by Appendix A of ADB in such certification schemes and cannot simply make their own assessments without evidence<sup>31</sup>.

<sup>26</sup> Regulation 7

<sup>27</sup> Construction Products Regulation 2011 Preamble (34) and the CEN/TS1511 “*Guidance on direct and extended application*” implemented in the UK by BS1 DD CEN/TS 15117: 2005 described as a “*draft for development*” {BSI00001736}. It was said to be for the purpose of “*provisional*” application to generate a data bank for relay to the European body who would formalise it into a standard. It is unclear whether it was in fact so developed or adopted in the UK

<sup>28</sup> ADB Appendix A par 1b refers to assessments of conformity from test evidence against “*appropriate standards or by using relevant design guides*”. It is submitted that the EXAP rules are one such standard/guide {CLG00000224\_0119}

<sup>29</sup> 305/2011/EU Construction Products Regulation 2011 incorporated into the law of England & Wales by the **Construction Products Regulations 2013**

<sup>30</sup> This is expanded upon by ADB “*Use of Guidance*” under “*Independent Certification schemes*” {CLG00000224\_0007}. Further under “*Technical Specifications*” {0008} it is stated that if a product covered by a European Technical Assessment is appropriately used, it should meet the standards named in ADs

<sup>31</sup> Guidance as to how assessments should be carried out was given by the Passive Fire Protection Federations “PFPP” in the form of a “*Guide to Undertaking Assessments in lieu of Fire Tests*” in June 2000 [not on Relativity and no longer available on line as replaced by 2019 version “*Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence*”]. The 2000 Guidance was expressly adopted by Fire Test Study Group Resolution 82 {BRE00005837\_0090}. The guidance made clear that the assessments were to be a technical evaluation of an element of the structure (par 3.2) and the assessments were divided into simple, intermediate and complex assessments (par 7). Even the complex ones

Again, given that compliance with any AD is not an absolute defence to liability for non-compliance, a BBA certificate cannot be treated as proof of compliance; it would need to be interpreted. Care must also be taken by designers and contractors to ensure the product has been tested in such manner as to demonstrate fitness for its intended end use<sup>32</sup>. In practical terms, in order to be accepted by Building Control, specifiers and manufacturers know that specifiers will need a BBA certificate, particularly in the case of public sector work. Further or alternatively, the manufacturers need some other means of getting their product approved by Building Control, since that is the final bar to their product being used on the building.<sup>33</sup> So, for example Celotex chose to obtain an LABC certificate instead of a BBA certificate.

### 3.2.4 Other guidance

(1) As mentioned at paragraph 1.4 above, two Industry bodies NHBC and BCA, organisations seemingly separate but in fact joined by sharing certain senior personnel,<sup>34</sup> seemingly encouraged by the manufacturers themselves,<sup>35</sup> have given guidance as to how compliance may be achieved which have to some extent gone beyond, and even contradict the guidance contained in ADB.

(2) This guidance began with the BCA guidance: *“Technical Guidance Note 18”* (**“TGN 18”**) first issued in June 2014<sup>36</sup> which suggested three routes to compliance: (i) All elements of the cladding should be Limited Combustibility (the linear route) or (ii) the BR135 system test or (iii) a desktop study from a UKAS accredited testing body, stating whether the BR135 criteria would be met by the proposed system. Desktop studies should not have been introduced as a means of compliance. Even the EXAP rules (par 3.2.3 above) are wholly inapt to extend the performance of a BS8414 system test which by definition involves a test of an entire system of differing products. There have, following Grenfell, been attempts to agree a set of rules for extension of the results of BS8414 test which have resulted in BS9414.

(3) The guidance was at least clear in stating under *“Key Issues”* that *“Thermosetting insulants (rigid Polyurethane foam boards) do not meet the limited combustibility requirements of*

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related to door sets and glazing sets rather than an entire cladding system. The purpose of such assessment was clearly directed at products within a similar family as those which had been tested, as opposed to an entire BS8414 system test.

<sup>32</sup> Appendix A *“Performance of materials, products and structures”* par 1 inc Note 2{CLG00000224\_0119}.

<sup>33</sup> It is however made clear by ADB that building control bodies *“may”* accept the certification of products as evidence of compliance with the relevant standard; they are not entitled to assume it: Independent schemes of certification and accreditation {CLG00000224\_0011}.

<sup>34</sup> Steve Evans

<sup>35</sup> See para 5.2.4 below

<sup>36</sup> {BCA00000016}



*ADB...*" That guidance was adopted by the NIIBC in their letter to contractors in 22.7.15<sup>37</sup> with the embellishment that a further method of demonstrating compliance was a fire safety engineering approach. That addition was incorporated into NIIBC's *Technical Extra Guidance July 2015 Issue 18*<sup>38</sup>. The addition of the fourth option, fire safety engineering, was also adopted by a revised version of BCA's TGN 18 issued in June 2015, which now added a fourth option for compliance "If none of the above options are suitable, the client may consider addressing this issue via a holistic fire engineered approach taking into account the building geometry, ignition risk, factors restricting fire spread etc"<sup>39</sup>. Strangely both BCA's June 2015 TGN 18 and NIIBC's July Issue 18 note were both incorrectly amended to read: "Thermosetting insulants (rigid polyurethane polyisocyanurate, polystyrene foam boards) do not usually meet the limited combustibility requirements of ADB..." (emphasis added).

(4) The four options were again summated in a Technical Guidance Note issued by NHBC in July 2016 "Acceptability of common wall constructions containing combustible materials in high rise buildings" ("the July 2016 Guidance").<sup>40</sup> The note went yet further however and proposed in effect a fifth option which dispensed with the need for a desktop study altogether in the case of three commonly used facades, namely brickwork, timber panelling and Aluminium Composite Panels ("ACP"). The appendices to the Note then went on to provide a detailed inside to outside build-up of the wall which the NHBC would accept without desktop. In the case of ACP (this permitted 140mm thick insulation being either Kingspan K15, Celotex RS5000 or Xtratherm SR/RS with "Minimum class B ...aluminium composite material boards with a class 0 surface spread of flame classification". As will be apparent from the above, this constituted a contravention of the Building Regulations Schedule 1 and ADB insofar as it permitted a combination of highly combustible materials in the façade without the need for either BR135 system specific testing and even without the need for a so-called desktop study. This blanket approval was apparently given on the basis of "the significant quantity of data obtained to date from range of BSS414 tests". Given such tests are the property of the manufacturer or potential end user procuring the tests, and there is no requirement to publish them, such data can only have come from the manufacturers themselves, and we know that they did share some data with NHBC.

#### 4. Testing Regimes

<sup>37</sup> {NHB00001175}

<sup>38</sup> {CEL00009784}

<sup>39</sup> {BCA00000043\_0002}

<sup>40</sup> {CTAR000000026}

4.1 Up until 2002, ADB imposed only the National tests for Non-combustibility, Limited Combustibility under BS476 parts 4 & 11 or the tests for surface spread of flame under BS476 parts 6 & 7. In 2002<sup>41</sup>, ADB was amended to include reference to tests which give rise to the seven Euro classes A1 (Non-combustible) down to F (no performance determined) under the European harmonised standard, BS EN13501-1. These however sat alongside the National tests, until removed by ADB 2019. This gave rise to problems as the two sets are completely different and cannot be equated, apart from those for Non and Limited Combustibility which equate to A1 and A2<sup>42</sup>. The BS476 parts 6&7 tests purely test surface spread of flame and do not expose the core of a product, whereas the three test methods under BS EN 13501-1 (used in varying combinations<sup>43</sup>) for Class B-E test both heat energy released<sup>44</sup> and flame spread<sup>45</sup> and expose the core. Even the tests under BSEN 13501-1 test only relatively small samples (as compared to a cladding panel) and in some cases for short periods of time<sup>46</sup> as will be explained by Dr Lane in her presentation.

## 4.2 Insulation: background to the introduction of BR135 and BS8414

### 4.2.1 Recognition that Class 0 (surface spread of flame) was an insufficient measure of the impact of fire in facades

In 1988, well before the fires of Knowsley Heights (1991) and Gamcock Court (1999), the first edition of BR135 was published which recognised that the use of thermal insulation on the exterior of buildings was a relatively new technique and proposed a “series of fundamental design recommendations...to minimise the hazard to life ...”.<sup>47</sup> At this time, ADB 1985 was in force which expressly permitted combustible cladding (even above 15m, the then height restriction) provided the surface was Class 0 and allowed combustible insulation only if encased in the cavity of a brick or block wall.<sup>48</sup> Importantly, BR135<sup>49</sup> stated it was unsatisfactory that external flame spread (potentially leading to loss of life by damaging compartmentation) was currently controlled by BS476 parts 6&7 (those leading to Class 0) and instead concluded overall fire performance of cladding systems could only be established by

<sup>41</sup> List of ADB amendments s7 “Reaction to fire” {CLG00001470\_0013}

<sup>42</sup> Lane Phase 1 Report paras F4.15.4 & F4.15.5 {BLAS0000027\_0033}

<sup>43</sup> Lane Phase 1 Report Figure F.4 {BLAS0000027\_0025}

<sup>44</sup> Lane table F9 {BLAS0000027\_0086-90}

<sup>45</sup> Lane table F10 {BLAS0000027\_0092}

<sup>46</sup> Phase 1 Report Fig F.25 {BLAS0000027\_0083} and Figure F.4 {BLAS0000027\_0025}

<sup>47</sup> {BRE00001077\_0003}

<sup>48</sup> ADB 1985 PAR 6.7, 6.9, 6.13 and table 6.2 (not on Relativity)

<sup>49</sup> under the heading “REGULATORY ASPECTS”

actual fire conditions on a full scale building façade. It was acknowledged that there was: “... risk of progressive spread via cavity within the cladding system or through a layer of combustible insulant to areas remote from the original fire”.

#### 4.2.2 Large Scale Testing

(1) The first large scale cladding test was published over a decade later in 1999, Fire Note 9<sup>50</sup>, the forerunner to the BS8414 tests. It was introduced (following the recommendation of the Select Committee that it be adopted in January 2000)<sup>51</sup> by the 2000 edition of ADB<sup>52</sup> as a means of complying with the provisions of Diagram 40 which, then governed the external surface of walls. In other words, when first introduced, Fire Note 9 was a means of demonstrating the suitability of the cladding panels, not insulation<sup>53</sup>. The reason the test was introduced only in the context of the cladding panels is likely attributable to the fact that the then in force 1992 ADB required<sup>54</sup> the use of Limited Combustibility insulation on walls over 20m (the then height limit) unless within brick or block cavity walls with a sealed top

(2) The route to compliance of the whole cladding system (both panels and insulation) by satisfying the performance criteria in BR135 2<sup>nd</sup> ed using data from large scale tests BS8414 as an alternative to the linear route was introduced by ADB 2006<sup>55</sup>. It is important to note that the tests themselves contain no pass/fail criteria, the performance criteria are contained in BR 135 and there must be an assessment of the BS8414 test by a test house such as BRE or Exova which results in a *Classification Report*. Absent such classification, the results of BS8414 are meaningless since (in addition to the thermocouple data which is subject to set parameters which it must not exceed within certain times) they include assessment of the physical behaviour of the rig, all of which require interpretation by a fire engineer and in particular whether the flames overtop the rig, since if and when they do, the test is considered a fail and will be stopped. If the flames do not overtop the rig the ordinary duration of the test is 60 minutes from ignition with the crib being extinguished at 30 minutes.

