KINGSPAN INSULATION LIMITED

OVERARCHING PHASE 2 SUBMISSIONS AND MODULE 7 ADDENDA

1 Kingspan Insulation's Overarching Phase 2 Submissions and Module 7 addenda are contained in this single document. Submissions in relation to the evidence given in Module 7 by Professor Purser have been provided separately.

A. Overall Conclusions

B. The dangers of PE-cored ACM cladding

C. The type of insulation made no difference to the speed of the spread of the fire

D. Corrections that must now be made to the Phase 1 Report in light of the expert evidence

E. The safety of K15

F. Impact of the timing of the Inquiry's expert evidence

G. Responsibility for the failings at Grenfell Tower

H. Criticisms made of Kingspan Insulation and K15

I. Closing remarks

A. OVERALL CONCLUSIONS

2 Kingspan Insulation has fully accepted that the Inquiry process has revealed some historical shortcomings in respect of the testing and certification of K15 between 2005 and 2014. It has taken appropriate steps to ensure that such shortcomings are not repeated, as detailed at paragraphs 13, 14, and 81-101 of its Opening Statement for Module 2[1].

[1] {KIN00023794/4-5} and {KIN00023794/29-34}.

3 Whilst Kingspan Insulation deeply regrets the fact those shortcomings occurred and has taken steps to ensure that such mistakes are not made again, the key point is that none of those shortcomings were in any way causative of the Grenfell Tower (**the "Tower"**) fire tragedy.

4 From the perspective of Kingspan Insulation, there are four key findings which fall to be made now that the expert evidence of Professors Bisby (**"Bisby"**) and Torero (**"Torero"**) has been adduced.

5 **First:** The overwhelming cause of the rapid fire spread during the Tower fire was the PE-cored ACM (**"PE ACM"**) cladding manufactured by Arconic. This is the emphatic conclusion of the Phase 2 experiments and expert evidence presented by Bisby to the Inquiry.

6 Bisby described Arconic's PE ACM cladding as a product, which *"presents extreme fire hazards"*[2] and *"is not a product that should be used ever*[3]*".* The evidence is conclusive: PE ACM is a *"uniquely hazardous"*[4] and dangerous product and its use was responsible for the nature and speed of the spread of the fire at the Tower. The Phase 1 report has already recorded that PE ACM was the principal cause of the fire[5], but the expert evidence adduced in Phase 2 enables, and requires, the causative role played by the PE ACM cladding to be set out in clear and emphatic terms.

7 **Second:** The expert evidence demonstrates that the ***type*** of insulation used behind the PE ACM cladding was not relevant to the nature and speed of the spread of the fire over the Tower. Bisby concluded that it was the insulating properties of the insulation used, and **not** its combustibility, that was relevant to fire spread.

8 Insulation is designed to retain heat and it plays a vital role in this regard from an environmental perspective; the need for insulation in rainscreen cladding refurbishments (such as Grenfell Tower) is a regulatory requirement mandated

[2] Transcript, Day 289, 9 June 2022, page 185, lines 15-25, page 186, lines 1-3.
[3] Transcript, Day 291, 15 June 2022, page 27, lines 2-20.
[4] Transcript, Day 289, 9 June 2022, page 185, lines 15-25, page 186, lines 1-3.
[5] Phase 1 Report, Para 2.13a.

by Part L of the Building Regulations. Thus, the cladding itself must be designed to be safe for use with insulation and the heat-retaining characteristics of insulation. Arconic's PE ACM cladding was not safe for use with any form of insulation.

9 The detailed published work of Efectis[6] demonstrates that the speed and spread of the fire over the Tower would not have been materially different had non-combustible mineral fibre insulation been used behind the PE ACM cladding instead of combustible (PIR) insulation. This is consistent with the evidence of Bisby and Torero. No expert evidence has been adduced which permits a different conclusion to be drawn.

10 Kingspan Insulation has consistently emphasised all of the above conclusions in its submissions to the Inquiry.[7] These conclusions were apparent already from the evidence of the 2017 DCLG Building Safety tests and the independent peer reviewed publications from Efectis. The Inquiry's own expert evidence has now reached the same conclusions. It should now be apparent to all core participants, from the years of investigation, that the fire spread at the Tower was caused by PE ACM cladding panels manufactured by Arconic, rather than the type of insulation used.

11 **Third**: K15 is a safe insulation product if it is installed and used correctly. K15 of the type installed on the Tower has been used in 14 different cladding systems which have successfully met the BR 135 criteria when tested to BS 8414; it is safe to be used in such systems[8]. The details of each of these 14 BS 8414 tests have been submitted to the Inquiry[9].

