

KINGSPAN INSULATION LIMITED

CLOSING STATEMENT, PHASE 2, MODULE 6

1. Kingspan Insulation's Phase 2 Module 6 Closing Submission is addressed in the following parts:
 - A) **The scope of Module 6;**
 - B) **The dangers of a simplistic reliance on assumptions about combustible, non-combustible and limited combustibility materials**
 - C) **The nature and speed of the spread of the Grenfell Tower fire was a result of the PE-cored ACM cladding and not the type of insulation.**
 - D) **The Grenfell Tower refurbishment did not comply with the building regulations in force at the material time.**
 - E) **Large scale whole system testing of cladding systems is the most effective way to achieve safe cladding systems – not the linear route**
 - F) **Failure to consider relevant evidence in Module 6**
 - G) **Other matters arising during Module 6**
 - H) **Conclusions**

A. THE SCOPE OF MODULE 6

2. The Inquiry stated that Module 6 would cover four broad areas: firefighting, fire risk assessment, testing and certification, and Government¹. These submissions will focus on the last two areas – testing/certification and Government.
3. In respect of testing and certification, the Inquiry stated that:

“During the course of Module 2 the Inquiry examined in detail the fire testing, classification and certification of the specific external wall materials used on Grenfell Tower. In Module 6, the Inquiry will broaden the scope of its

¹ Letter to the Core Participants from the Inquiry dated 1 June 2021

investigations into the regime for the fire safety testing and classification of construction products and systems. As well as hearing further evidence from key manufacturers about the testing, classification, certification and marketing of specific construction products, the Inquiry intends to explore in evidence the following matters:

- (a) The development of the various relevant standards and criteria relevant to fire safety for external wall arrangements, including testing to BS 8414/BR 135 and “Desktop Assessments”*
- (b) “Routes to Compliance” with the requirements of Part B of the Building Regulations and Approved Document B for external façade systems.*
- (c) The standards, procedures and operational practices of accredited fire test organisations such as the BRE and Exova in relation to the fire testing of external wall materials and systems.*
- (d) The standards, procedures and operational practices of certification bodies such as the British Board of Agrément and Local Authority Building Control.*
- (e) The system of accreditation for testing and classification bodies.*
- (f) The development of guidance in relation to the fire safety of external wall systems produced by manufacturers, industry associations and standards-setting organisations.*
- (g) The role of organisations such as the National House Building Council.*
- (h) The interaction between manufacturers, testing and classification organisations, certification and accreditation bodies, industry associations and standards-setting organisations.*
- (i) The oversight or regulation of the regime for testing, classification and certification as a whole in relation to fire safety and performance in fire.*
- (j) The role of Central Government in any such oversight.”*

4. In respect of “Government” the Inquiry stated that:

“As well as examining any role played by Central Government in the testing and certification regime as outlined above, in Module 6 the Inquiry will undertake a close examination of the functional requirements of the Building Regulations and guidance in relation to fire safety. It is intended that this will include detailed consideration of:

- (a) the development and interpretation of the relevant Building Regulations and associated guidance;*

- (b) *Government policy on relevant aspects of fire safety and the evidential or other basis for such policies;*
 - (c) *reviews of and amendments to the Building Regulations and associated guidance, including consultations;*
 - (d) *fire safety research commissioned by the Ministry for Housing, Communities and Local Government and other relevant organisations, the conclusions drawn therein and any action taken by Government in relation to such research;*
 - (e) *Government handling of issues raised in relation to fire safety by external individuals and organisations.*
5. The Inquiry did not in fact widen the scope of its investigation to include a comprehensive and detailed consideration of the certification or testing of construction products regularly used in cladding, beyond those used on Grenfell Tower. Instead, the Inquiry conducted its examination of the wider construction industry and the regulatory regime through the narrow lens of the insulation products that were on the Grenfell Tower; we submit that this was a missed opportunity.
6. In particular, there was no meaningful consideration of certification and testing of products classified as “non-combustible”, “limited combustibility”, those rated A1/A2 and/or of the testing of systems comprising such products. Nor was there any meaningful consideration of evidence as to what testing had been carried out in respect of PE-cored ACM cladding in combination with non-combustible insulation, important following the emergence of details about the large scale testing commissioned by the Government in around 2000. Nor did the Inquiry take the opportunity to explore, in detail, the robustness of the current building regulations and the extent to which they may still fail to deliver safe cladding systems.
7. The Inquiry’s failure to widen the scope of its inquiry beyond the insulation used on the Tower was despite the fact that it has been clear for a long time that the nature and speed of the spread of the fire on Grenfell Tower would not have been materially different had non-combustible insulation been used behind the PE-

ACM cladding instead of PIR/phenolic insulation.² It is the capacity of, both combustible and non-combustible insulation to retain heat which is relevant in cladding fires involving PE-cored ACM, not the combustibility of the insulation. This has also been the conclusion of the expert reports of Professors Bisby and Torero. Module 6 provided an opportunity for the Inquiry to consider the safety of cladding systems and the fitness and suitability of the Building Regulations in the light of the known fact that the fire spread in the Grenfell Tower fire would not have been materially different had non-combustible insulation been used. Instead, a large amount of time was spent in Module 6 traversing the same ground as Module 2 in relation to the testing and certification of the very small amount of K15 insulation used on Grenfell Tower.

8. Furthermore, the Inquiry did not take the opportunity in Module 6 to fully examine the adequacy of the regulatory regime by carrying out a proper assessment of the extent to which cladding systems which would be deemed to satisfy the “linear route” to compliance under the current building regulations (Approved Document B) might nevertheless be unsafe and fail to meet the requirements of BR 135 if tested to the BS 8414 standard or similar large scale system test requirement. This is despite the fact that it is evident that this is a significant issue of concern raised by Professors Torero³ and Bisby⁴ in their expert reports for Module 7.
9. Regrettably, the expert reports of Professors Bisby and Torero were not made publicly available by the Inquiry until June 2022, well after the conclusion of Module 6⁵, despite the fact that they were received by the Inquiry in December 2021 and early January 2022. An opportunity was therefore missed to explore

² See Part C below

³ Torero, J Phase 2 Grenfell Tower Inquiry: Adequacy of the Current Testing Regime {JTOR00000006-003} section 12.3

⁴ Bisby, J Grenfell Tower Inquiry Phase 2 – BR135 Desktop Assessment Report {LBYP20000004}, paras 306, 315, 319, 326 and 334.

⁵ Contrary to the previous practice of the Inquiry on other occasions. The Inquiry has previously made expert reports publicly available many months before the experts have been called to give evidence; for example reports from Todd, Daeid, Bisby, Torero and Lane were published by the Inquiry in June 2018 and they then gave live evidence in October/November 2018.

many of the key issues raised in those reports as to the fitness for purpose of the building regulations (past and current) with witnesses in Module 6. Nor did the Inquiry explore with witnesses the extent to which relevant entities (including the BRE and the Government departments) might have been able to disclose test reports and data relating to tests undertaken in respect of a range of different cladding systems and utilising both combustible and non-combustible components, including insulation. As set out in section F below, this was another missed opportunity.

B. THE DANGERS OF A SIMPLISTIC RELIANCE ON ASSUMPTIONS ABOUT COMBUSTIBLE, NON-COMBUSTIBLE AND LIMITED COMBUSTIBILITY MATERIALS

10. In its opening statement to Module 6, Kingspan Insulation invited the Inquiry to consider questions about combustibility and whether assumptions about the performance of "combustible", "limited combustibility" and "non-combustible" products can be relied upon (as they are in respect of the linear route to compliance) to ensure that the whole cladding system is safe. Indeed, we invite the Inquiry to think critically about the use of binary "combustible" vs "non-combustible" language, and the assumptions that it creates.
11. Professor Bisby in his Phase 1 presentation very elegantly demonstrated that just because something is combustible does not mean that it will burn in all circumstances⁶.
12. Brian Martin added this regarding the meaning of "combustible":

"I think the problem with the word "combustible" is that it means different things to different people and different things at different times" and "If you're being precise about it, you would probably refer to a definition. I think you'll speak to some fire scientists who will tell you that everything is combustible, it's just a

⁶ Bisby Presentation to the Inquiry, 20 June 2018

question of how hot you get it. So “combustible” isn’t a binary question unless you’re using a specific definition”.⁷

13. Much of what follows in this statement illustrates the issues created by this reductive perspective on a set of complicated physical and chemical phenomena.