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<sup>50</sup> {BRE00005595}

<sup>51</sup> {CTAR000000020}{CTAR000000021}

<sup>52</sup> As a footnote to the then par 13.5 (par 12.5 in the current version)

<sup>53</sup> See definition of Systems in par 3 {BRE00006695\_0004} Furthermore, Fire note 9 itself made clear the insulation did not form part of the test

<sup>54</sup> See 1992 ADB main changes (first page z {BLA00005482\_0002} and 12.7 {0074}

<sup>55</sup> Par 12.5 {CLG00000173\_0095} having been commented on with a degree of approval by KS in its Consultation response {CLG00002607\_0034}

### 4.3 Accuracy and susceptibility to manipulation of BS8414 testing and of tests under BSEN13501

(1) It is ironic that the BS8414 test, introduced to more accurately predict the way a given cladding system would behave in fire has (in the case of the products used at Grenfell) become a vehicle for abusing the system. It is clear that the BS8414 tests can be manipulated: Kingspan and Celotex manipulated the BS8414 test to obtain a misleading assessment (under BR 135) of their product. KS have been and remain consistently irresponsible regarding the test: even following the fire an update from Pargeter confirmed KS would be changing air gaps and doing what it could to pass in a test in the Government's safety programme *"Test is anonymous so a fire safety engineer won't be able to put it down as Kingspan.....We will be looking at challenging the norms that are associated with non-combustible. We will be changing the gap to a 4mm and if we get a pass it's a credible alternative. Danger that we win the test and Celotex PIR will then put the test in as they perform similar. We are looking for the next development to keep up ahead of the game."*

... *Strategy ...support 8414 test. Support the use of Desktop studies ...*<sup>56</sup> Equally the three test methods under BSEN13501 are susceptible to manipulation (see below par 7.1.2 [re Arconic]).

#### (2) Use of fire retardants and the fallacy of products advertised as "Fire Retardant"

In any case, even without any interference with the test rig or materials, the fact of using fire retardants in materials is likely to assist a product pass a test, because such retardants slow the time to ignition and reduce flame spread<sup>57</sup> but the tests are not reflective of actual fire conditions, and the product can be assisted to pass using fire retardant as planned by KS when trying to pass BS476 parts 6&7 tests in 2007.<sup>58</sup> This is well understood within the plastics industry.<sup>59</sup> Further there are other indications that, for example the so-called fire retardant<sup>60</sup> ("FR") PE could achieve a B Euroclass, but behave poorly in a fire. This appears to have been a widely held view; see Frank Ritter SA composites email to Booth Muirie

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<sup>56</sup> {KIN00002569}

<sup>57</sup> Unmanned Report dated 1.2.11 on the insulation market apparently produced by/for St Gobain when it was considering acquisition of Celotex par 3.5.3.6 *Flame retardants* {CEL00008480\_0017}

<sup>58</sup> KS technical services dept half yearly report 2007 {KIN00005292\_0007} "... numerous attempts with the new technology to achieve the class O....We are now looking at future modifications utilising fire retardants"

<sup>59</sup> St Gobain Northboro Research and Development centre Technical Note 2014 {CEL00003440\_002} at end of first para under heading *"Health hazards of flame retardants are a major concern"* "Therefore fire retardants are unnecessarily incorporated into foams in order to pass unrealistic fire safety test while simultaneously increasing health and environmental exposure risks"

<sup>60</sup> An undefined term: fire resisting is a term defined by BS476 part 22 or European standards but it manufacturers have not always tested the product to those standards SEE LABC warning {INQ00014085}



*"...we would appreciate to support the ban of ACM panels with PE core and "cheating" ACM-FR products on Facades, which unfortunately became almost standard as well"*<sup>61</sup>.

The same lack of confidence in FR was echoed by Brian Martin DCLG when he said<sup>62</sup>: *"I'm not entirely sure that even the ACM products that have "flame retardant" cores would meet the rules of thumb in the AD so it'll be interesting to see if any of them get through an 8414 test"*.

It appears industry did not, prior to Grenfell, embrace such testing being required of metal cladding panels: KS K15 tested at some time prior to February 2016 with solid aluminium cladding and even that failed<sup>63</sup>.

### (3) Inability to replicate the precise system tested under BS8414

A further problem lies in the fact that in reality it is impossible to precisely replicate the façade construction tested to BS8414 on actual buildings. This requires revision of the test to make it more realistic (i.e. more openings and accurate floor to floor heights) but also requires careful review of the assumptions on which the performance criteria within BR 135 are based<sup>64</sup>.

## **5. Kingspan K15**

### **5.1 Test reports available at the time of supply to Grenfell (May 2015)**

#### 5.1.1 The K15 2005 BS8414 Test

(1) As the K15 product used at Grenfell was not of Limited Combustibility (as required by the linear route) it should not have been used, as that was the route being followed. Even had the route pursued been to satisfy the performance criteria of BR135, K15 had only one test that could potentially justify its use over 18m on masonry constructions, namely the BS8414-1 test (over-cladding on masonry) carried out in 2005.<sup>65</sup> However, this test used the version of K15 then available which was described internally within Kingspan as *"old technology"*. The technology changed (for the worse in terms of fire safety) in September 2006. The technology was inherited from a Dutch firm which Kingspan had acquired and was referred to by Kingspan

<sup>61</sup> Email 19.2.16 Nick Jenkins (Booth Muirie) internal and to Euroclad re Frank Ritter {BLM00000058}

<sup>62</sup> Email to N Jenkins Booth Muirie 17.2.16 {BLM00000139\_0002}

<sup>63</sup> Email 19.2.16 Nick Jenkins (Booth Muirie) internal and to Euroclad re Frank Ritter {BLM00000058}

<sup>64</sup> Arup email 30.5.18 Judith Schulz {KTN00020612}

<sup>65</sup> Test no 220876 carried out 31.5.05 {KTN00000137}

as “New technology” or “Kesteren Technology”.<sup>66</sup> In 2007, subsequent testing under BS8414-2 involving K15 and Sotech Aluminium cassette rainscreen cladding, made clear that the “new technology” K15 itself “... is very different in a fire situation to the previous technology.... The old technology would turn into a light ash and fall away leaving[no] substance to feed the fire....” whereas new technology “...burnt very ferociously and gave the top cavity barrier a serious hammering”.<sup>67</sup> Kingspan’s Ivor Meredith in this report described the cladding rig tested as a “raging inferno”. Equally it was clear from the BRE “unofficial comments” that this was not a system failure, but rather, the K15 insulation was “...fully involved in the test. Surface spread of flame was fully apparent and the core continued to burn when the flame source had been extinguished. [BRE] stated they did not remember the product performing like that last time”.<sup>68</sup> The result of this was that, even had the 2005 test been validly carried out, it was in any case of no relevance after the technology changed, as K15 was from September 2006 onwards a significantly different product. In any event, there is an industry practice that test reports should no longer be treated as valid after five years such that the K15 BS8414-1 test should have been disregarded some five years before the product was purchased for Grenfell.<sup>69</sup> Perversely, not only did KS continue to rely on the test (and indeed did not withdraw it until 2019) but ten years after its obsolescence, in 2015, KS sought and obtained a BR 135 Classification Report for it.<sup>70</sup>

## (2) Flaws in the 2005 test

(i) The 2005 test was carried out at BRE. It appears that Kingspan intended to seek a Classification Report from BRE, recognising that the test itself, whilst “very advantageous in its raw form” a further assessment report was needed to “gain full advantage”<sup>71</sup>. It is little wonder that in fact Kingspan waited ten years before seeking to validate the 2005 BS8414 test by a Classification Report (despite knowing full well that to advertise the K15 as having been “certified” to be used above 18m absent a Classification Report was “dodgy”<sup>72</sup>) since it seems at least some Kingspan employees were aware (both at the time and subsequently) that the 2005 test had not been carried out in a legitimate way. This was not least because they were

<sup>66</sup> Adrian Pargeter 2<sup>nd</sup> Witness Statement, paragraph 10.30 {KIN00020824} and Excel spreadsheet of major changes exhibited to Pargeter’s 3<sup>rd</sup> R9 Witness Statement as {KIN00022307}.

<sup>67</sup> Kingspan (Meredith) Report of test 20.12.07 {KIN00020713\_0002 to\_0003}.

<sup>68</sup> {\_0003}.

<sup>69</sup> Fire Test Study Group Resolution No 72 originally resolved 6.10.93 and approved as valid 5.6.03 (still in force) {BRE00005837\_0079}.

<sup>70</sup> {KIN00000134}.

<sup>71</sup> {KIN00020718\_0002}.

<sup>72</sup> {KIN00005223}.

unable to identify the precise products which had been used in the test,<sup>73</sup> which should have been clearly identified in the original report. Instead, the products were very loosely defined in Section 3 of the Test Report. The cladding panels were described as UAC “cement particle boards” and the cavity barriers (which were not named by brand) were described simply as “2.5mm thick graphite based intumescent strip bonded to a nominal 0.6mm thick galvanised steel sheet”<sup>74</sup> which even a KS employee would later describe as “quite ambiguous”,<sup>75</sup> and “not common in the marketplace”;<sup>76</sup> it was so unusual that he even suspected it “may have been custom made for the test”.<sup>77</sup> In fact, the cavity barrier used was a Promat Promaseal RSB cavity barrier no longer commercially available by the time KS attempted a test using them again in 2016.<sup>78</sup> Graphite is a material used in the nuclear industry due to its high ignition temperature, and the Promat Promaseal cavity barrier in the 2005 test was in any event separately fixed to the structure of the rig in a way not advertised in the Test Report, and unlike a typical cavity barrier fixing method. It was “...riveted or tek-screwed to a steel ‘L’ profile which in itself is fixed back to the internal skin via the appropriate anchors”.<sup>79</sup> Neither cement particle boards, nor cement fibre boards (if that was what were used, as Adam Heath would later suggest),<sup>80</sup> are commonly used as rainscreen cladding panels.<sup>81</sup> The effect of the fortified cavity barriers can very clearly be seen on the photographs contained in the report.<sup>82</sup>

(ii) There appear to have been other irregularities in the way in which the test was carried out which will no doubt be explored in evidence, but the sequence of timings given by David Hoare of BRE in his contemporaneous notes of the test<sup>83</sup> appear to have been time-delayed by five minutes: the real times from ignition of the crib appear to be in the left hand margin of his notes and the times (some of which are picked up in the ultimate BRE report but some not, are recorded adjacent to the margin on the left. The purpose of the exercise of time delay appears

<sup>73</sup> {KIN00007172} and {KIN00008815\_0003}

<sup>74</sup> See Test Report Number 220876 {KIN00000137\_0006}

<sup>75</sup> See email from Adam Heath dated 11.05.16 {KIN00007172}

<sup>76</sup> See emails between Adam Heath and Promat in May 2016 {KIN00008804\_0001} to {0002}

<sup>77</sup> Ibid

<sup>78</sup> {KIN00008804}

<sup>79</sup> See Letter Promat UK Ltd to KS dated 13.04.07 advising that “In order to simulate the construction detailed in [the KS 2005 test carried out by BRE at Watford], the following fixing method and positioning of the RSB must be adhered to...” {KIN00005284}

<sup>80</sup> See emails between Adam Heath and UAC {KIN00008815\_0003}; See also Adam Heath Witness Statement at 11.53.

<sup>81</sup> The Marley cement board is a cement particle board, but by the time of its being tested by Celotex in 2014, that was not a widely used panel: hence Celotex’s desire to test with Reynobond on the wing wall of the rig and BRE’s recognition that the test data would be used to justify a different panel {CEL00000741\_0004}

<sup>82</sup> See Test Report Number 220876 {KIN00000137\_0014} and { \_0015}

<sup>83</sup> See Witness Statement of David Hoare Paragraph 56 {BRE00005622\_0015} and notes at {BRE00005621\_0060} to { \_0064}

to be to make the test seem more realistic: without this manipulation, the flames would have reached 4 metres by five minutes into the test (rather than the ten minutes recorded in the BRE report<sup>84</sup>). Absent the adjustment of the timing to show the flames reaching 4 metres at ten minutes not five, it would have been obvious that the cavity barriers must have been over-engineered in order to avoid the flames overtopping the rig within the remaining 55 minutes of the test.

(3) Kingspan would subsequently go to great lengths to successfully test K15 for use with a steel frame, since it was losing market share by not having a BS8414-2 test consistent with use in a steel framed structure. There were several fails, starting with the Sottech test described at par 5.1.1(1) above and two failed tests using Trespa cladding (a High Pressure Laminate) in January and March 2014, one of which became the subject of a formal complaint by KS to BRE despite the fact that the test appears to have clearly failed on the grounds that the prescribed temperature at the thermocouples was exceeded within the allowed period in addition to the flames over-topping the rig.<sup>85</sup> KS' efforts to pass a BS8414-2 test did not come to fruition using the new technology until 2015. The successful test involved Terracotta tile cladding panels and AIM cavity barriers. Such tests are of course wholly irrelevant to Grenfell Tower, because no-one could sensibly claim to have considered a BS8414-2 (steel frame structure) test applicable in any way to the construction at Grenfell.