[6]{INQ00014906}, {INQ00014908}, {INQ00014909}, {INQ00014910}, {INQ00014914}, {INQ00014916}, {INQ00014918}, {INQ00014920}.
[7] See paras 8-10 of Kingspan Insulation's Opening Submissions for Module 2 {KIN00023794/2-3}; paras 9 and 38 of its Closing Submissions for Module 2 {KIN00025944/3} and {KIN00025944/12-13}; and paras 6-13 of its Closing Submissions for Module 6 {KIN00026320/3-6}.
[8] For a list of these 14 tests, see Kingspan Insulation's Module 6 Closing submissions, para 41, footnote 32 {KIN00026320/16}, subject to the following two amendments: (1) the 14 tests does not include: test report reference {KIN00022638} and classification report reference {KIN00022642}; and (2) the 14 tests does include: BRE Global Test Report BS 8414-2 test (Report number: 302995 Issue 1) on 23 March 2015 (mineral composite grooved cladding panels): {KIN00000147} and BRE Global Classification Report (Report number: P100769-1000) dated 8 June 2015: {KIN00000144}.
[9] A further test has been carried out on a cladding system incorporating the same type of K15 as installed on the Tower. This further test met the BR 135 criteria. The test report and classification report for this test will be disclosed to the Inquiry.

12 Pursuant to Government guidance (PAS 9980) such systems can safely be retained on high-rise buildings in the UK subject to appropriate fire engineering judgements.

13 **Fourth:** whilst Kingspan Insulation has accepted that there were some shortcomings in relation to the testing and certification of K15 between 2005 and 2014, none of those shortcomings were relevant to the failings in the Tower refurbishment, or to the nature or speed of the spread of the fire. The Tower refurbishment was unsafe because of the use of PE ACM; the use of PE ACM on the refurbished Tower would have rendered it unsafe even if non-combustible mineral fibre insulation had been used instead of PIR or phenolic insulation.

14 Furthermore, none of Kingspan Insulation's shortcomings in any way affected the decisions made by the designers, builders and architects responsible for (i) the use of PE ACM cladding on the Tower, (ii) the use of PIR insulation with PE ACM cladding, or (iii) the use of a small quantity of K15 as a substitute for PIR insulation.

15 It follows that the shortcomings acknowledged by Kingspan Insulation, whilst wrong, unacceptable and subsequently comprehensively addressed, were not in any way causative of the fire or the nature or speed of the spread of the fire.

16 **The need to make corrections to the Phase 1 report in light of the expert evidence:** Whilst the Phase 1 Report was careful to explain that further expert evidence would be needed to ascertain the contribution played by different cladding materials to the spread of the fire, a few passages in the report suggested a preliminary conclusion[10] to the effect that the combustibility of the insulation used on the Tower contributed to the speed of the spread of the fire on the Tower. With the benefit of the totality of the expert evidence, such statements now need to be revisited and corrected; they are not supported by

[10] See for example para 33.6 (emphasis added): *"It is clear that the use of combustible materials in the external wall of Grenfell Tower, principally in the form of the ACM rainscreen cladding, but also in the form of combustible insulation, was the reason why the fire spread so quickly to the whole of the building."* The implication that the combustibility of the insulation was the reason why the fire spread so quickly is not supported by the expert evidence of Bisby and Torero. None of the expert evidence supported a conclusion that the fire at the Tower would have spread in any materially different way, or at any materially different speed, had non-combustible insulation been used behind the PE ACM.

the expert evidence of Bisby or Torero. The conclusion of the expert evidence was that the combustibility of the insulation could not be shown to have made any material difference to the nature and speed of the spread of the fire; the key issue was the insulating properties of the insulation and those properties are shared by both combustible and non-combustible insulation. Any such statements in the Phase 1 report to the contrary must now be corrected so as to avoid misunderstanding and ensure that the final conclusions are consistent with, and supported by, the expert evidence adduced. This is dealt with further at Part D below.

17 **The need to revisit the factual witness evidence in light of the expert evidence:** The expert evidence of Bisby and Torero has a profound impact on a proper understanding of the factual evidence adduced in Phase 2. Bisby cautioned that *"an intuitive understanding of the factors that govern fire initiation, growth and spread in such systems can very easily lead to incorrect assumptions."*[11] Such intuitive assumptions wrongly informed some of the questions put to witnesses in Phase 2 module 2.

18 In particular, the factual evidence will need to be considered having regard to the fact that the expert evidence now shows that the nature and speed of the spread of the fire was a result of the presence of the PE ACM cladding, and that using non-combustible insulation would have made no material difference. This will inevitably mean the Inquiry having to address the assumption that appeared in questioning to witnesses that combustible insulation was inherently unsafe for use in cladding systems and/or that its use on the Tower in some way contributed to the speed of the spread of the fire. In fact, it was the PE ACM that was inherently unsafe for use in cladding systems. This issue is addressed further at Part F below.