C. THE NATURE AND SPEED OF THE SPREAD OF THE GRENFELL TOWER FIRE WAS A RESULT OF THE PE-CORED ACM CLADDING AND NOT THE TYPE OF INSULATION.

14. It is critical to a proper understanding of the wider issues of testing, certification and regulation which are the subject of Module 6, to identify which failings were causative of the tragedy. Those failings – the ones that actually caused the fire to spread as it did - are the ones which should be the absolute priority of the Inquiry and must never be allowed to happen again. The second step is to identify how and why the failings which were causative of the tragedy were able to occur, notwithstanding the regulatory regime which is intended to prevent such tragedies. The third step is to identify what needs to be done to ensure that such failings never occur again.
15. It is only after those primary steps have been taken that other failings fall to be explored – i.e. failings which were **not** causative of the tragedy but which should nevertheless not have occurred and in respect of which action should be taken to prevent such failings from reoccurring as far as reasonably possible.
16. The primary cause of the nature and speed of the Grenfell Tower fire has already been correctly and unequivocally identified by the Inquiry and its experts: it was a result of the presence of Arconic’s PE-cored ACM cladding on the tower. The Inquiry’s Phase 1 Report states that *“...the principal reason why the flames spread so rapidly up the building was the presence of the ACM panels with*

⁷ Transcript 17 March 2022, Day 250, pages 107 lines 17-25 and 108 line 1

polyethylene cores which had high calorific value, melted and acted as a source of fuel for the growing fire."⁸

17. The Phase 1 Report also stated that the Chairman had commissioned the Inquiry experts to carry out further investigations to quantify the contribution made to the rate and extent of vertical flame spread by the other materials - PIR and phenolic foam insulation boards and the EPDM membrane and the Aluglaze window infill panels behind the ACM panels.⁹ The Chairman explained that obtaining a better understanding of how these materials behave in conjunction with each other when exposed to fire "*would be in the public interest*".¹⁰

18. As well as identifying that the PE-cored ACM cladding was responsible for the spread of the Grenfell Tower fire, the Inquiry's experts have also now been able to identify, very clearly, what was **not** responsible for the nature and speed of the spread of the fire over the tower. It is clear from the expert evidence that the combustibility of the insulation used behind the PE-cored ACM was **not** responsible for the nature and speed of the spread of the fire. Indeed, the testing conducted by the experts instructed by the Inquiry has demonstrated that substituting non-combustible mineral fibre insulation for combustible PIR and phenolic insulation made no material difference to the speed of the spread of the fire on the test rigs designed to simulate the cladding system on the Tower.

19. The Inquiry's expert opinion evidence is also consistent with the extensive modelling undertaken by Efectis which has been published in peer-reviewed

⁸ Grenfell Tower Inquiry Phase 1 Report {INQ00014817} paragraph 23.52

⁹ Grenfell Tower Public Inquiry Phase 1 Report {INQ00014817} paragraph 23.52 "I also think it more likely than not that the presence of PIR and phenolic foam insulation boards behind the ACM panels (and perhaps the EPDM membrane and the Aluglaze window infill panels) contributed to the rate and extent of vertical flame spread, but it is not possible at this stage to quantify the extent of their respective contributions. Further investigation which is to be the subject of evidence in Phase 2 may enable me to come to a more definite conclusion about these matters in due course. I should like to be able to do so, because I think it would be in the public interest to obtain a better understanding of how these materials behave in conjunction with each other when exposed to fire. "

¹⁰ Grenfell Tower Inquiry Phase 1 Report {INQ00014817} paragraph 23.52

journals.¹¹ The modelling demonstrates that the nature and speed of the spread of the fire would **not** have been materially different had non-combustible insulation, such as mineral fibre, been used instead of PIR insulation.

20. It is the insulating properties of the insulants used behind PE-cored ACM cladding that is relevant to the fire performance of the cladding, rather than whether those insulants are combustible or non-combustible. This is emphasised by Professor Bisby in his report "Grenfell Tower Inquiry Phase 2 Experiments Work Package 2 – System Interactions" dated 15 December 2021 as follows:

- a. *"the ability of the insulation to retain energy within the system and promote rapid and extensive heating of the ACM is the decisive factor for foil faced insulation products, rather than its combustibility per se"*¹²;
- b. Indeed, the systems which incorporated mineral fibre grew to full involvement of the PE-cored ACM in the fire "**more rapidly**" than systems using combustible insulation.¹³; and
- c. *"it must be noted that the mineral fibre insulation without foil facers also experienced growth to full involvement of the ACM, thus demonstrating that combustibility of the opposing face insulation is not a pre-requisite for rapid and extensive fire growth and spread."*¹⁴

21. Thus, the two facts arising from this expert evidence which are highly pertinent to Module 6 are:

- a. Reynobond PE ACM was the primary cause of the nature and speed of the spread of the fire on Grenfell Tower; and

¹¹ {INQ00014906}, {INQ00014908}, {INQ00014909}, {INQ00014910}, {INQ00014914}, {INQ00014916}, {INQ00014918}, {INQ00014920}

¹² Bisby, L Phase 2 Experiments: Work Package 2 {LBYWP200000001} paragraph 686

¹³ Bisby, L Phase 2 Experiments: Work Package 2 {LBYWP200000001} paragraph 685

¹⁴ Bisby, L Phase 2 Experiments: Work Package 2 {LBYWP200000001} Paragraph 690

- b. Both non-combustible mineral fibre insulation and combustible PIR and phenolic insulation retain energy in the system. Such inherent insulating properties will inevitably promote heating of the ACM and it is this factor which is relevant to the degradation of the ACM. Thus the nature and speed of the spread of PE-cored ACM fires are not dependent on the type of insulation (combustible or non-combustible). Insulation is a regulatory requirement mandated by Part L of the Building Regulations therefore its presence, per se, cannot be held as being to blame for anything.
22. The expert opinion evidence is not surprising. Professor Bisby's findings are also wholly consistent with the full scale BS8414 testing commissioned by the DCLG as long ago as 2017¹⁵, immediately following the Grenfell Tower fire, which showed that the PE ACM cladding system failed the BS8414 test with both non-combustible and combustible insulation. The tests had to be stopped at very similar times - in under 8 minutes. Indeed, the system tested with non-combustible mineral fibre had to be stopped (failed) at a slightly earlier stage than the system tested with combustible insulation. Following those tests, the independent Expert Panel concluded that: *"ACM cladding (and other metal composite material cladding) with unmodified polyethylene filler (category 3) presents a significant fire hazard on residential buildings at any height with any form of insulation"*¹⁶.
23. This early evidence that the combustibility of the insulation was not a significant cause of the fire spread has been drawn to the Inquiry's attention in Kingspan Insulation's earlier written submissions, but for reasons which remain unclear, this important Government testing of PE-cored ACM systems in combination with both combustible and non-combustible insulation has received little consideration

¹⁵<https://www.gov.uk/government/publications/fire-test-report-dclg-bs-8414-test-no1>;
<https://www.gov.uk/government/publications/fire-test-report-dclg-bs-8414-test-no2>

¹⁶ *Advice for Building Owners of Multi-storey, Multi-occupied Residential Buildings* – Ministry of Housing, Communities and Local Government, January 2020, page 6, para 1.15 (emphasis added).

by the Inquiry so far, and was not explored with the relevant Government witnesses during Module 6.