#### (4) Consequences of the misleading 2005 test

These cannot be overstated:

(i) Whilst, unlike Celotex, KS did not expressly target GT as a flagship for their product, but KS, regarded as *"the industry leader"*,<sup>86</sup> set<sup>87</sup> the precedent that combustible insulation given the then existing technology could genuinely pass a BS8414 test and so be used above 18m. The timing was propitious due to the recently introduced Energy Performance Buildings Directive<sup>88</sup> and the revised document L. For some seven years, K15 was the only product tested seemingly successfully under BS8414.<sup>89</sup> KS have, according to Adrian Pargeter,<sup>90</sup> carried out a test seeking to replicate the 2005 test *"using a similar build up"* however due to *"...the*

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<sup>84</sup> {BBA00000035\_0010}

<sup>85</sup> {BRE00005773\_0104} to {0105}{KIN00000140}{BRE00003564}

<sup>86</sup> Par 11.1 paper produced by/for St Gobain when considering acquisition of Celotex {CEL000008480\_00\_38}

<sup>87</sup> See draft article release dated December 2005 {KIN000008924}

<sup>88</sup> Directive 2002/91/EC into force 4.1.03

<sup>89</sup> Xtratherm appears to have been the next product to do so in October 2012; See Test Report {BBA000000088} and Classification Report {BRE00002571}

<sup>90</sup> See Pargeter's 2<sup>nd</sup> Witness Statement at Paragraph 10.32 {KIN00020824\_0094}



passage of time it is impossible to be sure that this test exactly replicated the 2005 test... using "new technology K15". Mr Pargeter noted the test was conducted on 6.6.19, that it appeared successful and would feature on KS' website. There is a test report for a BS8414-1 test carried out on 6.6.19 on K15 with a given batch number using Siderise cavity barriers and Eternit Equitone Natura panels with an accompanying Classification Report confirming the test met the requirement of BR135<sup>91</sup>, but as Pargeter himself says, this is not a replica of the 2005 test. In any event, the "new technology" K15 is not the same formula at all as that produced over 15 years ago given the changes in formulation and given the fact that KS in any event has used different facers at any one time<sup>92</sup> and therefore the 6.6.19 test is simply irrelevant.

(ii) The fact of K15's apparent satisfaction of the BR135 criteria led directly (as explained below) to Celotex carrying out in 2014 an essentially copycat test but using BS8414-2 (steel framed structures). The K15 2005 BS8414-1 test also spawned a slew of desktop studies which permitted the use of KS in countless buildings. Pargeter lists those desktops which he was aware of involving K15 and says none involved K15 with a PH cored rainscreen,<sup>93</sup> but of course it is possible there were such desktops in existence, but that KS were not aware of them. In any event, KS' entire marketing strategy was premised on cultivating the impression that K15 was suitable for use over 18m as explained below.

(iii) All this led directly to the misconception that combustible insulation was generally fit for use over 18m.

### 5.1.2 Class 0 (derived from tests under BS476)

Whilst Class 0 is irrelevant in the context of insulation (which under the linear route must be Limited Combustibility) KS did not have relevant tests demonstrating Class 0 on the version of K15 which would have been used at Grenfell. It is clear from the evidence, and is admitted by Adrian Pargeter,<sup>94</sup> that as from 2016 it became clear to KS that K15 could not achieve Class 0 in BS476 tests. It is clear KS knew its product struggled to pass the Class 0 test as early as 2007 see (2) below.

(1) Despite the original product literature for K15 in 2001 describing it as Class 0, there do not appear to have been tests under BS476 until 2004 when a test took place on ODP Phenolic

<sup>91</sup> <https://www.kingspan.com/gb/en-gb/fire-safety/kingspan-bs-8414-1-csicc-systems>

<sup>92</sup> See Excel spreadsheet of major changes exhibited to Pargeter's 3<sup>rd</sup> statement {KIN00022307}

<sup>93</sup> See Pargeter First Witness Statement at paragraph 4.17 {KIN00000494\_0015}

<sup>94</sup> See Pargeter Second Witness Statement at paragraph 4.40 {KIN00020824\_0029}

core.<sup>95</sup> These tests were rendered irrelevant by the change to Kesteren technology in September 2006. Subsequently KS undertook tests in November 2008 but this was after Kingspan had already obtained its first BBA Certificate for K15 08/4582 dated 27.10.08 which, without justification, stated that *"The product is classified as Class 0 or 'low risk' as defined in the documents supporting the national Building Regulations"*.<sup>96</sup>

(2) The 2008 tests were passed using *"black coated test face"* which meant they were manufactured in Tiel.<sup>97</sup> and were generally sold on the European continental market not in the UK.<sup>98</sup> The K15 product used differing Lamtec foil facers on its products depending from which of KS manufacturing sites they emanated, but the Castleblayney and Pembroke sites had facers which were perforated top and bottom whereas the Tiel black faced product had an unperforated top.<sup>99</sup> It seems that the products had not previously been perforated: Meredith would later comment (by email in June 2014) that the *"the certification for Kooltherm K15 is based upon an unperforated Lamtec 25 micron foil face outer facer"*<sup>100</sup> and remarked that *"The addition of perforations has shown a marked reduction in performance of the Euroclass tests ...."*<sup>101</sup> Furthermore, KS certainly planned to pass these tests using increased fire retardant.<sup>102</sup>

(3) The Class 0 tests were carried out again in 2009 and the observed colour was *"silver"*<sup>103</sup> but again, Meredith's email in June 2014 quoted immediately above may suggest such tests related to an unperforated face, rather than the product used at Grenfell in 2015, which, based on the June 2014 thread would have had a perforated face on both sides. In any case it is clear from the spreadsheet of major changes produced by Pargeter that there were some very significant changes in the period between 2009 and 2015 when the product was supplied to Grenfell, and so the 2009 Class 0 tests are of no relevance.<sup>104</sup>

(4) There appears to have been some further BS476 testing of K15 in 2011/12<sup>105</sup> but we are unable to tell if they resulted in Class 0 and it is difficult to see how they (genuinely) could

<sup>95</sup> See Test Report {KIN00022070\_0002}. An indicative test on a foil facer in 2004 does not count, see {KIN00022067}. Thereafter no tests were undertaken until November 2008 (so after the issue of the BBA certificate) {KIN00005981} {KIN00006033} {KIN00000252}

<sup>96</sup> {BBA00000037\_0005}

<sup>97</sup> See Ivor Meredith email 24.06.14 {KIN00003894\_0002}: *"In Tiel the product is black faced..."*

<sup>98</sup> See Ivor Meredith email 24.06.15 {KIN00006576\_0001}: *"My understanding has always been that K15b was mainly used in mainland Europe..."*

<sup>99</sup> {KIN00003894\_0001}

<sup>100</sup> {KIN00003894\_0002}

<sup>101</sup> {KIN00003894\_0003}

<sup>102</sup> KS technical services department half yearly report 2007 {KIN00005292\_0007}: *"... numerous attempts with the new technology to achieve the class 0....we are now looking at future modifications utilising fire retardants"*

<sup>103</sup> {KIN00000256\_0005}{KIN00000261}

<sup>104</sup> {KIN00022307}

<sup>105</sup> See reference in email thread 8.10.17 {KIN00007982\_0001}

have, as it is likely that a different product was supplied to the different test houses who carried them out.<sup>106</sup> In any case, given there was a polyol change in April 2013,<sup>107</sup> it is clear any test under BS476 achieving Class 0 prior to that change is irrelevant after then. As to any subsequent BS476 testing, it is clear from certain email threads that in some of such tests KS had in fact tested only the facer in order to pass tests in 2016: *"we have only got class 0 on the Silver K15... facer and Black K15 facer in isolation"*.<sup>108</sup> This even though KS had been advised that the product should be tested as a complete product (unsurprisingly as BS476 is a product test) and despite the fact that KS acknowledged internally that *"claiming class 0 for just a facer test when...its meant to be [a] product as placed on the market"* was *"a bit of a cheat"* and *"...a complete spin"*.<sup>109</sup>

### 5.1.3 Tests under BSEN13501-1

As at 2013, KS' DoP for K15 dated 1.7.13 declared that the product had a Euroclass rating of C,s1-d0.<sup>110</sup> Since KS appears to have used different versions of its products for tests, it is difficult to see how they could be certain of the RtF of the product being sold commercially. This defeats the whole purpose of a DoP.

## 5.2 Certification: Dealings with Test Houses and Certifiers

KS appears to have persuaded (by improper pressure) organisations such as LABC and BBA to misstate the properties of K15.

### 5.2.1 BRE

Clearly the full circumstances of the 2005 test which was presided over by BRE require the fullest exploration and those include the extent to which BRE (Clark, who would later carry out the Celotex BS8414-2 test in 2014, and Hoare) were aware of the nature of the build-up

<sup>106</sup> In 2011 we have only located a Part 7 test by Exova {KIN00000258}; there is a Part 6 test by a different test house BRE on 4.08.11 on K7/K8/K9/K10/KD10 which may or may not be the precise formulation as the K15 tested by Exova {KIN00020742}. There is a further Part 6 test from July 2012 by BRE {KIN00020740}; See also reference in email thread 8.10.17 {KIN00007982\_0001}: *"I do have a full product test for K10/K15x2, one from 2011 and the other from 2012(attached), we aren't using them as such I don't think, or I should say we aren't bringing attention to them...its most likely that they are very good indeed and we can't seem to get anywhere near that with the testing now"*

<sup>107</sup> Purgec spreadsheet of major changes item 22 {KIN00022307}

<sup>108</sup> {KIN00004205}

<sup>109</sup> Aaron Chalmers email 26.6.16 {KIN00004168\_0001} and Dan Ball on 27.06.16 {KIN00021380}.

<sup>110</sup> See DoP {KIN00000130} which appears to have been the one in force as at May 2015 (the next version is dated 01.01.16 {KIN00000129}). Note however that KS did not obtain a Classification Report to support the 2013 declaration until March 2015 {BBA00000039}, although it had carried out the tests in May and June 2013: ES ISO 11925-2 {KIN00000233} and EN 13823 {KIN000000237}.

of and products used on the 2005 test rig, why it was that BRE allowed the test report to be so non-specific in the product description and also the timing issue described at paragraph 5.1.1(2)(ii) above. There is then the question of why BRE was willing to issue a Classification Report in 2015 for a test which had been carried out ten years previously, when BRE must have been aware that the 2005 test was by established industry practice to be disregarded after five years. There are inevitably wider questions as to BRE's role in which it is clear it became KS' adviser in the most general sense regarding K15 and indeed KS' other product lines, when it was required to be entirely independent. These matters put BRE in breach of its duties of accuracy and impartiality under BSEN ISO/IEC 17035:2005<sup>111</sup> and will be fully explored in Module 6.

### 5.2.2 LABC

In May 2009, the LABC issued a System Approval Certificate, along with a Type Approval Summary for K15 <sup>112</sup> This was reissued in 2013 as a LABC Registered System <sup>113</sup> The research for this certificate was outsourced to Herefordshire Council Building Control who attended a single meeting with KS. Aside from what may have been said at this meeting, the only information provided by KS in support of the application was some K15 literature and BBA Certificate 08/4582. Despite there being no support in these documents for the statement, both Type Approval Summaries describe K15 as a material of Limited Combustibility.<sup>114</sup> So wrong was this statement that even KS could not quite understand how it had been issued <sup>115</sup> This, however, did not stop KS from wholly capitalising upon the error both publicly,<sup>116</sup> and internally as an excuse to scale back its efforts to develop K15 so that it could actually pass a BS 8414-2 test <sup>117</sup>

### 5.2.3 BBA

<sup>111</sup> The relevant version is the 2005 version but not yet on Relativity. The 2017 version is at {BRE00005621}

<sup>112</sup> See System Approval Certificate and Type Approval Summary {HBC00000030}

<sup>113</sup> See LABC Registered System {KIN00005817}; LABC Registered Details Drawing and Document List {KIN00005818} and Revised Type Approval Summary {HBC00000017}

<sup>114</sup> See {HBC00000030\_0004} and {HBC00000017\_0004}

<sup>115</sup> See emails between Malcolm Rochfort and Philip Heath in May 2009 {KIN00008840}: "We can be very convincing when we need to be...I think the LABC convinced themselves Kooltherm is the best thing since sliced bread. We didn't even have to get any real ale down him!"