B. THE DANGERS OF PE ACM CLADDING

19 As set out above, the PE ACM cladding panel used at the Tower has been described by the Inquiry's expert, Bisby, as a product which *"presents extreme*

[11] Transcript, Day 289, 9 June 2022, page 183, lines 17-27, page 184, lines 1-6.

fire hazards"[12]*,* is *"uniquely hazardous"*[13] and *"is not a product that should be used ever*[14]*"*.

20 Bisby said "*I have previously – and consistently – identified polyethylene-filled ACM (specifically Reynobond PE) as the primary cause of rapid fire growth and spread during the Grenfell Tower fire*."[15] His opinion did not change during his oral evidence; he expressed his opinion in clear and robust terms.

21 In fact, even prior to the testing undertaken by the Inquiry's experts, there was already a considerable body of evidence in respect of the dangers of using PE ACM in cladding systems. For example:

(a) It is now known that large-scale testing of PE ACM in a system with Isowool insulation was commissioned by the Government in 2001[16]. The system failed the test in under 6 minutes. Dr Colwell of the BRE, who witnessed the test, explained *"it was a very rapid, very large fire growth"*[17] and (in her opinion) those who witnessed the test *"were all concerned at the performance of the product"*[18]. After this testing in 2001, Dr Colwell's view was that she *"couldn't see that ACM would be an appropriate product for use"*[19] in a high-rise building, and Dr Smith OBE (former Managing Director of the BRE), confirmed the BRE's conclusion from the test was that the PE ACM product *"should never ever be used on a tall building"*[20].

(b) Large-scale testing commissioned by the DCLG in 2017 demonstrated that systems incorporating PE ACM failed BS 8414 testing; PE ACM systems failed in under 8 minutes both when using non-combustible mineral wool and when using combustible PIR insulation. This testing evidenced the dominance of the PE ACM in the failure of the system.

[12] Transcript, Day 289, 9 June 2022, page 185, lines 15-25, page 186, lines 1-3.
[13] Transcript, Day 289, 9 June 2022, page 185, lines 15-25, page 186, lines 1-3.
[14] Transcript, Day 291, 15 June 2022, page 27, lines 2-20.
[15] Phase 2 Experiments Work Package 2 – System Interactions {LBYWP200000001/3} para 16.
[16] For example, see Transcript, Day 251, 21 March 2022, page 33.
[17] Transcript, Day 232, 15 February 2022, page 97, line 23.
[18] Transcript, Day 232, 15 February 2022, page 100, lines 5-10.
[19] Transcript, Day 232, 15 February 2022, page 100, lines 16-17.
[20] Transcript, Day 235, 21 February 2022, page 111, lines 7-10.

(c) The extensive modelling undertaken by Efectis[21] demonstrated that PE ACM was so dominant in the fire spread at the Tower that there would have been no material difference in the rate of fire spread if combustible PIR insulation had been replaced with non-combustible insulation[22]. This evidence from the Efectis modelling was first published on 17 November 2019[23] and formed part of Kingspan Insulation's submissions in Module 2. The evidence of Bisby and Torero in Module 7 was consistent with the Efectis research[24].

(d) Efectis' modelling also demonstrated that the fire would not have spread onto and over the façade of the Tower at all had a different cladding panel (Euroclass A2) been used with combustible PIR insulation, instead of PE ACM[25]. Torero examined the Efectis modelling and agreed that its conclusions were consistent with the work he and Bisby had undertaken[26].

22 The findings of Bisby and Torero in their Phase 2 experiments (Work Packages 1 ("**WP1")** and 2 (**"WP2"**)) have corroborated the findings of this extensive body of evidence in respect of the dangers of PE ACM.

23 The purpose of the WP1 experiments was to understand *"the thermal and mechanical properties of the products under a range of representative heating conditions, and* ***to ensure that the Inquiry is given rigorous scientific data upon which to base its eventual conclusions****"*[27] (emphasis added). The following products were tested in WP1: Arconic's Reynobond PE ACM,

[21] See footnote 6 above.
[22] See Kingspan Insulation's Closing Submissions for Module 2 Closing, para 9 and para 38 {KIN00025944/3} and {KIN00025944/12-13}.
[23] {INQ00014914}.
[24] Torero provided commentary on the Efectis modelling in his oral evidence to the Inquiry: *"obviously once everything has split and the fire has gone into the fast growth phase, then they can calibrate and they are at a scale in which their model is actually predicting quite correctly what is happening in the rest of the building."* - Transcript, Day 292, 16 June 2022, page 109, lines 4-25, page 110, lines 1-12; Counsel to the Inquiry asked Torero (in reference to Efectis' modelling) *"Do you agree that the nature and rate of flame spread on cladding systems incorporating foil faced PIR and foil faced phenolic and unfaced (inaudible) [mineral fibre insulation] in all cases with PE core ACM rainscreens have found to be comparable in modelling?".* Torero responded: *"At that scale. Once everything has taken off and I think that's actually consistent with Professor Bisby's observations. So once it's taken off, yes. I mean, there's no reason for me to disagree tw [sic] [with] that."* - Transcript, Day 292, 16 June 2022, page 118, lines 3-16.
[25] Kingspan Insulation's Module 2 Closing Submissions, para 38.3 {KIN00025944/13}
[26] *"Finally, and most importantly, these studies do not show disagreement with any of the conclusions presented in either my or the Chairman's Phase One reports or the present report"* {JTOR00000006/195} para A2.33.
[27] Transcript, Day 289, 9 June 2022, page 116, lines 16-23.