24. The expert evidence as to the causes of the fire spread on Grenfell Tower is absolutely critical to a proper understanding of the wider issues of testing, certification and regulation which are the subject of Module 6. Given that the nature and speed of the spread of the fire on Grenfell Tower was a result of the PE-cored ACM and would not have been materially different had non-combustible insulation been used, the primary focus for Module 6 should have been on the testing and certification of PE-cored ACM products. It is essential to understand how and why such products came to be marketed in the UK and available for use in rainscreen cladding systems in circumstances in which they were unsafe for use regardless of the type of insulation with which they were combined.

25. In fact, relatively little time has been spent by the Inquiry in Module 6 on the myriad of issues relating to the testing and certification of the Arconic PE-cored ACM, as opposed to insulation products.. This may be because the Inquiry has been able to secure only limited co-operation from Arconic in respect of disclosure relating to their PE-cored ACM cladding¹⁷, although the Inquiry could have sought disclosure from other manufacturers of PE-cored ACM products. This is unfortunate and a missed opportunity for the Inquiry to understand, in detail, how and why the regulatory regime failed to prevent PE-cored ACM, which was responsible for the tragedy, being marketed in the UK and used on the refurbishment of the Tower. Nor has the Inquiry investigated the testing and certification of other potentially dangerous materials or system designs despite its stated intention to “*broaden the scope of its investigations into the regime for the fire safety testing and classification of construction products and systems*”¹⁸

¹⁷ Kingspan Insulation, which manufactured only 5% of the insulation sold for use on Grenfell Tower has disclosed approximately 23,350 documents whereas, so far as we can ascertain from the Inquiry's disclosure bulletins, Arconic, the manufacturer of the entirety of the PE-cored ACM, has disclosed only a few hundred documents.

¹⁸ Letter to the Core Participants from the Inquiry dated 1 June 2021

26. An important distinction must be drawn between failings which have been causative of the Grenfell Tower fire and failings which, whilst regrettable, were not causative. Kingspan Insulation has repeatedly accepted that there were shortcomings in respect of the testing and certification of its K15 insulation¹⁹. But the presence of K15 on Grenfell Tower was not causative of the nature or the speed of the spread of the fire by reason of its combustibility. That fact is clear and is beyond any doubt. The nature and speed of the spread of the fire on Grenfell Tower was a result of Arconic's Reynobond PE ACM cladding, not the type of insulation used behind it. Kingspan Insulation is not responsible for the actions of Arconic. Assertions made by some Core Participants that those supplying combustible insulation were somehow "seminally causative"²⁰ of the tragedy that occurred at Grenfell Tower are contradicted by the Inquiry expert evidence, the Efectis expert evidence, the DLCCG testing evidence, and the Phase 1 report; such assertions are, quite simply, wrong. K15 and Kingspan Insulation were not causative of the fire spread at Grenfell Tower.

27. Professor Bisby rightly cautions against intemperate or instinctive judgements of this type:

*"The experiments presented in this report have highlighted the immense complexity of the heat transfer environment within a ventilated rainscreen cladding cavity... This suggests that an intuitive understanding of the factors that govern fire initiation, growth and spreads in such situations can very easily lead to false or incorrect assertions."*²¹

28. Thus the key question that has been identified for investigation in respect of the regulatory context is: how and why did the regulatory system fail to prevent a

¹⁹ See for example Kingspan Insulation Limited's written Opening Statement for Phase 2, Module 2 {KIN00023794} paragraph 12, the oral statement made on its behalf on 5 November 2020, Day 66 by Leading Counsel and its written Closing Statement for Phase 2 Module 2 {KIN00025944} paragraphs 16-18.

²⁰ For example, BSR Team 1 Module 1 and 2 oral closing submissions 13 September 2021, Transcript day 173 page 33 lines 18 and 19.

²¹ Bisby, L Phase 2 Experiments: Work Package 2 {LBYWP200000001} Page 4, Paragraph 17

cladding manufacturer, Arconic, from marketing a PE-cored ACM product for use in rainscreen cladding applications when testing (including to BS 8414), has indicated that no system using that product could satisfy the requirements of BR 135 when tested with either combustible or non-combustible insulation? This question is even more important given the evidence which emerged in Module 6 about the large scale Government tests carried out by the BRE in 2000.²²

29. Another key factor which arises in respect of the regulatory issues is that the Arconic PE-cored ACM product could have been specified for use in the refurbishment in accordance with the linear route permitted by the regulations at the material time had it been used with mineral fibre insulation. This is notwithstanding the fact that it is now known that the nature and speed of the spread of the Grenfell Tower fire would not have been materially different had the PE-cored ACM been used in combination with mineral fibre insulation. The product was specified based on a Euroclass B test result. This was incorrect and the product in cassette form subsequently achieved a Euroclass E test result. The regulatory regime should not have enabled Arconic's PE-cored cladding product to be used and the Inquiry should have investigated how and why it happened, so as to be able to recommend a remedy.

30. This raises the fundamental question as to how and why the regulatory regime came to permit a product such as the PE-cored ACM to be used in a rainscreen cladding system in conjunction with mineral fibre insulation under the "linear route" and therefore without any BS 8414 test being undertaken. The fact that this combination of products was deemed permissible under the linear route is even harder to understand given that a test had shown in 2000 that it was unsafe for such use. The Government's post-Grenfell Tower fire testing²³ which demonstrated that PE-cored ACM systems failed when combined with either combustible or non-combustible insulation, therefore merely confirmed what should already have been known to the Government since 2000. Consideration must surely be given as to whether the linear route to compliance, based on

²² For example, see the evidence of Mr Brian Martin, transcript 21 March 2022, Day 251, pages 33 to 55

²³ See the DCLG tests referred to above.

classifications of individual products, is fit for purpose when the consequences of a product being mis-classified, as in the case of Arconic PE Core ACM, can be catastrophic.

31. It is submitted that the primary focus of Module 6 should have concerned those two key regulatory issues; but in any event, the Inquiry must now attempt to address them, to the extent possible, in its final report.

D. THE GRENFELL TOWER REFURBISHMENT WORKS DID NOT COMPLY WITH THE BUILDING REGULATIONS IN FORCE AT THE TIME OF THE REFURBISHMENT WORKS

32. The Grenfell Tower Refurbishment Works were not designed in accordance with the Building Regulations in force at the time. The architects had four routes to compliance open to them:

- a. The linear route;
- b. The BS 8414 route;
- c. The desktop study route; and
- d. The fire engineered route.

33. However, it appears that the linear route was not available to the designers of the system given their brief to meet the latest energy performance standards. The architects/designers wrote²⁴ to Rockwool, a leading mineral fibre insulation manufacturer, but were told that it was not practical to use mineral fibre insulation to achieve their desired U-value. Instead they chose to use a Celotex product, which did not meet the linear route requirement of “limited combustibility”.

34. Therefore, to design the refurbishment works in compliance with the Building Regulations as they were at the time, the designers/architects had to use a system that had passed a BS 8414 large-scale fire test, had been subject to a

²⁴ Emails between Studio E and Rockwool Limited dated 5 July 2017 to 24 July 2017 {SEA00005276}

desktop study or which had been considered by a fire engineer as part of a holistic fire engineering assessment of the whole building.

35. So far as Kingspan is aware no cladding system comprising a PE-cored ACM has ever passed a BS 8414 large-scale fire test in conjunction with either combustible or non-combustible insulation. When PE-cored ACM cladding systems were tested by the Government to BS 8414 following the tragedy (the DCLG 2017 tests²⁵), both failed - when combined with PIR insulation and with non-combustible mineral fibre insulation. No competent fire engineer, conducting a desktop study or a fire engineering assessment, could have concluded that such a system was safe without evidence of a successful BS 8414 test of a sufficiently similar system. Had those responsible for the design of the refurbishment or those carrying out the refurbishment works complied with the regulations by either testing Arconic's PE-cored ACM cladding in a large scale test with any insulation, or by commissioning a desktop study or a fire engineering assessment from a competent engineer, then they would have concluded that the proposed system was not compliant and should not be built and the tragedy would have been averted.
36. Again, the patent failures of a regulatory system which permitted a major refurbishment to take place which did not begin to comply with the building regulations in force demands the utmost scrutiny in the context of Module 6.