<sup>116</sup> See press release entitled "Kingspan First to Make the Grade With LABC" dated 03.07.09 {KIN00008748}; See also Ivor Meredith email dated 19.06.09 {KIN00005385}: "From now on when challenged I'm simply going to send the LABC document and let that do the talking".

<sup>117</sup> See Fire Focus Group minutes dated 18.05.09 {KIN00008845}: "Following discussions it was agreed that we still need to look at developing a product that will be able to pass a BS 8414-2 test as a back up to the LABC documentation..." but that this "urgent requirement has been relaxed".



(1) The Certificate in force at the time of supply to Grenfell was the second issue of 08/4852 dated 17.12.13<sup>118</sup>

(i) It wrongly characterised the product as “Class 0 or ‘low risk’” despite the fact that there was no relevant Class 0 report for K15 at this time (since the existing test became invalid in April 2013 see par 5.1.2(3) above) and no BS476 test was recorded in the Certificate. The certificate referred at Section 8.2 to the 2005 test, albeit without reference to the Test Report number or date. By the date of this version of the BBA certificate, the 2005 test was already three years out of date and in any event no Classification Report had been issued for it. This edition at least contained a footnote under the description of the 2005 test stating: “*The test result relates only to this specific construction and a separate test would be required to establish the performance of any other combination of materials*”. This was inserted by BBA very much against KS’ wishes, who regarded its relegation to a mere footnote as a triumph on their part.<sup>119</sup> Nevertheless, the certificate read on at Section 8.3 to state: “*The product incorporated in the construction defined in section 8.2 can be used in buildings with a floor more than 18m above ground level...*”. In November 2014, the BBA proposed a revision to this wording to state expressly that “*The product’s use in other constructions is limited to 18m in height*”, however Kingspan were again reluctant to agree to such restrictive wording,<sup>120</sup> and somehow managed to delay this amendment until October 2015.<sup>121</sup> The Test Report recorded that a 60mm board had been tested. This is significant as KS would rely on the certificate to market all thicknesses of its K15 board, not simply the 60mm version, and KS successfully convinced the BBA to remove express reference to this limitation.<sup>122</sup>

(ii) KS’ attitude to this certificate was to seek to widen the applicability of K15 as much as it possibly could: “*I’m fully aware we want it as open delimiting as possible that’s blindingly obvious is it not?*”.<sup>123</sup>

(2) The first issue of BBA certificate 08/4582: 27.10.08

It is inevitably important to have regard to this issue and the amended issue requested by BBA (See (3) below), since these shaped the subsequent iterations of the document to some degree.

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<sup>118</sup> {KIN00000454}

<sup>119</sup> See Joel Clarke email dated 10.12.13 {KIN00005870\_0001}; the statement is now “*in the smallest possible font and buried deep in the certificate itself we have made significant progress when compared with the last draft*”.

<sup>120</sup> See Joel Clarke email dated 25.11.14 in reference to the BBA and this amendment: “*Sly little f\*ckers*” {KIN00011826}

<sup>121</sup> See BBA Certificate 14/S154 (Issue 1) {KIN00000490}.

<sup>122</sup> See emails between Clarke and Meredith in January 2015 {KIN00005572\_0007} and {\_0005}; See also emails between Clarke and BBA in September 2013 {KIN00002157\_0003}.

<sup>123</sup> Clarke to Meredith 9.1.13 {KIN00005572\_0004} to {\_0005}

This first issue also contained, at Section 7.1, the reference to Class 0 and Low Risk,<sup>124</sup> and this reference to Class 0 was particularly egregious given Kingspan had no test report under BS476 at all at the date of this version. The 2005 test was referred to, again without reference to the test date or report number. Section 7.3 contained the very broad caveat: *"In buildings with a floor more than 18m above ground level, advice should be sought from the certificate holder"* Kingspan was happy with this caveat as it directed potential customers back to it for advice, allowing it to control the narrative. KS regarded this as a "get-out" clause by which it could escape the restrictive alternative: a certificate which was expressed to be specific to the system tested. When the certificate was being revised into its second issue (paragraph (1) above), Clarke would comment that *"I don't even think they'll even give us the get-out of the 'contact the manufacturer' ....I'd love it back how it was, but feel it unlikely"*.<sup>125</sup>

(3) The amended version of 08/4582,<sup>126</sup> dated 6.4.10 but not in fact issued then

So content with wording of the original certificate was KS that when the BBA requested a revision of the certificate due to queries about Section 7, KS' Philip Heath would instruct others at KS to *"Let the file gather dust .."*.<sup>127</sup> KS' delaying tactics appear to have been successful as the amended certificate had still not been issued by 7.10.10,<sup>128</sup> and appears at some point to have been abandoned. It was, however, it seems publicly available as we know it came into Celotex's possession and indeed was the subject of complaints by others as explained below.<sup>129</sup> This amendment contained, at Section 7.1, the extraordinary suggestion that K15 was a material of Limited Combustibility. That was done by stating that K15 may be used *"in accordance with"* paragraph 12.7 of ADB. This mistake even came to the attention of Brian Martin of DCLG and caused BBA to have to explain that the mistake had arisen by *"human error"*.<sup>130</sup> The circumstances of this error will of course need to be explored, but it was indeed a serious error and one likely induced by the existence of the LABC Type Approval Summary (see paragraph 5.2.2 above) which explicitly stated that KS was a material of Limited Combustibility.

(4) It is clear from KS' deliberations over the various iterations of the BBA certificate that its sole intention was to ensure that the certificate was worded in such a way as to potentially

<sup>124</sup> {BBA00000037\_00005}

<sup>125</sup> Clarke to Meredith 9.1.13 {KIN00005572\_0004}

<sup>126</sup> See Certificate {KIN00000493}

<sup>127</sup> See email from Heath to Pack and Meredith dated 5.3.09 {KIN00020716\_0001}

<sup>128</sup> See internal BBA email of this date {BBA00002599}

<sup>129</sup> See Roper email to BBA dated 31.10.13 {BBA00004913} and attachment {BBA00004914}.

<sup>130</sup> See Albon email to Martin dated 23.7.14 {BBA00000178\_0001}

confuse and so as not to be confined to use in the precise configuration tested, even though that was plainly the purpose of the BR 135 system test, that it is specific to a system.

(5) These matters put BBA in breach of its obligations of impartiality and accuracy under BS EN ISO/IEC 1705:2012<sup>131</sup>.

#### 5.2.4 NHBC and BCA

As explained at paragraph 3.2.4 above headed “*Other guidance*”, NHBC and BCA issued guidance which contravened the Building Regulations and ADB. This appears to have been done under pressure/with encouragement from both Kingspan and indeed Celotex.

Since January 2014, the NHBC had expressed serious concerns to KS about its test evidence and whether it was sufficient to support the widespread use of K15 in the industry.<sup>132</sup> Discussions between NHBC and KS concerning KS’ testing continued well into 2015.<sup>133</sup> It seems that during this time KS were, in their own words, “*slowly educating*” the NHBC and appear to have been influential in the NHBC/BCA decision to endorse desktop studies as a means of compliance.<sup>134</sup> Where more subtle methods failed, KS was quick to adopt bullying tactics to force its influence upon the NHBC. Following notification that the NHBC would ask builders specifying K15 to strictly follow BCA Guidance Note 18,<sup>135</sup> KS’ lawyers threatened the NHBC with an injunction.<sup>136</sup> KS later boasted internally that they had “*blocked*” this initial guidance, and that NHBC would not issue any guidance until KS “*had approved the content*”<sup>137</sup> It appears also that NHBC had agreed to involve KS in changes to the BCA guidance itself.<sup>138</sup> Depressingly it is clear that in June 2015, after the second issue of the BCA TGN 18,<sup>139</sup> NHBC was well aware of the problem with K15 that it had only been tested successfully to BS841-1 and yet was being used on steel frame buildings. In its presentation “*Use of Combustible Materials in Claddings to High Rise Buildings*” (prepared at some point after June 2015) it resolved for new projects to require the contractor to demonstrate compliance in accordance with the four options under BCA TGN 18 and for existing projects

<sup>131</sup> {BSI00001732} and {BSI00001732}.

<sup>132</sup> See NHBC memo {NHB00000675}.

<sup>133</sup> See minutes dated 12.10.15 {KIN00002496} in which KS agreed to provide a “*comprehensive list of all tests including K15 (Passed/Failed/Planned)*” including where the test data could be obtained.

<sup>134</sup> See Meredith email to BRE dated 24.07.15: “*We are slowly educating the NHBC and worked with them and the BCA to produce BCA Technical Note 18... that promotes BS 8414 and Assessments relating to BR 135*”.

{BRE00004073}.

<sup>135</sup> See NHBC letter to KS dated 05.02.15 {KIN00008297}.

<sup>136</sup> See Fenwick Elliott letter dated 13.02.15 {KIN00008283}.

<sup>137</sup> See Millichap email dated 27.03.15 {KIN00006380\_0001}: the guidance was issued in March 2015, See {KIN00006453} and {KIN00006454}.

<sup>138</sup> See Millichap email to Meredith dated 20.04.15 {KIN00012646}: “*Also keep them [NHBC] on the hook for support around regulatory matters particularly BR135 but also changes to the BCA document as agreed*”.

<sup>139</sup> Which was drafted by the NHBC and adopted by the BCA, see NHBC presentation {NHB00000068\_0018}.

where K15 was being used it would direct the Contractor to KS for comfort letters.<sup>140</sup> Sadly, it seems NHBC was more concerned with reputational damage to itself/claims against it, than it was with protecting public safety.

Kingspan was and is well aware of what the regulations meant and that if the linear route was being followed, Limited Combustibility insulation was required.<sup>141</sup> Despite that, following the fire, KS is now advocating yet more strongly the routes to compliance it has always favoured, namely demanding all cladding systems be tested, and pushing the fire safety engineering route and desktop studies, thereby conveniently side-stepping the linear route (see par 4.3(1) above).

#### 5.4 Marketing and Culture

The marketing strategy for K15 was simple: target specifiers including Architects and use technical expertise as a way in.<sup>142</sup> KS' literature presented K15 as being compliant in as many situations as possible. This was primarily done by adopting language or statements, which whilst often true insofar as they went, were only half-true and were therefore bound to mislead. Statements such as that K15 was "*successfully tested to BS 8414:2002, and can meet the criteria within BR135 and is therefore acceptable for use above 18 metres*" and only including details of the tested system in much smaller, less prominent text.<sup>143</sup> When the 2005 tested system was described, it was done in the most generic terms possible; the terms "*non-combustible cladding*" and "*non-combustible substrate*" were heavily relied upon.<sup>144</sup> This enabled Technical Advisors at KS to argue both that *any* non-combustible cladding could be used with K15, and that K15 did not need a BS8414-2 test to be used on steel frame systems, provided a non-combustible sheathing board was used.<sup>145</sup> Those at KS were well aware of K15's limitations, but transparency is not in their nature; as Meredith explained, K15 is not suitable behind some cladding panels, but "*that's the last thing we want to tell our customers*".<sup>146</sup> In short, KS set out to confuse and mislead, and they were successful; as Tony Baker put it to his colleagues at BRE: "*...the market is starting to get very confused through clever marketing by KS*".<sup>147</sup>

<sup>140</sup> {NHB00000068\_11} to {\_0020}

<sup>141</sup> 15.11.19 CPD {KIN00000820\_006} to {0013}

<sup>142</sup> Kingspan Strategy Day: Strategic Plan 2006-2010 see *Technical Service* {KIN00005546\_0012}

<sup>143</sup> See, for example, "*Kooltherm K15 Rainscreen Board: Insulation for Use Behind Rainscreen Cladding Systems*" dated January 2011 {KIN00005463}

<sup>144</sup> See, for example, K15 brochure in force at the time of GI {KIN00000063\_0006}

<sup>145</sup> See, for example, email from Gareth Mills on 28.07.08 to Roofdec {KIN00009042\_0001}

<sup>146</sup> See Meredith email dated 14.08.07 {KIN00005308\_0002}

<sup>147</sup> See internal BRE email dated 24.07.13 {BRE00003397}



The principal problem at Kingspan is its results driven culture. Described in 2011 by its then would be competitor, St Gobain, as placing value “... on loyalty, length of service and demonstration of total commitment to the cause. There is great focus on delivery of results, irrespective of the obstacles and setbacks”. One of those obstacles was statutory compliance. KS was also regarded by St Gobain as having a culture of secrecy to such an extent that few within it were aware of the (many) formulation changes.<sup>148</sup> This certainly appears to have been the experience of Meredith who explained in a disciplinary hearing that he was “under a great deal of pressure to maintain” the claims made about K15’s performance, resulting in a large amount of testing “to justify our lie”.<sup>149</sup> It seems there was absolutely no proper training despite KS having a library of documents and being required to understand the Building Regulations and ADB. Neither does there seem to have been any form of mentoring. This is explicable by the evident contempt for compliance which was inconsistent with proper training and mentoring.