Celotex's RS5000 insulation, Kingspan Insulation's K15 insulation and Aluglaze's window infill panels. It is noted that there was no testing of the Siderise cavity-barriers used on the Tower.

24 Following the results of WP1, Bisby concluded that *"Of the four cladding products considered in work package 1, Reynobond PE has the largest potential to contribute to fire growth and spread"*[28]*;* the *"Reynobond PE was the largest contributor to energy release in the cladding at Grenfell Tower"*[29]; and *"in every case, as I've said, my view is that the ACM-PE and the burning of the polyethylene is what's contributing the vast majority of the heat flux"*[30].

25 The WP2 experiments were carried out to understand *"how these products burned as part of a system, and how their individual burning behaviours might lead to interactions within a ventilated rainscreen cladding system"*[31].

26 As with the WP1 results, the results of WP2 led Bisby to come to the same conclusions in respect of the dangers of PE ACM; Bisby explained *"It remains my view that, of the products and materials present in the external wall assembly of Grenfell Tower, the* ***Reynobond PE was primarily responsible for the rate and extent of fire spread****"*[32] (emphasis added). Bisby provided his expert opinion to the Inquiry on the dangers of using PE ACMs in any cladding system (emphasis added):

(a) *"First, it's clear that* ***Reynobond PE ACM presents extreme fire hazards****. It is a* ***very, very burny material****. Indeed,* ***all ACM PE products present extreme fire hazards. There are few construction products intended for any use on the outside of a building that I have ever seen burn with such intensity.*** *Every time we ran an experiment that escalated to full involvement of the ACM, I was surprised and alarmed. Once you have seen how these products behave under realistic fire exposures, if you know anything about fire safety and anything about the testing methods that were being used to classify*

[28] Transcript, Day 289, 9 June 2022, page 144, lines 9-22.
[29] Transcript, Day 289, 9 June 2022, page 144, lines 9-22.
[30] Transcript, Day 290, 13 June 2022, page 18, lines 24-25, page 19, lines 1-2.
[31] Transcript, Day 289, 9 June 2022, page 116, lines 24-25, page 117, lines 1-3.
[32] Transcript, Day 289, 9 June 2022, page 184, lines 7-10.

reaction to fire performance of cladding products in England, you must surely know ***that these products are uniquely hazardous****"*[33].

(b) *"You know, if you test ACM PE on an 8414 test, notwithstanding all my comments about complexity and differences in behaviour,* ***I defy you to pass that test****"*[34].

(c) *"I mean, regulation B4 requires us to adequately limit the external spread of fire. If you have ACM PE used in anything other than insubstantial quantities, I don't think you can be confident that you've done that as a designer"*[35].

27 Kingspan Insulation has consistently submitted that the PE ACM cladding panel played the primary role in the nature and speed of the spread of the fire, that the Tower would have been unsafe regardless of the type of insulation used in combination with PE ACM, and that PE ACM presents a significant fire hazard on residential buildings at any height with any form of insulation[36].

28 The evidence is conclusive: PE ACM is a *"uniquely hazardous"*[37] and dangerous product; the nature and speed of the spread of the fire at the Tower was a result of the presence of the PE ACM cladding.

C. THE TYPE OF INSULATION MADE NO DIFFERENCE TO THE SPEED OF THE SPREAD OF THE FIRE

29 The expert evidence of Bisby and Torero is clear: the fire spread at the Tower was caused by the PE ACM, rather than the type of insulation used. The nature and speed of the spread of the fire would not have been materially different if non-combustible insulation had been used in the cladding system at the Tower with PE ACM. This conclusion is supported by the DCLG large-scale testing, and the extensive modelling by Efectis.[38] To put the point another way, there

[33] Transcript, Day 289, 9 June 2022, page 185, lines 15-25, page 186, lines 1-3.
[34] Transcript, Day 290, 13 June 2022, page 188, lines 7-9.
[35] Transcript, Day 291, 15 June 2022, page 38, lines 11-15.
[36] See for example, Kingspan Insulation's Phase 1 Closing Submission, para 4, {INQ00000565/6-7}; Module 2 Closing Submission, para 9 {KIN00025944/3}.
[37] Transcript, Day 289, 9 June 2022, page 186, lines 1-3.
[38] Kingspan Insulation has consistently raised this point throughout the Inquiry. For example, in its Phase 1 Closing Submission, Kingspan Insulation submitted that it would be important for the Inquiry to understand whether the

is no expert evidence before this Inquiry which would support a different finding.