E. LARGE SCALE WHOLE SYSTEM TESTING IS THE MOST EFFECTIVE WAY TO ACHIEVE SAFE CLADDING SYSTEMS – NOT THE LINEAR ROUTE

37. Kingspan Insulation's position is not that the linear route will **always** produce an unsafe cladding system. Rather, it is that whilst the linear route can result in some systems being deemed to be safe because they comply with the linear route,

²⁵<https://www.gov.uk/government/publications/fire-test-report-dclg-bs-8414-test-no1>;
<https://www.gov.uk/government/publications/fire-test-report-dclg-bs-8414-test-no2>

those very same systems can also be incapable of passing a BS 8414 (or similar) large-scale test and are therefore, unsafe²⁶.

38. The expert evidence of Professors Bisby and Torero is, again, essential context to the issues considered in Module 6 in respect of the regulatory system. In particular, it is clear from the expert evidence that large scale “whole system testing” of cladding build up, whilst not perfect, provides a critically important way of testing the safety of a proposed cladding system.²⁷ It presents a much safer route than the current alternative of relying exclusively on a linear route to compliance based on assumptions made from small scale testing.
39. The combustibility of individual products is only one consideration when it comes to ensuring safe cladding systems. Professor Bisby highlights “...*the immense complexity of the heat transfer environment within a rainscreen cladding cavity — even in the relatively small and simple cladding system arrangements tested in our experiments*”.²⁸ Professor Torero explains that, cladding systems can be unsafe for a wide range of reasons including “*thermo-mechanical behaviour, regardless of the combustibility of the constituent materials*”²⁹. That reality was also alluded to by Dr Sarah Colwell of the BRE who emphasised that she was aware of system tests of varying types incorporating mineral fibre which did not meet the requirements for varying reasons, including collapse, failure to stay on the rig for the duration of the test and fire spread internally or externally.³⁰ The

²⁶ See also Bisby, J Grenfell Tower Inquiry Phase 2 – BR 135 Desktop Assessment Report, dated 30 May 2022 {LBYP20000004} paragraph 326. See also the email from Brian Martin to Tony Baker quoted by Professor Bisby at paragraph 328 of his report {BRE00047587/1}

²⁷ For example, Torero J, Phase 2 Grenfell Tower Inquiry: Adequacy of the Current Testing Regime {JTOR00000006} paragraphs 12.2.82 to 12.2.92 – Summary in relation to BS8414 testing and Bisby L Phase 2 Experiments: Work Package 2 {LBYWP200000001} page 127 paragraph 681 and page 129 paragraph 698

²⁸ Bisby, L Phase 2 Experiments: Work Package 2 {LBYWP200000001} Page 4, Paragraph 17, and also in paragraphs 681 and 698

²⁹ Torero, L Phase 2 Grenfell Tower Inquiry: Adequacy of Current Testing Regime {JTOR00000006} Page 177 Paragraph 15.0.5

³⁰ Transcript 16 February 2022, Day 233, Page 64, lines 2 to 18

safety of a cladding system is a highly complex issue, as Professor Bisby has noted³¹, which has to be considered from every angle and not based on simplistic assumptions.

40. Large scale whole system testing provides a means of helping fire engineers understand more about these complexities. A core area of focus should therefore be on improving the efficacy of large scale whole system testing, alongside improving the understanding, experience and qualifications of the fire safety engineers tasked with analysing all the available data.

41. In its opening statement to Module 6 and in its previous submissions to the Inquiry, Kingspan Insulation explained its long-held concerns about the assumption that the linear route to compliance will always produce a safe cladding system. It does not. Whilst enormous focus has been placed on the issue of combustible insulation by this Inquiry, the reality is that cladding systems using combustible materials can be safe (by way of an example, there have been 14 successful BS 8414 tests of different cladding systems incorporating K15 insulation.³²). Conversely systems using only non-combustible or limited

³¹ Bisby, L Phase 2 Experiments: Work Package 2 {LBYWP200000001} Page 4, Paragraph 17

³² BRE Global Test Report BS 8414-2 test (Report number 303930 Issue 3) on 21 April 2015 (Taylor Maxwell Tampa terracotta tiles): {KIN00000593}; and BRE Global Classification Report (Report number: 297211 Issue 2) dated 3 July 2018: {KIN00000578} (originally issued in September 2015 and subsequently reissued); BRE Global Test Report BS 8414-2 test (Report number: 303931 Issue 1) on 7 July 2015 (brick slip panels): {KIN00000150} and BRE Global Classification Report (Report number: P100576-1000) dated 13 November 2015: {KIN00014435}; BRE Global Test Report BS 8414-2 test (Report number P100838-1000 Issue 2) on 15 July 2015 (Gebrik panels): {KIN000001481} and BRE Global Classification Report (Report number P100838-1001 issue 2) dated 21 September 2015: {KIN00018577}; BRE Global Test Report BS 8414-2 test (Report number: P100184-1000 Issue 3) on 26 January 2016 (ArGeTon Tampa terracotta tiles): {KIN00000139} and BRE Global Classification Report (Report number P100184-1001 Issue 3) dated 2 December 2016: {KIN00015914}; BRE Global Test Report BS 8414-1 test (Report number P107017-1000 Issue 1) on 9 October 2017 (Mitsubishi Alpolic/fr ACM) {KIN00000141} and BRE Global Classification Report (Report number P107017-1001 Issue 2) dated 11 January 2017: {KIN00008578}; BRE Global Test Report BS 8414-1 test (Report number P109971-1000 Issue 1.0) on 9 October 2017 (Mitsubishi Al polio A2 ACM): {KIN00000149} and BRE Global Classification Report (Report number P109971-1001 Issue 1.0) dated 4 April 2018: {KIN00000473}; BRE Global Test Report BS 8414-1 test (Report number P109973-1000 Issue 1.0) on 27 October 2017 (Mitsubishi Alpolic A2 ACM): {KIN00000472} and BRE Global Classification Report (Report number P109973-1001 Issue 1.0) dated 4 April 2018: {KIN00000470}; BRE Global Test Report BS 8414-1 test (Report number P109939-1000 Issue 1) on 7 November 2017 (Mitsubishi Alpolic/fr ACM): {KIN00000142} and BRE Global Classification Report (Report number P109939-1001 Issue 1) dated 11 January 2018: {KIN00008577}; Exova Test Report BS 8414-1 test (Report number DLR1448 Rev.0) on 3 December 2017 (3mm Aluminium Panels): {KIN00000477} and Exova Classification Report (Report number 580810 Rev 0) dated 15 March 2018: {KIN00020327}; Exova Test Report BS 8414-1 test (Report number DLR1453 Rev.0) on 12 December 2017 (Mitsubishi Alpolic/fr ACM): {KIN00000465} and Exova Classification Report (Report number SR0811 Rev.0) dated 30 May 2018: {KIN00000464}; BRE Global Test Report BS 8414-2 test (Report number P109938-1000 Issue 2) on 5 February 2018 (Mitsubishi Alpolic A2 ACM): {KIN00000594} and BRE Global Classification Report (Report number P109938-1001 Issue 1) dated 14 August 2018: {KIN00000562}; BRE Global Test Report BS 8414-2 test (Report number P112065-1000 Issue 1) on 2 May 2018 (102.5mm Facing

combustibility materials can be unsafe.³³ As Professor Torero concludes: “Consequently, a ban [on combustible materials] will not solve the problem”.³⁴