## **6. Celotex**

### **6.1 Test reports available at the time of supply to Grenfell (May 2015)**

#### **6.1.1 The RS5000 2014 BS8414-2 test: RS5000 and Marley Fenit panels**

##### **(1) Background**

(i) Celotex already had a product, FR5000, which had been specified in the 2013 NBS specification at Grenfell. However, that product had no claim to be used above 18m and should not have been specified. When Celotex began “developing” FR5000 it does not appear that there was any intention to actually change the product,<sup>150</sup> merely to achieve a successful BS8414 test and rebrand the product as fit for use over 18m.<sup>151</sup> This very fact should have caused questions to be raised within Celotex (and St Gobain if they were aware). Celotex was very clearly motivated to obtain a BS8414-2 test by the fact that KS had a test for masonry under BS8414-1.<sup>152</sup> It was Celotex’s intention from the outset for the BS8414-2 test to be used

<sup>148</sup> Under headings “Ethos” and “Secrecy” {CEL00008480\_0038}

<sup>149</sup> {KLN00022312\_0067}

<sup>150</sup> See CX “Above 18m Action Plan” dated March 2013, which defines the project as achieving “accreditation for FR5000 for use in above 18m applications” {CEL00001182}; See also Roper Witness Statement at 3.4 {CEL00010052}

<sup>151</sup> Which is precisely what happened. see email from Berger to Esova dated 12.07.16: “RS5000 is the same product as FR5000 but marketed specifically for the above 18m market. A detail not known in the market place” {CEL00001335\_0002}.

<sup>152</sup> See CX internal emails in September 2012: “If we are to be serious in this specification market we need to get our act together sharp! Ecotherm and Kingspan will have this sewn up if we don’t act

in the widest number of applications<sup>153</sup> possible by obtaining a generic desktop study.<sup>154</sup> Like KS, Celotex understood that all the architect needs to be told is that the product is compliant *"and that suffices from their perspective ... contractors opt for the more cost effective solutions and though they are liable for what goes into that building they do not know enough about the fire test to challenge"*. The main obstacle to getting Celotex's product onto a building was therefore Building Control.<sup>155</sup> Celotex planned to emulate KS by obtaining a certificate from LABC with the same wording as K15 so that Building Control would accept the product on a *"variety"* of cladding systems.<sup>156</sup>

(ii) Critically, Celotex was well aware at the time of embarking upon the BS8414 testing programme that one option was not to proceed with it at all. As Roper bluntly put it in his November 2012 research email: *"Or do we take the view that our product realistically shouldn't be used behind most cladding panels because in the event of a fire it would burn"*.<sup>157</sup>

(iii) There had been a first, failed, test in February 2014 using the same Marley Eternit panel and RS5000 which Philip Clark (the BRE operative who had carried out the test on K15 nearly a decade earlier and by now Burn Hall manager) had warned his colleagues in advance of the *"very real possibility"* the tests would fail and advising full PPE be worn.<sup>158</sup> The test was stopped at 26 minutes due to flames overtopping the rig, and, despite Clark apparently initially suggesting he might treat the extinguishing of the flame as having occurred at 30 minutes (which is when it should be extinguished<sup>159</sup>) the result of the test was officially a fail. It is suggested by Roper that Clark gave advice as to how to pass the test.<sup>160</sup>

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*sum"* {CEL00002892}; see also CX *"Above 18m Action Plan"*, which explains: *"Between August 12 & Jan 13, Celotex recorded lost opportunity from not having above 18m was 70,000sqm... we cannot compete with Knutherm products. Only Kingspan K15 & Yveatherm's Safe R market that they have achieved above 18m fire accreditation. Both are in accordance with BS 8414:1 onto a masonry wall"* {CEL00001182}

<sup>154</sup> Including on steel framed structures see Roper par 4.5 {CEL000010052\_0005}.

<sup>155</sup> See J Roper's research email dated 1.11.13 {CEL00000716}; *"...since the beginning of the project, we have been looking at testing worst case scenario... to then be supported by an assessment report which broadens the scope of potential systems that we are applicable for"*; also Roper email to S Howard at BRE seeking a recommendation for a cladding panel so that the RS5000 test can be widely extended {BRE00005773/835}; Celotex would in 26.5.15 obtain a generic desktop from Exova for brickwork, Terracotta and *"All cladding laminates"* albeit that it did not in fact justify the use of ACM with aluminium sheet cladding Class 0 {CEL00001116\_009} to {0010}.

<sup>156</sup> J Roper's research email dated 1.11.13 {CEL00000716}.

<sup>157</sup> J Roper's research email dated 1.11.13 {CEL00000716}; *"Kingspan ... do not have a piece of paper that states they can specifically be used behind any cladding panel. What they have done is got ... a [LABC] registered document detail which states that K15 can be used in a variety of cladding systems"*; see also Roper email dated 08.11.13: *"I've also got LABC involved to issue a report stating CX can be used behind a variety of systems above 18m to prevent any challenge from building control"* {CEL00000735\_0004}.

<sup>158</sup> See {CEL500000716}.

<sup>159</sup> See {BRE00005773\_0292}.

<sup>160</sup> See Roper email to TFC dated 17.2.14 {CEL00000842}.

<sup>161</sup> See Roper Witness Statement at paragraph 5.29 {CEL00010052\_0013}.

(2) The second (successful) test took place on 2.5.14, again using Marley Eternit panels and RS5000.<sup>161</sup>

(3) It is now clear and admitted by Celotex,<sup>162</sup> that the means by which Celotex satisfied the BR 135 criteria was in a not dissimilar manner to that used by KS in the 2005 K15 test. KS used a fortified cavity barrier containing graphite and which was separately attached to the frame by a steel bracket such that it could not become detached. Celotex fortified the location at the second set of thermocouples (which was critical to satisfying the temperature parameters and prevented the flames from over-topping the rig) using two sections of Magnesium oxide (“MgO”) (a material commonly used to line furnaces and not a material used in ordinary construction) by reinforcing the cavity barriers at the level of the thermocouples critical to passing the test and at the top of the rig. Like KS, Celotex have since carried out a test to “mirror, as closely as possible” the May 2014 test,<sup>163</sup> in an attempt to establish that the 6mm MgO had no material impact. A test was carried out on 04.04.18 which supposedly met the BR 135 criteria. Aside from the differences openly admitted by Celotex,<sup>164</sup> the formulation changes described at 6.1.2 below mean that the RS5000 tested was also different and therefore irrelevant.

(4) Critically however, Celotex went a step further in its deception. A decision was made to conceal the presence of the MgO and omit any reference to its existence in both official reports, and product literature. Despite Celotex’s attempts to remove it from the Test Report, a single clue survived; Figure 18, an image which shows the MgO partially in place mid-removal. The image starkly illustrates the impact of the material, which appears to have stopped the flames dead in their tracks.<sup>165</sup> The question of who within Celotex was involved in this decision will need to be explored, but it seems likely that those present in the Management Action Group (or MAG)<sup>166</sup> meeting of 13-14 May 2014 were involved.<sup>167</sup>

(5) It became clear to others within Celotex in around October 2014,<sup>168</sup> that the test had not been carried out in a legitimate way, but nevertheless the test was not withdrawn until

<sup>161</sup> See Test Report 295369 {CEL00000993} and Classification Report 295255 (Issue 2) {CEL00002375}.

<sup>162</sup> See letter from Linklaters to GTI dated 23.10.18 {CEL00010054}.

<sup>163</sup> See Witness Statement of Dean O’Sullivan at [119] {CEL00010027}.

<sup>164</sup> See BS 8414 Summary Paper at paragraph 3.7 {CEL00010040}.

<sup>165</sup> See Test Report {CEL00000993\_0029}.

<sup>166</sup> The executive team of Celotex, comprising the heads of the different business functions, including Craig Chambers (Managing Director). See Rob Warren Witness Statement at Paragraphs 11 and 26 {CEL00010043}.

<sup>167</sup> See presentation for that meeting which includes reference to the 6mm MgO {CEL00000933}; See also later version with such reference omitted {CEL00000961}.

<sup>168</sup> See Debbie Berger annotation on the Test Report: “WTF? 6mm MgO + 8mm Marley eternit panel?” {CEL00008507\_0013}.



23.06.17,<sup>169</sup> even though Roome argued for the a cessation of RS5000 promotion, as explained in the context of Celotex's dealings with NHBC explained at par 6.2.3 below.<sup>170</sup>

### 6.1.2 Testing to Class 0

Again Class 0 is irrelevant to insulation, but Celotex had two production lines for FR5000/RS5000. In 2011, Class 0 certification was obtained in respect of both lines;<sup>171</sup> such certification continued to be used for RS5000 after its launch in 2014.<sup>172</sup> However, in August 2012 a formulation change was made on one of those lines only (Hipchen),<sup>173</sup> making it a different product. However, it was decided within Celotex that *"no external testing will be carried out"* on this revised product.<sup>174</sup> This meant that Celotex only had Class 0 certification for one of its two production lines (Hennecke) from 2012 onwards. Celotex was obliged to submit to ongoing audits of FR5000 by the BBA and inform them of any chemical changes. Nonetheless, Celotex deliberately kept this change from the BBA, something they did habitually.<sup>175</sup> Formulation changes were common at Celotex, in particular changes to types and levels of fire retardants,<sup>176</sup> so common in fact that they were not even sure of the exact ingredients of their own product.<sup>177</sup> These changes were not immaterial in terms of fire performance; in August 2017, six different samples from both lines failed BS476-6 tests within the first three minutes of testing.<sup>178</sup> The upshot for Grenfell Tower is that it is unclear what the chemical composition of the RS5000 used was, it is however clear that the Class 0 certification in place was not applicable to that product given the changes in formulation.

## 6.2 Certification: Dealings with test houses and certifiers

### 6.2.1 BRE

<sup>169</sup> See product suspension data sheet {CEP000003054}.

<sup>170</sup> See Roome email dated 18.06.15 {CEL00001126}.

<sup>171</sup> See Line 1 Classification {CEL00000663} and Line 2 Classification {CEL00002313}.

<sup>172</sup> On the basis that they were the same product: see Roper email to BRE dated 12.06.14 {CEL00000964}.

<sup>173</sup> Polyol change: BASF Elastopir 1039/501 was changed to Elastopir 1039/503.

<sup>174</sup> See Change Note 486 dated 29 August 2012 {CEL00009887}.

<sup>175</sup> See emails between Ian Parker and Jodey Hammond in September 2012: *"there is a possibility the BBA could pick this up when they audit incoming chemical receipts, and they did specifically inform us that any new chemicals should be highlighted to them following prior audits when they found we had made a number of chemical changes and not told them about it"* {CEL00009516}.