30 In his WP2 report and oral evidence to the Inquiry, Bisby explained the following (emphasis added):

(a) *"You can see that **all cases that involve insulation of the cavity are broadly similar, whether the insulation was combustible or not**, and whether foil facers were present or not. So for the RS5080, the 5100, the K15 and the mineral wool, with and without foil, you end up with a total heat release that is broadly similar"*[39].

(b) *"**When this non-combustible insulation product was used, I found that escalation occurred; that is, the Reynobond PE became fully involved in the fire. I consider this to be a very interesting result. It suggests that the insulation product did not need to burn in order for an escalation to occur.** It was sufficient that the insulation product allowed heat to be retained within the system"*[40].

(c) *"Given that the **cladding system arrangements which incorporated non-combustible mineral wool insulation also grew to full involvement of the ACM – indeed this occurred more rapidly than for the foil faced combustible insulation** – I consider it unlikely that the HRR contributions from the foil-faced insulations through burning were decisive in promoting fire growth"*[41].

(d) *"it must be noted that the **mineral wool insulation without foil facers also experienced growth to full involvement of the ACM**, thus*

speed of the spread of the fire would have been different if a non-combustible mineral wool insulation had been used, instead of combustible PIR insulation: {INQ00000565/7} para 4.3. The findings from the WP2 experiments fully corroborate the submissions made previously by Kingspan Insulation to the Inquiry in respect of this central issue. During Phase 2, Kingspan Insulation emphasised that both the DCLG testing and the Efectis modelling demonstrated that using non-combustible mineral wool insulation in a system with PE ACM would have make no material difference to the nature and speed of the spread of the fire. In addition, Kingspan Insulation referred to ISO-13785 testing it had commissioned in March 2018 to complement the DCLG's BS 8414 testing programme, by testing a similar combination of systems {KIN00023795/24} para 66. This ISO-13785 testing showed very similar results for each type of insulation tested (RS5000, K15 and non-combustible Duoslab mineral wool) when tested in a system with PE ACM.

[39] Transcript, Day 289, 9 June 2022, page 181, lines 12-18.

[40] Transcript, Day 289, 9 June 2022, page 176, lines 9-16.

[41] Para 685, Work Package 2 report {LBYWP200000001/127-128}.

*demonstrating that **combustibility of the opposing face insulation is not a prerequisite for rapid and extensive fire growth and spread**"*[42].

(e) *"that **even a comparatively small ignition source** – such as must be expected in a residential fire scenario – **can under the right circumstances, lead to irreversible and severe escalation of burning and fire spread in/on a ventilated rainscreen cladding system incorporating ACM panels with a polyethylene filler/core alongside either combustible or non-combustible insulation**"*[43].

(f) *"it is my opinion that the **ability of the insulation to retain energy within the system and promote more rapid and extensive heating of the ACM is the decisive factor for foil faced insulation products, rather than its combustibility per se**"*[44];.

(g) *"**combustibility of the insulation product used has been shown to be of secondary, or even tertiary, importance** based on our experiments (when ACM PE rainscreens are used)"*[45].

(h) *"…**burning of the ACM's PE filler/core, rather than burning of combustible insulation, is - by a considerable margin - the critical issue** in the fire performance of cladding systems incorporating ACM PE rainscreen panels. This is **regardless of the type of thermal insulation used for the cavity's opposing face**"*[46] [47].

31 Bisby summarised this key finding in his oral evidence to the Inquiry: *"The **fact that these polymer foam insulating products were combustible thus appeared to be of relatively little importance** compared to the fact that all of these insulation products, whether combustible or not, were very effective at retaining heat within the cladding system…**The fact that the polymer foam***

[42] Para 690, Work Package 2 report {LBYWP200000001/128}.
[43] Para 702, Work Package 2 report {LBYWP200000001/129}.
[44] Para 686, Work Package 2 report {LBYWP200000001/128}.
[45] Para 32, Work Package 2 report {LBYWP200000001/5}.
[46] Para 695, Work Package 2 report {LBYWP200000001/128-129}.
[47] In respect of WP1, Bisby also noted the following in respect of RS5000 and K15: *"Neither of these products are therefore considered to have been primary or decisive contributors to heat release during the Grenfell Tower fire, particularly within the timescales relevant to vertical fire spread."* - Transcript, Day 289, 9 June 2022, page 153, lines 23-25, page 154, lines 1-22.

insulation products could burn appeared to be of secondary importance, as compared to their insulative properties "[48] (emphasis added). Torero agreed with Bisby's conclusion that the ability of the insulation to retain heat within the system is the decisive factor and that this capacity, shared by combustible and non-combustible types of insulation, resulted in PE ACM entering a *"run away"* phase of fire propagation.[49] See the Appendix to these submissions which reproduce photographs from Bisby's WP2 report comparing the phenolic and mineral fibre experiments at the critical time.