42. As noted above, Dr Sarah Colwell of the BRE mentioned in her evidence that she had experience of BS 8414 tests of cladding systems (other than PE-cored systems) incorporating non-combustible insulation which may have failed to meet BR 135 and emphasised that she was aware of system tests of varying types involving mineral fibre which did not meet the requirements for varying reasons, including collapse, failure to stay on the rig for the duration of the test and fire spread internally or externally.³⁵ It is not clear whether the Inquiry has sought to obtain detailed information about all such failed tests, but failures of BS 8414 tests involving non-combustible products has certainly not been a focus of Module 6 despite the obvious relevance of such tests to ensuring safe systems in the future.
43. Concerns regarding the efficacy of some of the small-scale testing methods, for example those used to qualify for a Class 0 rating, on which the linear route requirement for cladding panels was widely understood to be based, are not new. Dr Lane, one of the Inquiry's experts,³⁶ referred in her evidence, to experiments undertaken by Dr Raymond Connolly in 1994 following the Knowsley Heights

Brickwork): {KIN00020833} and BRE Global Classification Report (Report number P112065-1001 Issue 1) dated 31 October 2018: {KIN00001773}; BRE Global Test Report BS 8414-1 test (Report number P114679-1000 Issue 1) on 6 June 2019 (8mm Eternit Equitone Nature fibre cement tiles): {KIN00022315} and BRE Global Classification Report (Report number P114679-1001 Issue 1) dated 5 March 2020: {KIN00022317}; Efectis Reaction to Fire BS 8414 -2 Test Report (Report number EUI-18-FF-000131) on 27 June 2019 (40mm Granite panels): {KIN00022638} and Efectis Fire Performance of External Thermal Insulation Classification Report (Report number EUI-18-000131 Issue 1) dated 25 June 2020: {KIN00022642}.

³³ Second Witness Statement of Adrian Pargeter: {KIN00020824}, paragraph 12.3(e); Exova BS 8414-1 Test Report (Reference DLR1537 Rev.0) dated 11 December 2018: {KIN00020847}.

³⁴ Torero, L Phase 2 Grenfell Tower Inquiry: Adequacy of Current Testing Regime {JTOR00000006} Page 177 Paragraph 15.0.5

³⁵ Transcript 16 February 2022, Day 233, Page 64, lines 2 to 18

³⁶ Transcript 10 November 2020, Day 68 page 101 lines 5-8

fire³⁷. Dr Lane explained that the building had an over cladding system incorporating a non-combustible insulation, but that *"one of the reasons for the rapid spread of the fire was an unusual construction detail which effectively created a flue that travelled up through the height of the building"*³⁸. Dr Lane noted Dr Connolly's conclusions following his experiment that: *"small-scale reaction to fire properties of the cladding materials did not reflect the fire hazard associated with the full-scale cladding system"* and that there was a *"clear need for full-scale testing of performance in fire for what he termed rational design of cladding systems"*³⁹.

44. Similar issues were also raised previously in a report carried out by the Select Committee on Environment, Transport and Regional Affairs published in December 1999, which sought to examine the issues arising from the fires at Knowsley Heights (in 1991) and Garnock Court (in 1999). The Committee found *"that the small-scale tests which are currently used to determine the fire safety of external cladding systems are not fully effective in evaluating their performance in a 'live' fire situation"*⁴⁰. In evidence submitted to the Committee in July 1999 (in relation to this report), the Loss Prevention Council noted: *"For most external wall applications the guidance refers largely to small-scale product tests such as surface spread of flame. LPC's view is that the real-scale performance of many walling systems can only be adequately tested by full-scale reaction to fire testing, including joints and other three-dimensional aspects of the design"*⁴¹; and in relation to the same report, the Fire Brigade Union commented: *"We have been particularly concerned for some time with the principle of small-scale fire testing of large building components such as composite cladding, or insulated sandwich panel systems. We believe strongly that such testing and its findings should be*

³⁷ See paras 143 to 144 of Kingspan Insulation's Closing Statement for Module 2 {KIN00025944/49} to {KIN00025944/50}.

³⁸ Transcript 10 November 2020, Day 68, page 102 lines 1-4

³⁹ Transcript 10 November 2020, Day 68, page 102 lines 7-9

⁴⁰ Environment, Transport and Regional Affairs Committee: First Report - Potential risk of fire spread in buildings via external cladding systems dated 20 July 1999 {CLG00019478/9} Paragraph 19.

⁴¹ <https://publications.parliament.uk/pa/cm199899/cmselect/cmenvtra/741/741a14.htm> - Memorandum by the Loss Prevention Council (ROF 35) Paragraph 11.

validated by large scale testing of the complete system under realistic fire conditions. However, it appears that the real barrier to large scale testing is the question of cost rather than that of scientific prudence⁴²."

45. Kingspan Insulation expressed its own concerns with the linear route before the Parliamentary Select Committee in 2018 and provided evidence to the Inquiry of examples of systems, including a test in July 2018 of a system which incorporated Vitracore G2, which would pass the linear route to compliance but which failed when subjected to whole system BS 8414 testing⁴³. Witnesses from Kingspan Insulation were extensively and wrongly⁴⁴ criticised by Counsel to the Inquiry for attempting to "mislead" the Parliamentary Select Committee on this critical issue. Yet the point of public safety which Kingspan Insulation was making is supported by, and consistent with, the evidence of Professor Bisby.⁴⁵
46. The evidence adduced by Kingspan Insulation to both the Parliamentary Committee and the Inquiry also included large-scale system tests carried out by third parties (without any involvement by Kingspan Insulation) of cladding systems that incorporated a variety of A1/non-combustible/A2 insulation and cladding products which would satisfy the linear route to compliance, but which failed BS8414 tests when assessed against the criteria set out in BR135.⁴⁶ As

⁴² Environment, Transport and Regional Affairs Committee, Potential Risk of Fire Spread in Buildings via External Cladding Systems dated 20 July 1999 {FBU00000127} page 3, paragraph 4.4

⁴³ Letter from Kingspan Insulation to Clive Betts MP, Chair of the Housing, Communities and Local Government Select Committee dated 6 July 2018

⁴⁴ This was a particularly surprising line of cross-examination to spring on a witness without advance notice given that it is a cornerstone of parliamentary democracy that those addressing Parliament, including those giving evidence to Parliamentary Select Committees, are able to speak freely and are protected by law from allegations of misleading Parliament; such allegations are for Parliament alone to raise and determine. Article 9 of the Bill of Rights 1689 provides that: "*That the freedom of speech and debates or proceedings in Parliament ought not to be impeached or questioned in any court or place out of Parliament*". Kingspan Insulation's legal representatives wrote to the Inquiry on 21 January 2021 to note their understanding that questioning witnesses about the evidence given to the Select Committee (orally or in writing) is not appropriate or permissible under Article 9 and asked the Inquiry, if it was of a different view, to set out their reasoning for this; no substantive response to this question was received. Having brought this issue to the attention of the Inquiry, it is a matter for the Chairman to determine whether such questions contravene the prohibition provided by Article 9 and whether they should be struck from the record.

⁴⁵ Bisby, J Grenfell Tower Inquiry Phase 2 – BR 135 Desktop Assessment Report, dated 30 May 2022 {LBYP20000004} paragraph 326

⁴⁶ Kingspan Insulation Limited Phase 2 Module 2 Closing Statement {KIN00025944} paragraph 145

Kingspan Insulation explained in its closing submissions to Module 2, the purpose of drawing attention to those tests was to demonstrate the inherent weakness in relying only upon the linear route to compliance. In drawing attention to these third party tests, Kingspan Insulation was making a very important point of public safety. Module 6 provided an opportunity for the Inquiry to explore these key issues of public safety, which were also raised by Dame Judith Hackitt in her report⁴⁷, with regulators and the Government.