<sup>176</sup> See J Mahoney email dated 13.08.12 {CEL00009925}: *"Although from a certification and claims point of view we can reduce or remove the levels... I have concerns on the overall fitness for purpose if we take it too far"*.

<sup>177</sup> See Minutes dated 19.05.15 *"Currently we do not know the actual blend of MDI/Polyol and other ingredients used to make a board. This means there is an unknown constituent to our boards that could play a huge part in... compliant analysis... process control and optimisation of board quality"* {CEL00008737}.

<sup>178</sup> See Dr Sarah Dane email dated 16.08.17 {CEL00000543}.



It seems likely that at the very least Phil Clark of BRE had some knowledge of the irregularities in the test, and facilitated Celotex in concealing this fact as the author of the Test Report.<sup>179</sup> The overwhelming likelihood is that he advised Celotex as to how the test could be passed.<sup>180</sup> Certainly by 6.11.14, attitudes in the market towards combustible insulation were changing; Berger and Roome met with BRE who seem to have described a “*growing uncertainty*” in the market, on what was an “*emotional*” topic, since people had been “*burnt by K15 approvals in the past*” and are more sensitive to insulation companies’ priority being sales rather than “*life safety*”.<sup>181</sup> Berger would later lament that the “*market is changing as is more knowledgeable about the technical requirements of insulation in ventilated facades above 18m*”.<sup>182</sup> BRE’s complicity in facilitating that situation and perpetuating it with Celotex, is of the utmost seriousness and appears a breach of BS ENISO/IEC 17025:2005<sup>183</sup>.

## 6.2.2 LABC

As explained at paragraph 6.1.1 above, obtaining an LABC certificate similar to K15’s was central to Celotex’s strategy. Rather than acting as any form of regulatory gatekeeper, as one might expect, the LABC appears to have been a weak link of which the manufacturers took full advantage. The lack of skill and care demonstrated by the LABC at times was shocking, not least when they advised Celotex that because RS5000 was Class 0 “*it can be termed a material of limited combustibility*” and could therefore be used above 18 metres.<sup>184</sup> The critical wording that Celotex required in their LABC certificate was, like K15, that RS5000 could be “*used with a variety of cladding systems*”, “*meets the criteria set out in BR 135*” and therefore “*is acceptable for use in buildings with storeys above 18m in height*”; it transpires that in order to achieve this aim, all Celotex had to do was ask.<sup>185</sup>

## 6.2.3 NHBC

Already in the throes of negotiations with Kingspan about its test data for K15, the NHBC was immediately sceptical of RS5000 as a new entrant to the high-rise market. The NHBC raised

<sup>179</sup> See Hayes’ First Witness Statement at [67] where he recounts a discussion between Roper and Clark about the 6mm MgO {CEL00010154}; Clark had Figure 18 (photo of the MgO) specifically drawn to his attention when Roper asked him to remove it from the Test Report {CEL00001350}.

<sup>180</sup> See Clark Witness Statement at [194] where he describes advice given to CX during the test {BRE00005768}; See also Roper Witness Statement at [5.29] and [5.31] where he describes advice given about improving chances of passing {CEL00010052}.

<sup>181</sup> See Berger email dated 06.11.14 {CEL00001259} and notes {CEL00001260}.

<sup>182</sup> See Berger email dated 20.01.15 {CEL00001273}.

<sup>183</sup> Not yet on Relativity but 2017 version at {BRE00005621}.

<sup>184</sup> See David Ewing email dated 02.01.14 {CEL00000939}.

<sup>185</sup> See Roper email to LABC providing the wording required {CEL00001995}, which was included in the Registered Detail {CEL00000009}.

serious queries about the validity of the test,<sup>186</sup> but they didn't appear to have noticed or been made aware of the key deception, namely, the use of MgO behind the critical thermocouples. This was no accident of course, since Celotex resolved to keep it from them.<sup>187</sup> The combination of increasing knowledge in the industry, and the NHBC's stricter approach to compliance, put Celotex in a difficult position. Customers requested further testing, desktop studies and letters of comfort, all of which KS were providing but which Celotex, initially, were not. This prompted Roome to propose that Celotex *stop* promoting RS5000 on NIIBC jobs until the issues with NHBC had been resolved, however he was overruled.<sup>188</sup> Any hopes that the NIIBC would continue down the path it had started and prevent RS5000 being used in non-compliant situations were dashed however when, regrettably, a *volte face* occurred in July 2016 and (to the surprise even of Celotex<sup>189</sup>) the NIIBC authorised the use of RS5000 even without a desktop study in certain situations, as explained at 3.2.4 above under "Other guidance".

## 6.3 Marketing and culture

### 6.3.1 Lambda values

These were deliberately understated by distorting the median: deleting unjustifiably large amounts of outlying data. Again, this is admitted by Celotex.<sup>190</sup> The motivation for misrepresenting the Lambda value was to make RS5000 a more attractive, more competitive, product. The lower the Lambda value, the better the level of thermal insulation, and the *thinner* the insulation can be. This made RS5000 a more attractive proposition to architects concerned with fitting insulation within narrow cavities and hitting (or exceeding) regulatory energy targets. Indeed, this is precisely why Celotex was selected for use on Grenfell Tower.<sup>191</sup>

### 6.3.2 Marketing Strategy

<sup>186</sup> See email from Dave White to Roper dated 29.09.14 explaining NHBC concerns in detail {CEL00001030}.

<sup>187</sup> See notes of Paul Evans and Roper on a whiteboard listing "NIIBC Concern/Challenge", "CY Response", "Action Required" and level of "Risk". In respect of the Gurn MgO (referred to as "*calcium silicate* at level 2"), the action was to "*remove last image of test report*" namely Figure 18, which was the only remaining evidence the MgO was used {CEL00002517}.

<sup>188</sup> See email chain dated 18-19 June 2015 {CEL00002942}.

<sup>189</sup> See Berger email dated 10.07.16 "*I'm unsure what to do with this info... I'll give Frans a call to understand what this actually means...*" {CEL00002045}; See also Hayes email dated 21.07.16: "*Very interesting document*" {CEL00003943}.

<sup>190</sup> See letter from Linklaters to GTT dated 21.11.17 {CEL00009813}.

<sup>191</sup> See Max Fordham email to Studio E dated 16.08.12 {SEA00005840}.

Despite an initial recognition by Celotex that the Kingspan route was wrong,<sup>192</sup> the approach they eventually adopted was strikingly similar. Both tested an unrepresentative cladding panel and used over-engineered cavity barriers, and sought to widen the test's application through desktop studies. In Celotex's case, they knew that testing a representative panel meant testing ACM, but since they knew ACM would fail,<sup>193</sup> they rejected this option. Like Kingspan, they also rejected the route of honesty and transparency, since this would involve "re-education" of the market about the system specific nature of BR 135. They also rejected the option of opting out the above 18m market altogether, despite recognising that the "*product realistically shouldn't be used behind most cladding panels because in the event of a fire it would burn*".<sup>194</sup> The decision was made to opt for the Kingspan route, most likely at a meeting on 04.11.13 which was supposedly attended by senior members of Celotex, including the Managing Director (Craig Chambers).<sup>195</sup> Like KS, Celotex also adopted imprecise and generic wording in product literature to create the impression that the product was universally suitable above 18 metres.<sup>196</sup> Celotex also deliberately chose to market RS5000 as Class 0 (even though they knew they were supposed to use the Euro-classification<sup>197</sup>) because it sounded better than Class D, which is what it was.<sup>198</sup>

Notwithstanding their knowledge that RS5000 had not been tested with ACM panels, Celotex not only permitted RS5000 to be used on such projects but used them as case studies in their marketing campaign; ironically, Grenfell Tower was one of them.<sup>199</sup> Celotex adopted a push/pull marketing strategy as their route to market: in short, they got distributors such as SIG

<sup>192</sup> See for example, notes dated 24.06.13 "Astonished as to how K15 is used so widely..." {CEL00001863}; also J Roper's research email dated 1.11.13: "trying to do the right thing requires a complete re-education of the market and this would require a huge campaign and probably a lawsuit" {CEL500000716}.

<sup>193</sup> See Roper email dated 31.10.13: "The big issue we have is that we know a standard aluminium panel will melt and amount to a failure in this particular test [BS 8414]" {CEL00000735\_0006}.

<sup>194</sup> See J Roper's research email dated 1.11.13 {CEL500000716}; See also slides re chances of passing {CEL00001196\_0015}: "ACM Panel with Improve Barrier System (~50%)".

<sup>195</sup> See Roper slides presented at meeting on 04.11.13 {CEL00001196\_0014}; also Witness Statement of Paul Evans at Paragraph [77] {CEL00010058}.

<sup>196</sup> See for example the RS5000 datasheet which states that RS5000 "Is the first PIR insulation board to successfully test to BS 8414-2:2005, meets the criteria set out in BR135 and therefore is acceptable for use in buildings about 18 metres in height" {CEL00000409}.

<sup>197</sup> A mandatory requirement once the CPR 2013 was brought into force, not that this concerned Celotex: See emails between Celotex and the BBA on this topic in 2016 {CEL00007411}: "I understand the position of the CPR but my view remains... the removal of our Class 0 and Class 1 fire performance could lead to an increase in enquiries to Celotex of whether we still hold these accreditations".

<sup>198</sup> See Joe Mahoney email dated 04.04.17 {CEL00004252}.

<sup>199</sup> See {RYD00047871}.

to *push* the product for them onto architects, and contractors and installers who were motivated to *pull* the product onto the building through discounts which increased their profit margins.<sup>200</sup>

## **7. Arconic PE 55 cassette cladding panel**

Following the ADB linear route, the requirement for the outer skin of the external wall was Class 0 or Euroclass B. To comply with the Building Regulations and the linear route it is submitted that a Limited Combustibility/A2 core would have been required. The PE cored product used is a Class E and, as the Chair has found, clearly non-compliant.

### **7.1 Test reports available at the time of supply to Grenfell (May 2015)**

#### **7.1.1 Class 0: tests under BS476 Parts 6 & 7**

(1) The position is stark: at the time of supply to Grenfell, Arconic had never obtained a test report showing that the product used at Grenfell was Class 0. The lacuna in Class 0 test data for the PE product had been flagged to Arconic's senior management from at least 2006, by its UK sales manager, who expressly referred to his concerns about "*misrepresentation to the market*."<sup>201</sup> This lack of Class 0 certificate for PE 55 would have been apparent to anyone with access to Arconic's *Toolbox*<sup>202</sup> which contained a Class 0 report for Reynobond 55 FR<sup>203</sup> but no equivalent Class 0 report for Reynobond 55 PE. Email exchanges in July 2015 make clear that Deborah French, Vince Meakins and Gwenaëlle Derrendinger would have been aware of the lack of certificate.<sup>204</sup>

(2) It is particularly telling that Arconic's BBA application form for Reynobond 55,<sup>205</sup> despite (misleadingly) claiming Class 0 performance for Reynobond 55 generally, attached only Class 0 test reports for FR<sup>206</sup> and no BS476 Part 6&7 at all for its PE product. If Arconic had been in possession of any Class 0 test reports for Reynobond 55 PE, the BBA application would have been the time to produce them. The BBA's failings to interrogate this absence of data are explored further at [7.2].

(3) Arconic does not appear to dispute that it has never had BS 476 Parts 6&7 test data demonstrating that the Reynobond 55 PE panel used on Grenfell obtained Class 0, despite marketing its product as such. The high point of Arconic's evidence is a lacklustre allusion to

<sup>200</sup> See CX RS5000 Launch slides {CEL00008669\_0057}.

<sup>201</sup> {MET00064988\_0021} to {0019}.

<sup>202</sup> Weirle par 116 {MET00053105\_0030}.

<sup>203</sup> Exova Warringtonfire class 0 summary report ref. 322844 & 322845 {BBA00000157\_0067}.

<sup>204</sup> {MET00053180\_0001} to {MET00053180\_0003}.

<sup>205</sup> {BBA00000157\_0026}.