32 In its Module 2 closing, Kingspan Insulation explained that any rainscreen insulation, including non-combustible insulation, will play some part in a cladding fire, because its insulating properties act to retain heat[50]. As all UK cladding refurbishments, such as the Tower refurbishment, require insulation from a regulatory perspective, the cladding system must therefore be designed so that it allows for the fact that, in the event of a fire, the insulation will inevitably retain heat within the system.

33 Bisby's opinion, based on the results of WP1, was that *"the energy contribution from the insulation products is quite small…comparatively quite small if you compare against something like the polyethylene from the ACM, once it starts burning"*[51]*.* When asked by Counsel to the Inquiry to quantify the meaning of *"quite small",* Bisby said that the best he can say (in his opinion) is that *"the contribution from the insulation in that initial environment and even to the upward fire spread is probably less than 10% of the overall contribution. Something like that. I mean, it could be 2%, it could be 10%"*[52]. We submit that the contribution of energy from the insulation is trivial when considering the causes of the fire spread at the Tower. In any event, we submit that any such energy contribution from K15 has been overstated.

---

[48] Transcript, Day 289, 9 June 2022, page 178, lines 2-17.
[49] *"...one of the very significant conclusions of his test is that the insulating capabilities of whether it is mineral wool or cellular plastic insulation has an extraordinary impact on the capacity of the aluminium composite panel to enter this run away phase. In the absence of those insulating properties, this doesn't happen. The moment that you have the insulating properties, you get to this position…"* Transcript, Day 292, 16 June 2022, page 97, lines 24-25, page 98, lines 1-7.
[50] Kingspan Insulation's Module 2 Closing Submissions, para 10-11 {KIN00025944/4}.
[51] Transcript, Day 290, 13 June 2022, page 22, lines 19-24.
[52] Transcript, Day 290, 13 June 2022, page 23, lines 14-19.

34 Kingspan Insulation considers that Bisby's estimate of a contribution of energy from the insulation of between 2% to 10% is irrelevant as it was clearly not material to the fire propagation. For example: (i) Bisby's WP2 experiments with mineral wool insulation reached critical time and time of peak heat release rate more quickly than foil faced RS5000 and K15; (ii) Efectis' modelling showed that if the PIR had been substituted with non-combustible insulation, the fire propagation would have been marginally quicker; and (iii) the DCLG test of PE ACM with mineral fibre failed marginally more quickly than that with PIR. But even if Bisby's evidence is accepted, the overall energy contribution from K15 would be limited to between 0.1% to 0.5% of all energy produced, given that K15 was only 5% of the insulation ordered for use on the Tower. It follows, on the basis of Bisby's analysis, that any contribution attributable to K15 in respect of the energy produced was negligible[53].

35 As the extensive computational fluid dynamics modelling and testing carried out by Efectis and published in peer-reviewed journals[54] has demonstrated, the nature and speed of the spread of the fire at the Tower would not have been materially different had non-combustible insulation been used instead of combustible PIR insulation (which was approximately 95% of the insulation purchased for use on the Tower). Bisby's experiments indicate that the fire spread at the Tower would also not have been materially different if non-combustible insulation had been used instead of the 5% (approximately) of K15 that was purchased for use on the Tower. The energy contribution

[53] In his WP2 report, Bisby noted the following in respect of the total energy released by K15: *"The data presented in this report also suggest that up to the point of local burnout of the ACM, in a worst-case scenario wherein all mass lost from the insulation products is assumed to be converted into energy release through combustion/oxidation… burning of Kingspan K15 insulation may have contributed up to 53% of the total energy released by the cladding system arrangements tested"* {LBYWP200000001/4-5} paras 27-30. Bisby later clarified the meaning of this figure from his report, in his oral evidence. When asked the following question by Counsel to the Inquiry: *" Given the conclusion that you've set out in 685, which is that non-combustible mineral wool insulation grows to full involvement of the ACM more rapidly than the foil-faced combustible insulation, given that conclusion, are you able to tell us whether the theoretical percentage contributions to total energy release provided by each individual insulation product provides any kind of reliable indication of those contributions to the overall speed and extent of flame spread where you have a PE-cored ACM system?"* Bisby responded*: " I think what it tells us, as I said last week, is that that contribution in comparative terms is relatively minor, if it exists at all"* - Transcript, Day 290, 13 June 2022, page 72, lines 17-25; page 73, lines 1-10. He also explained how the 53% "worst-case scenario" figure was *"being unfair to the insulation product, because it's not the case that all of the mass turns into energy. I do feel that I've been quite clear in the way I've presented those data to caveat it by saying, "These are the maximum possible values we could ever expect". So this is sort of the worst-case scenario. If we assume that all mass turns into energy, this is as bad as it could possibly be. In reality, it's going to be somewhat less than that."* Transcript, Day 290, 13 June 2022, page 77, lines 3-7, lines 20-25, page 78, lines 1-17.