47. Had the cladding system at Grenfell Tower been subject to large scale testing before it was installed, then such testing would have acted as a check and balance on the classification and certification of Reynobond PE ACM and may well have resulted in the identification of the errors in respect of the classification and certification of that product which were hidden from the view of the designers, architects and contractors responsible for compliance with the Building Regulations.
48. To the limited extent that the evidence heard in Module 6 did touch upon aspects of this critical issue, the evidence supported Kingspan Insulation's position that whole system testing is a better measure of safety than small scale testing and the linear route to compliance. Examples of such evidence are given below including concerns in relation to dependency on certain types of small scale testing.

BRE - Dr Sarah Colwell

49. Dr Lane's explanation⁴⁸ of the well documented dangers in relying solely on small-scale testing was echoed in the evidence of Dr Sarah Colwell of the BRE. She said that the Knowsley Heights fire was a lesson that *"it's about not just the individual components, but it's how they work together as a system, and that's why the large-scale tests were developed."* She noted that individual component

⁴⁷ Building a Safer Future. Independent Review of Building Regulations and Fire Safety May 2018

⁴⁸ Transcript 10 November 2020, Day 68 pages 101 and 102

53. In his witness statement submitted to the Inquiry on 23 November 2018 Brian Martin described the introduction of the BS8414 test standard in 2006 as *"a more robust approach"* as it required façade system designers *"to demonstrate an acceptable performance for a specific construction system"*.⁵⁴ In oral evidence Brian Martin, emphasised that *"I think that was the consensus amongst the fire scientists that had looked at this subject, that they felt a larger scale test was more reliable. That's probably true of any fire test"*.⁵⁵
54. This was developed when Brian Martin was answering questions relating to the 1999 Select Committee recommendations and he answered: *"you could clad a building in combustible materials and still avoid extensive fire spread, that's essentially the point of BS8414, was to try and deliver a building that would do that"*.⁵⁶
55. Mr Martin also explained⁵⁷ that *"the fact that there's a combustible component in itself isn't necessarily a problem...insofar as BS 8414 is concerned, and you can certainly achieve compliance with the functional requirement with combustible components"*.

Fire Sector Federation- Mr Dennis Davies

56. Mr Davies gave oral evidence with regards to Lakanal House which also mirrored Kingspan Insulation's view that *"the deep concern was that – going back to the built environment and the Building Regulations and the process of how materials were being used. There was a concern that you could have a product, a component and it could be introduced into a building and form part of a system but the coherence of the whole product to how it's actually then installed and used"*

⁵⁴ Witness statement of Mr Brian Martin {CLG00019469} Paragraph 94

⁵⁵ Transcript 17 March 2022, Day 250, page 83 lines 5-8

⁵⁶ Transcript 28 March 2022, Day 255, page 138 lines 15-18

⁵⁷ Transcript 24 March 2022, Day 254, pages 75 line 25 and 76 lines 1-8

within the system was not necessarily tested as a whole or seen as a whole so you could have a mismatch and the performance would not work well."⁵⁸

57. Kingspan Insulation agrees that improvements to the current large-scale testing regime need to be made, but submits that the evidence heard in Module 6 shows large-scale system testing is the highest bar for testing the fire safety of cladding systems. In addition, extensive large-scale testing of a variety of systems would help to improve knowledge in the industry about the robustness of cladding construction and design, helping to determine which combinations of materials will provide a safe system.
58. Kingspan Insulation fully supports Dame Hackitt's recommendations that:
- (a) additional test houses should be established and certified to increase the capacity for testing;
 - (b) a clearer and more effective specification and testing regime of construction products must be developed;
 - (c) clear statements should be developed as to what systems products can and cannot be used for; and
 - (d) the scope of testing, and the resulting implications must be more clearly communicated in plain, consistent and non-technical language.⁵⁹

F. FAILURE TO CONSIDER RELEVANT EVIDENCE IN MODULE 6

59. In his opening address to the Testing, Government and FRA section of Module 6, Counsel to the Inquiry stated that it would be hearing evidence which would enable the panel to understand the context in which various manufacturers made and sold PE-cored ACM panels and combustible insulation and in which BRE carried out tests and research and the BBA and other bodies came to certify those

⁵⁸ Transcript 10 March 2022, Day 246, pages 153 line 19 to page 154 line 3

⁵⁹ Building a Safer Future – Independent Review of Building Regulations and Fire Safety: Final Report by Dame Judith Hackitt dated May 2018, page 95, para 7.17; and for example, see Recommendation 7.1 (page 94) in Dame Hackitt's final report: *"A clearer, more transparent and more effective specification and testing regime of construction products must be developed. This should include products as they are put together as part of a system"* -

products.⁶⁰ Counsel to the Inquiry also explained that the evidence would be "*focussing particularly closely on the regulation of external wall materials*" and that central questions would include how and why the alternative route of large scale testing was introduced into Approved Document B.⁶¹

60. Unfortunately, Module 6 did not consider all the available relevant evidence in respect of large scale testing. One example of a missed opportunity to consider relevant evidence concerns the pair of BS 8414 tests, in December 2007 and January 2008, carried out on two Sotech cladding systems one in combination with K15 and then other mineral fibre insulation. The December 2007 BS 8414 test of the Sotech cladding system incorporating K15 insulation ("**the December 2007 Test**") failed to meet the BR 135 criteria: the test failed. It has repeatedly been put to numerous witnesses in Module 2⁶² and Module 6⁶³ that the December 2007 Test shows that (new technology) K15 failed badly and that this somehow suggests that K15 has a poor reaction to fire.
61. On 16 and 23 October 2020 Kingspan Insulation disclosed to the Inquiry 53 documents regarding a BS8414 test carried out in January 2008 ("**the January 2008 Test**").⁶⁴ The January 2008 test comprised the same Sotech cladding system design as the December 2007 Test but with non-combustible mineral fibre insulation substituted for K15. This January 2008 system also failed the BS8414 test when assessed in accordance with BR135. Kingspan Insulation has raised

⁶⁰ Transcript 6 December 2021, Day 214 page 1 lines 15-19.

⁶¹ Transcript 6 December 2021, Day 214 page 4 lines 12-14 and page 5 lines 1-2

⁶² For example transcript 23 November 2020 day 75 page 151 lines 21-23; 25 November 2020, Day 77 page 80; 24 November 2020, Day 76 page 78, lines 1-3

⁶³ For example transcript 15 February 2022, Day 232 pages 226 and 227

⁶⁴ On 7 February 2022, the Inquiry was sent a spreadsheet which listed all the Inquiry reference numbers for these documents.

the Inquiry's failure to refer to the January Test in its earlier written submissions to the Inquiry.⁶⁵

62. The January 2008 Test with non-combustible mineral fibre insulation, when compared with the December 2007 Test, provides compelling evidence that the nature and design of the entire cladding system is critical to understanding the cause of the BS 8414 test failures in December 2007 and January 2008.
63. These tests should be viewed as a pair. They provide an important illustration that the same cladding system can fail with both combustible and non-combustible insulation. A greater understanding of this reality is imperative to allow the Inquiry, the Government, and wider public to understand the fire safety of different systems and the fact that a failure of a cladding system with one type of insulation cannot be taken to mean that the insulation type is responsible for the failure of the system. They also show that such failures are not merely confined to PE-cored ACM systems – the Sotech cladding comprised pure aluminium cassettes. Despite the very obvious relevance of two almost identical large-scale failed BS 8414 tests, one with combustible and one with non-combustible insulation, to the Inquiry's consideration of the testing regime in Module 6, the Inquiry has not, so far as we are aware, shared the records regarding the January 2008 Sotech BS 8414 test with other Core Participants or made them part of the public record. The second Sotech test is clearly highly relevant to the issues which have been considered by the Inquiry as well as to the erroneous assumptions⁶⁶ which have wrongly informed numerous questions put by Counsel to the Inquiry to witnesses about the first Sotech test.⁶⁷ The documents should now be disclosed by the Inquiry.