<sup>206</sup> Exova Warringtonfire reports 132316 {BBA00000050} and 132317 {BBA00000053}.



a miscellany of historic Class 0 test results for other unrelated PE products.<sup>207</sup> This ought not to distract. Dr Lane has confirmed that none of these test reports are relevant to the compliance of the cladding panels installed on Grenfell<sup>208</sup> and in any event according to Arconic's own records (in respect of Reynobond 160 PE reports) had expired almost ten years prior to the supply to Grenfell Tower.<sup>209</sup>

## 7.1.2 Tests under EN13501-1

(1) Arconic's testing of Reynobond PE to EN 13501-1 revealed a significant disparity in performance between PE riveted and PE cassette. The earlier tests on PE riveted in 2005<sup>210</sup> and in 2011<sup>211</sup> resulted in Class B. In contrast, when PE cassette was tested in 2005,<sup>212</sup> the cassette sample failed to such an extent that the test had to be stopped after 850 seconds, with the result that the only classification could be Class E using the EN ISO 119252 test criteria.<sup>213</sup>

Remarkably, Arconic took the view that the PE product (regardless of whether formed into cassette or riveted) could be held out as Class B.<sup>214</sup> This is reflected in both Arconic's marketing materials<sup>215</sup> and in discrete advice communicated by Arconic to individual customers.<sup>216</sup>

(2) Little credence should be given to the disingenuous claim now made by Arconic that it considered the 2005 cassette result to be simply an "aberration."<sup>217</sup> This is contradicted by internal emails in April 2005, in which Arconic privately acknowledge that the 2005 Class B report was valid only for PE riveted, but not cassette<sup>218</sup> and actively sought to avoid disclosure of the 2005 PE cassette report to customers on the basis that "we're not "clean.""<sup>219</sup>

<sup>207</sup> Wehrle 34 {MET00053105\_0010} and 46 {MET00053105\_0013}.

<sup>208</sup> (Lane Phase 1 Supplemental report par 11.9.1-11.9.18 {BLAS0000011\_0030} and Appendix O par O19.1.5. {BLAS0000036\_0103}.

<sup>209</sup> {MET00053158\_P04} referring to Warringtonfire reports 70707 and 70708 {ARC0000357} dated 9 May 1997 as having expired on 9 September 2005.

<sup>210</sup> CSTB classification report RA05-0005A dated 7.1.05 {ARC00000358}.

<sup>211</sup> CSTB classification report RA11-0032 dated 9.2.11 {ARC00000383}.

<sup>212</sup> CSTB fire test report RA05-0005B dated 7.1.05 {ARC00000536}.

<sup>213</sup> Lane Phase 1. Supplemental report. Appendix O. par O12.3.9 {BLAS0000036\_0056}. In 2011, further testing on PE cassette gave a formal classification of class E: CSTB classification report RA11-0244 {ARC00000386}.

<sup>214</sup> Wehrle, par 35 {MET00053105\_0010} and par 53 {MET00053105\_0015}.

<sup>215</sup> {ARC00000377}; {BBA00010740\_0103}.

<sup>216</sup> {MET00053158\_P04\_0005}.

<sup>217</sup> Wehrle, par 53 {MET00053105\_0015}.

<sup>218</sup> Wehrle-Guedziejko email 25.4.05 {MET00053158\_P03\_019S}.

<sup>219</sup> 5.7.10 Wehrle-Moyes email exchange {MET00053158\_P04\_0002}. See also 16.3.10 Wehrle-Moyes email exchange in which Wehrle described the fact that PE cassette doesn't obtain Class B as "VERY CONFIDENTIAL!!!" {MET00064988\_0125}.

Appalling as the deliberate eliding of the test performance for PE riveted and PE cassette is, the criticisms of Arconic's testing under EN 13501-1 extend yet further: serious questions must be asked about the reliability of the Class B results for PE riveted obtained in 2005 and 2011. In internal Arconic email exchanges, Wehrle admits that the tests resulting in Class B for PE riveted "*are not really reflective of the riveted system in general*"<sup>220</sup> and that the Class B result was obtained by "*arranging*" the system to pass.<sup>221</sup> How exactly the tests were manipulated remains unclear. However, it is of note that the 2005 and 2011 tests used a 50mm cavity. Wehrle appears to admit that the cavity should have been 20mm, rather than 50mm, as the former is how the panels are in fact used in practice.<sup>222</sup> It is well established that the width of the cavity is critical to fire development; either too wide or too narrow can halt development. Wehrle himself admits that changing the air gap can influence the results obtained in tests.<sup>223</sup> These are the only reports disclosed in which PE riveted obtained Class B. Following these tests, in January 2014, CSTB classification report RA13-0333 expressly cancelled and replaced the 2005 and 2011 tests and gave PE riveted Class E.<sup>224</sup> Thereafter PE riveted increased to Class C in December 2014.<sup>225</sup>

(3) The fact that this questionable testing and misleading marketing was undertaken against a backdrop of brazen acknowledgment within Arconic of the lethality of PE on facades, demonstrates Arconic's culpability. The dangers of PE on facades were repeatedly flagged to Arconic's senior management (possibly from 2005, see below) but at latest from 2009.<sup>226</sup> In April 2015 Wehrle made clear to the US president of Arconic Building and Construction systems that PE is Euroclass C-E and flammable and should not be used on buildings over 8-10m depending on country.<sup>227</sup> Whilst Wehrle's stark warning in 2015 that all projects must urgently be switched to FR<sup>228</sup> was implemented in France shortly afterwards<sup>229</sup> the UK market was being pursued by Arconic as early as January 2006 when it acknowledged the need for a

<sup>220</sup> 25.4.13 Wehrle-Moyes email exchange {MET00064988\_0121}.

<sup>221</sup> 24.6.16 Wehrle – Kasyanik email exchange {MET00064988\_0129}.

<sup>222</sup> Wehrle par 64 {MET00053105\_0017} and {\_0018} and Wehrle-Bauer email exchange of 4.7.11 {MET00053158\_0184}.

<sup>223</sup> Wehrle par 64 {MET00053105\_0018}.

<sup>224</sup> CSTB classification report RA13-0333 dated 31.1.14 {ARC00000393}.

<sup>225</sup> CSTB classification report RA14-0339 {ARC00000397}.

<sup>226</sup> Wehrle-Schmidt email dated 17.7.09 {MET00053158\_P10\_0130} and Wehrle-Schneider email of 30.6.11 {MET00053158\_P04\_0027}.

<sup>227</sup> Wehrle email to Pernah 26.4.15 {MET00053157\_0261}.

<sup>228</sup> Wehrle-Marichev email 29.6.15 {MET00053158\_P05\_0014}.

<sup>229</sup> Flacon email of 3.5.16 {MET00053158\_P06\_0099}.

UK strategy<sup>230</sup> and subsequently in March recognised that 50% of the market in the UK was public sector and to compete it required a BBA certificate.<sup>231</sup> The fate of the UK market appears to have been sealed at a meeting in July 2011, the minutes of which reveal a conscious decision to push PE onto markets which would still accept it as it was becoming unusable in Europe.<sup>232</sup> With utter cynicism, Arconic deemed concerns about the dangers of PE (which Wehrle suggests were evident as early as 2005) “*anti-commercial*.”<sup>233</sup> Arconic was reminded of these dangers from seemingly 2005 until Grenfell by every cladding fire, of which it was acutely aware including in October 2015<sup>234</sup>. Arconic even had the audacity to misrepresent its PE and FR products were Class 0 in December 2015,<sup>235</sup> despite by then a spate of cladding fires.

(4) Finally, as Reynobond 55 was covered by harmonised standard EN 13501-1 as well as Technical Assessments from CSTB,<sup>236</sup> as explained at paragraph 3.1 above (and contrary to the BBA’s erroneous analysis<sup>237</sup>), Arconic was required to have either CE marked the product or drawn up a DoP. It failed to do so, in breach of the CPR 2013.

## 7.2 Certification: dealings with certification bodies and test houses

7.2.1 The BBA’s dealings with Arconic is characterised by failings of governance, technical competence and processes, in breach of BS EN 45011:1998<sup>238</sup> which ultimately proved to be perilous

In terms of governance, the inappropriate levels of deference paid by the BBA to Arconic’s demands<sup>239</sup> and “*client*” experience<sup>240</sup> is a striking inversion of the proper relationship between certification body and applicant. This distorted dynamic perhaps explains the BBA’s

<sup>230</sup> Didier Scheidecker email to Guy Scheidecker item “2 Commercial Area 4 UK” records a claim resulting in stripping cladding and “4 Technical issue” records to the need to decide how to proceed with BBA and CWCT {MET00053158\_P13\_0158}

<sup>231</sup> Meeting in Luton 21.3.06 Scheidecker and Colin Southgate and ors to “Discuss organize and plan the action of the UK see item 6 strategy 2006” {MET00053158\_P13\_0162}

<sup>232</sup> {MET00053158\_P04\_0035}

<sup>233</sup> Wehrle-Baillon email of 29.6.15 {MET00053158\_P05\_0014}

<sup>234</sup> Email to Wehrle and others attaching photos of fire in King Fahed Medical Centre Riyadh which moved Wehrle to remark “FR showed a very good behaviour in PE the fire would have spread over the entire height of the tower” {MET00053158\_P10\_0163}

<sup>235</sup> {MET00053158\_P03\_0151}

<sup>236</sup> CSTB Technical Assessments 2/04-1083 {MET00053158\_P14\_008} and 2/07-1244 {MET00040847\_0002}.

<sup>237</sup> Wehrle 31 {MET00053105\_0009}.

<sup>238</sup> {BSI00001732}

<sup>239</sup> See for example Arconic’s “threat to stop all dealings with BBA unless a satisfactory solution was found re both the above potential approvals” at BBA-Arconic meeting of 2.11.06 {MET00053158\_P14\_00114}.

<sup>240</sup> See for example BBA email to Arconic of 27.9.07 “...please rest assured that every effort is being made to complete the project in the shortest possible time.” {MET00040840\_0009}.

spectacular failure to probe Arconic's inadequate test data and BBA's insouciance, in the face of Arconic's lack of engagement in the review process.<sup>241</sup>

7.2.2 Arconic's willingness to mislead permeated the entire course of its dealings with the BBA. In its original application<sup>242</sup> Arconic provided only the favourable Class B report for PE riveted<sup>243</sup> but not the corresponding test report for PE cassette.<sup>244</sup> It claimed Class 0 performance for Reynobond 55 generally<sup>245</sup> whilst supplying Class 0 test reports for FR only.<sup>246</sup> Upon receipt of the draft certificate<sup>247</sup> replete with misrepresentations on fire performance, Arconic stood silent. In subsequent reviews, Arconic consistently failed to disclose unhelpful test material, notably repeated Class E reports for PE cassette<sup>248</sup> and Class C reports for PE riveted.<sup>249</sup>

7.2.3 Serious questions must also be raised about the BBA's technical competence, in light of the conclusions it published in certificate 08/4510. In particular, that the PE panels may be regarded as having a Class 0 surface<sup>250</sup> apparently based on an erroneous inference drawn from the claimed Class B result<sup>251</sup> and its acceptance of an image of a high-rise building for the certificate cover page<sup>252</sup> implicitly suggesting certified use of the product over 18m, with no attempt at correction made by the BBA until November 2016.<sup>253</sup>

7.2.4 In terms of processes, the "confirmation certificate" procedure<sup>254</sup> was clearly deficient. Despite its understanding that CSTB would be conducting the regular surveillance of the Reynobond 55 product from the date of issue in 2008,<sup>255</sup> it was not until approximately 6 years later in 2014 that the BBA realised it had never received any surveillance reports.<sup>256</sup> Although certificate 08/4510 was based on CSTB Technical Approvals No. 2/04-1081 and 2/01-845<sup>257</sup>

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<sup>241</sup> {BBA00008663}.

<sup>242</sup> {BBA00000157\_0026} Arconic had previously initiated the application process in 2004 {MET00053158\_P13\_0122} but this was later abandoned.

<sup>243</sup> {BBA00010717}.

<sup>244</sup> Albon par 43 {BBA00000158\_0012}.

<sup>245</sup> {BBA00000157\_0026} section 1.3.

<sup>246</sup> Warringtonfire test reports 132316 {BBA00000050} and 132317 {BBA00000053}.

<sup>247</sup> {MET00040844\_0008}.