[54] See footnote 6 above.

produced by the specific insulation used made no difference to the nature and speed of the spread of the fire at the Tower.

36 The 2017 DCLG large-scale testing similarly demonstrated that PE ACM systems failed large-scale BS 8414 testing with both non-combustible synthetic mineral fibre and combustible PIR insulation. Both systems failed rapidly – within 8 minutes; indeed, the system incorporating mineral fibre failed marginally more quickly than the system incorporating PIR insulation[55]. Again, this was consistent with Bisby's experiments which showed that the systems incorporating mineral fibre insulation, which is sold without foil facing for rainscreen applications, reached Bisby's "critical time" marginally more rapidly than systems incorporating foil faced PIR or phenolic insulation (both being foil faced for rainscreen applications)[56].

37 The scientific evidence, therefore, comes from a variety of different sources but is consistent, clear and unequivocal: the presence of combustible insulation (PIR/phenolic) within the cladding system on the Tower made no material difference to the nature and speed of the spread of the fire, when compared to non-combustible mineral wool insulation.

D. CORRECTIONS THAT MUST NOW BE MADE TO THE PHASE 1 REPORT IN LIGHT OF THE EXPERT EVIDENCE

38 The Phase 1 Report made clear that the role of the various components of the cladding system would need to be the subject of further investigation to *"come to a more definite conclusion"*[57] as to their respective roles. Nevertheless, certain passages of the Phase 1 Report stated that the combustibility of the insulation was a relevant factor in relation to the speed of the spread of the fire. In particular, the Phase 1 report stated (emphasis added) that:

(a) *"It is clear that the use of combustible materials in the external wall of Grenfell Tower, principally in the form of the ACM rainscreen cladding,*

[55]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.
[56] See figure 32, Work Package 2 report {LPYWP200000001/78}.
[57] Phase 1 Report, Chapter 23, para 23.52.

but also in the form of combustible insulation, was the reason why the fire spread so quickly to the whole of the building"[58]*.*

(b) *"The presence of polyisocyanurate (PIR) and phenolic foam insulation boards behind the ACM panels, and perhaps components of the window surrounds, contributed to the rate and extent of vertical flame spread.*[59]*"*

(c) *"A number of aspects of the design of the refurbishment and the choice of materials will need to be examined. The choice of ACM panels with a polyethylene core, the choice of combustible insulation and XPS window infill panels […..], all of which made a major contribution to the extent of the fire, are just examples."*[60]

(d) *"Since the primary cause of the rapid spread of fire up, around and down the building was the use of ACM rainscreen panels with a polyethylene core, to which the use of combustible insulation contributed, the principal focus of Phase 2 will be on the decisions which led to the installation of a highly combustible cladding system on a high-rise residential building and the wider background against which they were taken"*[61]*.*

39 This implicit suggestion that the rate or speed of the spread of the fire would have been materially different had non-combustible mineral fibre insulation been used instead of PIR/phenolic insulation is not supported by the expert evidence. These statements, must therefore now be revisited and corrected in light of the substantially more detailed expert evidence now available.

40 The evidence provided by the Inquiry's experts during Phase 2 provides the Inquiry with a firm evidential basis to "*come to a more definite conclusion*" concerning the respective contribution of K15 and the other materials used in the cladding system. The Phase 1 finding that some role was played by insulation needs to be explained more fully now: that it was an inevitable role which would have been played by any insulation as a result of its capacity to

[58] Phase 1 Report, Chapter 33, para 33.6.
[59] Phase 1 Report, Chapter 2, para 2.13(b).
[60] Phase 1 Report, Chapter 34, para 34.8.
[61] Phase 1 Report, Chapter 34, para 34.4.

retain heat, regardless of whether it was combustible. The PE ACM cladding system therefore had to be safe for use with such insulation; it was not. The expert evidence now requires it to be explained that the combustibility of such insulation cannot be said to have made any material difference to the speed and spread of the fire on the Tower. Unless this clarification is now made, there is a material risk that homeowners, consumers, the insurance and construction industries will be misled as to the safety of the dwellings.

41 With this in mind, Kingspan Insulation respectfully invites the Inquiry to include the following conclusions in its Phase 2 report:

(a) The principle and overwhelmingly dominant cause of fire spread at the Tower was the PE ACM cladding panels.

(b) The expert evidence does not support the contention that the combustibility of the insulation made any difference to the nature and speed of the spread of the fire at the Tower.