⁶⁵ See for example Kingspan insulation's Phase 2, Module 2 Opening Submissions {KIN00023794}; and Kingspan Insulation's Phase 2 Module 2 Closing Submissions {KIN00025944} paragraph 68.3.

⁶⁶ Namely the erroneous assumptions that (a) the December 2007 test somehow indicates that the cladding system failed because of the presence of K15 and, further, (b) that it somehow demonstrates that new technology K15 had a poorer performance in a fire than old technology K15.

⁶⁷ See footnotes 63 and 64

64. Furthermore, despite requests, the Inquiry has not yet confirmed whether other Core Participants or relevant parties have been asked to disclose documents relating to the same January 2008 Sotech test or any other failed BS 8414 tests involving non-combustible and/or limited combustibility materials. It is anticipated that the BRE may well hold other information in respect of relevant BS 8414 tests. It is not clear what steps have been taken by the Inquiry to collate such evidence.
65. In addition, despite repeated submission of questions by Kingspan Insulation to be put to relevant witnesses⁶⁸, the January 2008 Sotech test and the proper conclusions to be drawn from the pair of tests have not been put to any witnesses. Both the December 2007 and the January 2008 tests were carried out by the BRE, and the BRE evidence during Module 6 would have been an appropriate opportunity to explore these matters. Dr Colwell was asked if she knew of the test, but she said she did not. She was not taken to any documents to jog her memory.⁶⁹ That has been the extent of the Inquiry's examination of the January 2008 test. The topic was not raised with Phil Clark, Debbie Smith, Tony Baker or Stephen Howard of the BRE.
66. Kingspan Insulation does not understand why the Inquiry has only examined the December 2007 test incorporating K15 but not examined the twin January 2008 test incorporating mineral fibre, or indeed any other large scale tests incorporating mineral fibre. This is a missed opportunity by the Inquiry to explore the wider industry and regulatory regime; the twin tests underline the advantages of large scale whole systems tests and the unreliability of making assumptions as to what is and what is not a safe system.

⁶⁸ Such as Kingspan Insulation's letter to the inquiry dated 15 February 2022

⁶⁹ Transcript 16 February 2022, Day 233 page 5 line 19 to page 6 line 12

67. In total, Kingspan Insulation have provided details of five⁷⁰ cladding systems comprising Euroclass A1 / A2 wall cladding panels and A1 / non-combustible⁷¹ insulation (including the Sotech January 2008 test) which failed to meet the requirements in BR 135 when tested to BS 8414. Details of those five tests are set out at paragraph 145 of Kingspan Insulation's Closing Statement for Module 2⁷². One of these tests was sponsored by Kingspan Insulation in order to prove an important point of public safety⁷³, but the other four tests were carried out independently by third parties (without any involvement by Kingspan Insulation).
68. Kingspan submits that the results of these test are important as they show the deficiencies of the "deemed to comply" linear route to compliance. It believes that it is important that all such evidence should be carefully examined by the Inquiry when considering the adequacy of the current Building Regulations. None of the documents relating to these five tests were considered by the Inquiry with any of the witnesses in Module 6.
69. Kingspan Insulation has consistently encouraged the Inquiry to seek disclosure of the body of evidence which exists within the wider industry in relation to large scale tests of cladding systems. As is clear from the evidence, such test evidence provides key information about how different components in a cladding system interact with one another in a fire and how the design of the overall system can play a critical role in the development of a fire.
70. The expert and test evidence summarised above demonstrates both that systems incorporating combustible materials are capable of achieving the criteria set out in BR135 when tested at large scale to BS8414 (or similar), and conversely that systems incorporating only non-combustible and limited combustibility materials,

⁷⁰ In addition, Kingspan Insulation has seen reference to a sixth example of a test with A2 cladding and insulation which failed the BR 135 criteria at 7.5 minutes. Kingspan Insulation has no further details of this test. Janet Murrell, Technical Manager at Exova, said the following in an email dated 11 September 2018: "*there being a number of tests (I just witnessed one which failed at 7.5 mins) where A2 over A2 fail BR 135 criteria (on temperature) which they are now allowed without test*". {KIN00025931}.

⁷¹ To AS1530-1.

⁷² Kingspan Insulation's Module 2 Closing Submissions {KIN00025944} pages 49 -50

⁷³ The test performed on 2 July 2018 comprising Vitracore G2 and Rockwool Duoslab

which are deemed to comply under the “linear route”, can fail to achieve the criteria⁷⁴. However, the Inquiry has not taken the opportunity to consider these core issues of public safety in appropriate detail in Module 6 notwithstanding that they go right to the heart of any assessment of the fitness for purpose of the current regulatory regime.

71. We submit, that any proper examination of the adequacy of the testing and regulatory regime by the Inquiry should have included:

(1) sharing the 53 documents submitted by Kingspan Insulation regarding the January 2008 BS 8414 test featuring Sotech cladding with other core participants;

(2) seeking disclosure from BRE or Sotech of documents relating to the January 2008 BS 8414 test featuring Sotech cladding;

(3) examining witnesses from the BRE or Sotech in relation to the January 2008 BS 8414 test featuring Sotech cladding;

(4) obtaining, and sharing with other core participants, details of all the other failed BS 8414 tests comprising A1/ A2 rated components carried out by independent third parties;

(5) examining witnesses about any failed BS 8414 tests of systems incorporating A1 and A2 rated components;

(6) having proper regard to the 14 successful BS 8414 tests of systems incorporating K15 insulation which Kingspan has disclosed, and any others involving K15 or any other combustible insulation.

⁷⁴ See footnote 27 above

72. Had the Inquiry explored such issues fully in Module 6, it is submitted that the only conclusions that could properly have been drawn are that:

- (i) the linear route to compliance, based on assumptions about individual components of a cladding system, is not the best way to achieve public safety; and
- (ii) large scale testing of whole cladding systems remains the best available way of achieving safe cladding systems in practice.

G. OTHER MATTERS ARISING DURING MODULE 6

73. We now wish to address certain other matters that were considered during Module 6, in so far as they concerned Kingspan Insulation.

74. **The BBA Certificate for K15 of 6 April 2010:** This BBA certificate contains the following statement:

"The product is classified as Class 0 or "low risk" as defined in the documents supporting the national Building Regulations. The product, therefore may be used in accordance with the provisions of:

England and Wales – Approved Document B, paragraph 8.4, Volume 1 and paragraphs 12.5, 12.6, and 12.7, Volume 2 (see also Diagram 40)"⁷⁵

75. Witnesses have been repeatedly questioned and cross-examined by Counsel for the Inquiry on the basis that because K15 is combustible insulation, the BBA certificate should not have made reference to the K15 being able to be used in accordance with paragraph 12.7 of ADB⁷⁶

⁷⁵ BBA Certificate for Kingspan Insulation's Kooltherm K15 {KIN00008358} Page 5 Section 7

⁷⁶ For example; transcript 24 November 2020, Day 76 page 2 line 1 to page 3 line 19; 2 February 2022, Day 225 page 114 lines 7 to 11, and 23 March 2022, Day 253 page 167 lines 2 to 20