<sup>248</sup> CSTB classification reports RA11-0244 dated 12.10.11 {ARC00000386} RA13-00333 dated 31.1.14 {ARC00000393} RA13-0333 dated 4.12.14 {ARC00000395}, RA15-0201 dated 22.9.15 {ARC00000405}.

<sup>249</sup> CSTB classification reports RA14-0339 dated 4.12.14 {ARC00000397} and RA15-0200 dated 22.9.15 {ARC00000402}.

<sup>250</sup> {BBA00000047}.

<sup>251</sup> Albon, par 69 {BBA00010723\_0018} and {0019}.

<sup>252</sup> {MET00053158\_P16\_0009} and {\_0011}.

<sup>253</sup> {BBA00010742\_0202}.

<sup>254</sup> Hayes, par 38 {BBA00010784\_0009}.

<sup>255</sup> Albon, page 3 {MET00040807\_0003}.

<sup>256</sup> {BBA00010741\_0241} Note that it appears that CSTB did in fact conduct surveillance of Merxheim, albeit BBA did not receive the reports {MET00053158\_P16\_0186} and Wehrle par 194 {MET00053105\_0045}.

<sup>257</sup> {MET00040847\_0002}.



(which comprise distinct reports for cassette and riveted systems) BBA did not consider whether it also ought to apply separate certifications for each system<sup>258</sup> or query the lack of test data supplied for the cassette system.<sup>259</sup> As to the fire test reports supplied by Arconic upon which the BBA based its conclusions on fire safety,<sup>260</sup> these appear to have been accepted at face value without further scrutiny. The impression given is of a toothless and inept organisation at the beck and call of its revenue generating clients.

### 7.3 Arconic marketing practices

Having set its sights on the UK, Arconic's "action plan" for this market was devised at a meeting in Luton in March 2006.<sup>261</sup> The action points tasked to Colin Southgate, Arconic's UK sales manager at the time, included targeting architects<sup>262</sup>, liaising with fabricators<sup>263</sup> and establishing a project list to improve "visibility of the running opportunities."<sup>264</sup> Obtaining BBA certification was recognised as an urgent priority.<sup>265</sup> By 2013 there was a clearly formulated strategy of targeting architects and investors together with main contractors and installers, pushing the aesthetics of the product onto architects through CPD. This would all be done by six "Approved fabricators", Arconic itself in the UK and Taylor Maxwell<sup>266</sup>.

The strategy succeeded: by 2014, Southgate's successor, Deborah French, was reporting a long list of UK projects that she was confident Arconic would win.<sup>267</sup> Fatefully, this list included Grenfell Tower - an opportunity brought to Arconic by CFP<sup>268</sup>, following Southgate's establishment of the relationship in 2007,<sup>269</sup> after the Luton meeting. Arconic maintains its disingenuous stance that it is not involved in selling to specific projects,<sup>270</sup> but Grenfell Tower in fact epitomises Arconic's sophisticated and deliberate marketing strategy in action.

## 8. Siderise

<sup>258</sup> Albon, par 44 {BBA00000158\_0012}.

<sup>259</sup> Albon, par 43 {BBA00000158}.

<sup>260</sup> CSTB classification reports RA-0005A and RA-06-0372. Warrington Fire reports 132317 and 132316 {BBA00000001}.

<sup>261</sup> {MET00053158\_P13\_0162}.

<sup>262</sup> {MET00053158\_P13\_0163} section 9 "Mail shoot to architects".

<sup>263</sup> {MET00053158\_P13\_0164} section 3 "Point of the customers".

<sup>264</sup> {MET00053158\_P13\_0165} section 9 "Marketing".

<sup>265</sup> {MET00053158\_P13\_0164} section 5 "Technical tools".

<sup>266</sup> Debbie French Sales meeting presentation June 2013 this strategy pictorially represented at {MET00019917\_0010} to {\_0011}.

<sup>267</sup> French email to Froehlich 6.6.14 "Projects in pipeline and action plan to achieve the forecast" {MET00053161\_0023}.

<sup>268</sup> Blades 7.18 {CEP000008838\_0008}.

<sup>269</sup> {CEP00045769} {CEP00045770}.

<sup>270</sup> Wehrle 97, {MET00053105\_0026}.

## **8.1 Tests available at date of supply to Grenfell**

### **BS476 part 20 and TGD 19**

Siderise claims to have pioneered horizontal open state cavity barrier testing,<sup>271</sup> conducting testing to the “principles” of BS 476 part 20<sup>272</sup> and subsequently to TG3 N64,<sup>273</sup> said to be substantially similar to TGD 19.<sup>274</sup>

## **8.2 Absence of relevant test and Siderise marketing failures**

Dr Lane confirms that none of Siderise’s pre-Grenfell tests (conducted between concrete blocks) are representative of the onsite installation at Grenfell and cannot be relied upon in that context.<sup>275</sup> Siderise now makes no secret of the inadequacy of testing for open state cavity barriers<sup>276</sup> but its marketing material failed to disclose this reality and in fact promoted its product as a bespoke solution for rainscreen applications.<sup>277</sup> Even following the fire, Siderise delivered CPD noting the requirement that the product should have been tested to be shown to meet the performance standard<sup>278</sup>, but, beyond showing an image of how the product is tested (namely between concrete beams, wholly unlike a rainscreen cladding system) nevertheless continues to advertise its product as fit for use in rainscreens. The fact that it has apparently passed some BS8414 tests, which are by nature system specific, is insufficient justification for advertising the Lamatherm barriers as being of general application within rainscreen cladding systems.

## **9. Windows**

### **9.1 Window infill panels: Aluglaze**

Aluglaze Styrofoam panels were selected for use as window infill panels at Grenfell Tower. The panels were comprised of a 25mm Styrofoam (extruded polystyrene foam) core sandwiched between two 1.5mm thick sheets of aluminium.<sup>279</sup> No fire data exists for this product; however extruded polystyrene is a combustible material and the use of core insulating panels such as these is subject to express warnings in ADB.<sup>280</sup>

<sup>271</sup> Swales 39 {SIL00000306}.

<sup>272</sup> {SIL00000290} {SIL00000224}. See also {SIL00000211} and {SIL00000223}.

<sup>273</sup> {SIL00000212}.

<sup>274</sup> Swales 50 {SIL00000306\_0013}.

<sup>275</sup> Lane Phase I at 11.20.46 {BLAS00000011\_0077}. Similar criticisms re vertical cavity barriers at {\_0083}.

<sup>276</sup> Mori 43 and 54 {SIL00000298\_0011} {\_0014}. Limitations are recognised in TGD 19 {SIL00001540\_0003}.

<sup>277</sup> {SIL00000325\_0004} {SIL000002195} {SIL00000229} despite limitation in {SIL00000211\_0004}.

<sup>278</sup> 15.11.19 “Open-State cavity barriers for use [in] rainscreens” by Chris Hall {KIN000008820\_0030} at {\_0037}.

<sup>279</sup> See Harley Specification Notes {HAR00003869}.

<sup>280</sup> Lane Phase I, 8.10.36 {BLAS00000008\_0061} and Appendix F ADB {CLG00000224\_0147}.

## 9.2 Window insert panel and extract fan

Although the specification indicates use of Kingspan TP10 for the insert panel, Dr Lane considers that the same Aluglaze as above was in fact used instead.<sup>281</sup> Whilst there is no fire test data available for the extract fan, Dr Lane confirms that it was constructed with a combustible plastic housing.<sup>282</sup>

## 9.3 EPDM and uPVC reveals

There is no known brand information or fire test data for the EPDM membrane fitted between the concrete columns and new window frames. However EPDM is a combustible material,<sup>283</sup> as is the uPVC used in the interior window reveals.<sup>284</sup>

## 9.4 Celotex TB4000 / Kingspan Thermapitch TP10 used behind uPVC reveals

Various BBA certificates<sup>285</sup> for TB4000 describe its fire performance as “*No Declared Performance*”, Class F or Class 1.<sup>286</sup> A DoP of 1.12.16 confirms “*No Performance Determined*” for reaction to fire.<sup>287</sup> Furthermore it was not even Class 0 as TB4000 is manufactured on the Hipchen line in respect of which there was no BS476 Parts 6&7 test.<sup>288</sup> TP10 has been tested to EN13501-1, generally obtaining Class D or Class E, with the last Class B result recorded in 2003.<sup>289</sup> It has also been tested to BS 476 Parts 6&7, obtaining Class 1.<sup>290</sup>

## 10. Conclusions

10.1 The Inquiry will of course explore the behaviour of the manufacturers and the test houses and certifiers with whom they interacted further in Module 6, but it is plain from the evidence available within Module 2 that the manufacturers are not humbled by the Grenfell fire, nor are their behaviours altered. Only Celotex openly admits past wrongdoing, whereas Arconic and Kingspan only seek to blame others. They fail to admit that their products were not as advertised and were highly flammable, even though they were well aware of such things many years before the Grenfell fire.

<sup>281</sup> Lane Phase 1, 8.10.41 {BLAS0000008\_0062}.

<sup>282</sup> Lane Phase 1, 8.10.40 {BLAS0000008\_0062}.

<sup>283</sup> Lane Phase 1, 8.8.2 {BLAS0000008\_0021}.

<sup>284</sup> Lane Phase 1, 8.7.8 {BLAS0000008\_0016}.

<sup>285</sup> {BBA00000007} {BBA00000010} {BBA00000020} {BBA00000021} {BBA00000022} {BBA00000026} {BBA00000030}.

<sup>286</sup> {BBA00000001\_0003} explains TB4000 is stated to achieve Class 1 on the basis of BRE Report 253274 {BBA00000019}.

<sup>287</sup> {CEL00002578\_0002}.

<sup>288</sup> Dean O’Sullivan paragraph 49 {CEL00010027} and paragraph 6.1.2 above.

<sup>289</sup> Lane Phase 1, Appendix E, E5.2.7 and table E10 {BLAS0000026\_0058} and {\_0059}.

<sup>290</sup> Lane Phase 1, Appendix E, E5.2.5 and table E10 {BLAS0000026\_0058} and {\_0059}.

10.2 As to Kingspan, it is hardly reassuring that one of its responses to the fire was to launch in 2018 a new business known as “*Kingspan facades*” which it says will be “*underpinned by an industry leading Compliance Assured scheme....This scheme, an industry first, shows Kingspan taking action to address the call for higher standards of installation and oversight on construction projects identified in the Hackitt Review...A key element of Compliance Assured is that Kingspan will provide a prescriptive list of components for their BS8414 Tested systems, working with a limited number of recommended suppliers*.”<sup>291</sup> (emphasis added). If that last part sounds eerily familiar, that is likely because it echoes Deborah French of Arconic’s remarks in 2015 explaining that PE was only released through approved fabricators on being required to explain the inherent flammability of PHS5.<sup>292</sup>

10.3 Whilst trumpeting itself as a paragon of Hackitt motivated virtue, KS is simultaneously giving the clear impression that they will continue to exploit the BS8414 route (see par 4.3(1) above).

#### 10.4 What, if anything, might be done in advance of a final phase 2 Report?

Given the dangers posed by the present testing regime and the degree of manufacture and institutional abuse it has enabled, it is imperative that during the course of the Module 2 hearings the Panel should give careful and continuing consideration to whether urgent recommendations must be made before the end of Phase 2, including a recommendation that the Government should urgently review the premise of its Building Safety Programme. Whilst we recognise the risks and difficulty in making individual recommendations in circumstances where fundamental overhaul of the regulatory system and underlying testing regime is required, and the Module 6 evidence has yet to be heard, the Panel should nevertheless be prepared to make such immediate recommendations as are necessary to secure public safety.

**Stephanie Barwise QC**  
**Marie Claire O’Kane**  
**Dalton Hale**

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<sup>291</sup> <https://www.kingspan.com/group/news-insights/kingspan-news-en/kingspan-launches-new-facades-business>

<sup>292</sup> “At this stage we will continue to offer both PE & PR core and continue the close working relationship we have with our Approved Fabricators to make sure the right technical support, Reynobond Specification and Materials are being used and installed on Reynobond projects”. {CEP00049717}