76. The true position, however, is that K15 could be used pursuant to the second part of paragraph 12.7 of ADB which permits the use of K15 and other combustible insulation products in a *“masonry cavity wall construction which complies with Diagram 34 in section 9.”*
77. Counsel to the Inquiry repeatedly failed to put this second part of the paragraph to witnesses, despite repeated requests that the whole paragraph should be put⁷⁷. This is particularly important given that the form of electronic presentation of documents to witnesses giving evidence in the Inquiry means that a witness can only see the part of a document shown to them. This partial referencing of paragraph 12.7 has led to the false and misleading impression that K15 could not be used under any circumstances in accordance with paragraph 12.7 of the ADB.
78. This misunderstanding was illustrated during the Inquiry's examination of Ms Marshall regarding the BBA Certificate for K15 dated 6 April 2010 where the Chairman intervened to ask the witness the following: *“...can I just ask you this: your answers suggest that it may have been beyond anyone's contemplation that a BBA certificate might include an inadvertent mistake. Did you ever think that was possible”?*⁷⁸ After Ms Marshall had given her response, Mr Chairman went on to say: *“well I ask the question because we know that in the [BBA] certificate that was in being until December 2013, there was a statement that the Kingspan product complied with or could be used in accordance with para 12.7 of ADB. At the moment, speaking entirely for myself, I don't see how that could possibly be true, since it was a combustible product. It would at least alert someone to the possibility of a mistake might it not?”*⁷⁹ The correct answer is that it was true: K15 could be used in accordance with the second part of para 12.7 of ADB in cavity wall applications. The important point to remember is that the BBA certificate is not dealing exclusively with rainscreen façade systems. It applies to all

⁷⁷ Kingspan Insulation's letters to the chairman dated: 4 February 2022, 3 December 2020, and 4 December 2020

⁷⁸ Transcript 2 February 2022, day 225, page 134 lines 21-25

⁷⁹ Transcript 2 February 2022, Day 225, page 135 lines 9-17

applications. The second part of paragraph 12.7 very clearly permits the use of K15 in respect of cavity wall applications.

79. This issue is an important one. The focus of this Inquiry has been on the particular type of construction used in the Grenfell Tower refurbishment. But that is not the sole form of construction covered by ADB. ADB also deals with very different forms of construction, including masonry cavity wall constructions. It would certainly have been clearer had the BBA certificate expressly referenced the fact that K15 could be used “in masonry cavity wall constructions in accordance with paragraph 12.7” rather than just “in accordance with paragraph 12.7”, but the BBA certificate was not wrong to point the reader to the fact that K15 could be used as provided for by paragraph 12.7.
80. **Allegations of improper relationships:** A number of witnesses from the BRE and the NHBC from whom the Inquiry has heard during Module 6 have been asked various questions in which some form of improper relationship has been intimated between those organisations and product manufacturers such as Kingspan Insulation. In response to such questions the witnesses from the BRE and NHBC testified to the independence of their respective organisations and the integrity of their decision making.⁸⁰ These responses echoed the evidence heard in Module 2 when the Inquiry heard from witnesses from the LABC and BBA. For the avoidance of any possible doubt, Kingspan Insulation did not place any improper pressure on, nor have any improper dealings with, the BRE, the NHBC, the LABC or the BBA, whether in respect of testing, certification, guidance notes or otherwise.

⁸⁰ See, for example, the response of Mr Evans of NHBC to such questions: 14 December 2021, Day 219, page 219; the response of Dr Colwell of BRE to similar questions on 16 February 2022, Day 233, page 16, line 21 to page 17, line 14 and the responses of Dr Smith of the BRE to such questions 24 February 2022 Day 238, page 22 line 22 and page 83, line 9

CONCLUSIONS

81. Any proper consideration of testing/certification and of the regulatory regime requires due consideration of the relevant evidence, including the expert evidence of Professors Bisby and Torero, so that the key failings which were causative of the Grenfell Tower fire can be identified accurately. The issues of real causative potency can then be explored appropriately.
82. The available evidence enables the Inquiry to identify and focus on the following key issues:
 - a. The Euroclass fire rating of Arconic's Reynobond PE-cored ACM cladding product was misstated and misrepresented;
 - b. On the basis of those misstated test results, at that time, the Arconic product could have been lawfully used on Grenfell Tower under the linear route to compliance provided that it was combined with mineral fibre insulation;
 - c. It is clear that the nature and speed of the spread of the fire on Grenfell Tower would not have been materially different had Arconic's PE-cored ACM cladding been combined with mineral fibre insulation; it was unsafe in combination with both combustible and non-combustible insulation. Thus, had the Arconic cladding been used with mineral fibre insulation then the designers would have achieved compliance with the building regulations, but the same, tragic, outcome of uncontrolled fire spread would still have occurred.
 - d. Large scale testing of PE-cored ACM cladding systems demonstrates that such systems are unsafe regardless of whether they are combined with combustible or non-combustible insulation. That is the only conclusion which can be drawn from the Government's testing following

the Grenfell Tower fire.⁸¹ However, it was also apparent from testing carried out as early as 2000 and which was known to the Government but not published. The regulatory regime must, therefore, be based on a proper understanding and assessment of relevant test data, including full scale test data.

- e. The Inquiry has heard of examples of other cladding systems (not involving PE-cored ACM) which have failed to meet the safety requirements of BR 135 when tested to BS 8414. Some of those failed systems involve A1 / non-combustible mineral fibre insulation and A1/A2 cladding, and could therefore lawfully be built under the linear route to compliance which is still permitted by the current regulatory regime⁸² notwithstanding that they would fail BS 8414 testing and are unsafe systems. The Inquiry has not considered the detail of such testing evidence in Module 6 and has not focused on this on-going issue of public safety. However, the evidence exists, is part of the record of the Inquiry, and cannot be ignored. Again, the totality of the relevant test data, including these data, must be taken into account both when assessing the fitness for purpose of the current regulatory regime and when considering future improvements to the regime.
- f. Conversely, there are numerous examples of cladding systems which utilise combustible products and which have been demonstrated to be safe when tested to BS 8414. By way of example only, there have been 14 such systems tested using K15 insulation which have met the BR 135 criteria when tested to BS 8414.

83. It is evident that:

⁸¹<https://www.gov.uk/government/publications/fire-test-report-dclg-bs-8414-test-no1>;
<https://www.gov.uk/government/publications/fire-test-report-dclg-bs-8414-test-no2>

⁸² Kingspan Insulation Limited Phase 2 Module 2 Closing Statement {KIN00025944} paragraph 145

- a. Cladding systems can be unsafe for a wide variety of reasons. Cladding systems comprising any materials (including only non-combustible products) can be unsafe, not least because of thermo-mechanical behaviours of the products when used in combination.⁸³
- b. The inherent complexities of cladding system fires means that a system based on the testing and certification of individual component products cannot be relied upon to ensure that a cladding system is safe.
- c. Accordingly, a “linear route” based on individual product testing and certification will not always result in safe cladding systems.
- d. Whilst individual product testing is undoubtedly important, the safety of the cladding system requires consideration of the way in which the system, as a whole, will respond to fire; this can only effectively be tested by large scale testing of the system.
- e. A regulatory system based on assumptions which are not supported by empirical testing is not a safe system.
- f. The current systems and procedures in place for individual product testing and for large scale testing can be improved and should be improved. No single system will be perfect, but they can be optimised.
- g. The safety of cladding systems will inevitably require reliance to be placed on assessments of safety carried out by properly trained experts. As Professor Torero emphasises, so-called “desktop studies” are an

⁸³ Torero, L Phase 2 Grenfell Tower Inquiry: Adequacy of Current Testing Regime {JTOR0000006} Page 177 Paragraph 15.0.5

inevitable and unavoidable part of ensuring safe cladding systems.⁸⁴ Detailed consideration will need to be given to ensuring that such assessments are as effective as possible.

- h. The regulatory regime must be adequately enforced so that buildings are not built which fail to meet the regulatory requirements. The Grenfell Tower refurbishment did not satisfy the regulatory requirements at the material time and yet it was still designed and constructed.

84. Kingspan Insulation will provide its views on appropriate improvements to the regulatory regime in accordance with the procedure set out in the Annex to the Inquiry's letter to Core Participants dated 14 April 2022.

Gowling WLG (UK) LLP

Geraint Webb QC

Tim Green QC

7 June 2022

⁸⁴ See Torero, L Phase 2 Grenfell Tower Inquiry: Adequacy of Current Testing Regime {JTOR0000006} Page 33, paragraph 6.0.4.