(c) The insulating properties of the PIR and phenolic insulation resulted in heat retention in the PE ACM, which resulted in fire spread because of the melting and combustion of the PE core of the ACM. Non-combustible mineral fibre would have played the same role had it been used. The nature and speed of the spread of the fire over the Tower would not have been materially different had PE ACM been combined with non-combustible mineral fibre insulation instead of PIR/phenolic insulation.

(d) The contribution of energy from the insulation is irrelevant as it is not material to fire propagation. In any event, based on the worst case scenario presented by Bisby (wherein all mass lost from the insulation products is assumed to be converted into energy) the overall energy contribution from K15 would not have exceeded 0.1% to 0.5% of all energy produced and was thus insignificant in the context of the fire, given that K15 was only 5% of the total insulation ordered for use on the Tower.

E. THE SAFETY OF K15

42 At the start of Phase 1 of the Inquiry (20 June 2018), Bisby told us: *"just because a material can burn under some circumstances doesn't necessarily mean that it will burn under a particular set of circumstances",* Bisby made clear that this distinction was *"critically important"*[62].

43 As the expert evidence has demonstrated, the binary classification of materials as "combustible" and "non-combustible" is misleading and unhelpful; the issue is whether the system as a whole is safe regardless of the classification of its component parts. As Torero[63] emphasised, systems comprised of entirely "non-combustible" materials may be unsafe when tested whilst systems comprised of "combustible" materials may be safe.

44 In total, 14 different cladding systems incorporating the same version of K15 as used on the Tower have been tested to BS 8414 and successfully met the BR 135 criteria. These are the tests in which Kingspan Insulation have been involved. There have also been numerous other successful tests of systems incorporating K15 with which Kingspan Insulation has had no involvement. The Building Regulations at the time of the refurbishment permitted the use of K15 on tall buildings provided that it was used as part of a cladding system which, as a system, could be shown to have met the BR 135 criteria.

45 As far as Kingspan Insulation is aware, no other rainscreen insulation has been used in so many different cladding systems that have successfully passed BS 8414 tests.

46 Details of each of those 14 BS 8414 tests of systems incorporating K15 of the type used on the Tower have been provided to the Inquiry. Counsel to the Inquiry have not focused on any of these 14 successful BS 8414 tests of systems incorporating K15 when questioning witnesses. However, Counsel to the Inquiry did state that these large-scale tests would be examined as part of the Inquiry process and the Inquiry has had every opportunity to consider each

[62] Transcript, Day 7, 20 June 2018, page 25, lines 2-5.
[63] Transcript, Day 289, 9 June 2022, page 98, lines 19 – 25.

of those tests in detail.[64] It must therefore be assumed that those tests have been examined carefully by the Inquiry and that it is accepted that they are valid tests of the relevant systems. There has been no expert evidence adduced to the contrary.

47 Those 14 tests demonstrate that appropriate systems incorporating K15 can successfully meet the BR 135 criteria when tested to BS 8414 and thus provide unequivocal evidence that K15 can be used safely in appropriate systems.

48 It was put to witnesses[65] during Phase 2 that the “new technology” K15 introduced in 2006 was somehow less safe than the "old technology” K15 tested in 2005. That assertion has not been supported by any expert evidence. It appears to have been based on a misunderstanding of a December 2007 BS8414 test of systems incorporating Sotech cladding and new technology K15 which failed to meet the BR 135 criteria.

49 No valid comparisons can be made between the successful 2005 test on a system incorporating "old technology" K15 and the 2007 "new technology" test. The tested systems were completely different, including the cladding panel used. The differences between the tests would render any objective comparison of the performance of the insulation in the two tests impossible.

50 In January 2008, a system incorporating Sotech cladding was tested again using mineral fibre insulation; it too failed. The twin Sotech tests demonstrate that systems incorporating the Sotech cladding failed to meet the BR 135 criteria both when incorporating K15 and when incorporating mineral wool.

51 Counsel to the Inquiry asserted that the December 2007 test demonstrated that K15 “failed spectacularly”;[66] this assertion was wrong. It would similarly

[64] Transcript, Day 113, 25 March 2021, page 60, lines 16 -18.
[65] For example see Transcript Day 81, 2 December 2020, page 56, lines 9-16: *"So we were discussing whether you knew about the worse fire performance of the new tech K15 while you were head of technical…Just a few more questions on that"*; Transcript, Day 76, 24 November 2020, page 20, lines 12-14 *"Did you ever tell the BBA about the failed tests in 2007 and 2008 and the worse fire performance of the new technology K15 that you saw in those tests?"*; page 34, lines 14-17: *"by this time, you had changed the product that was being sold and it performed worse in fire…"*, page 71, lines 11-14: *"But you also knew, more fundamentally, by this point that the K15 that's being sold performs even worse in a test situation that the old K15 in that 2005 report didn't you".*
[66] For example see Transcript, Day 77, 25 November 2020, page 80, lines 11-12: *"Well, we know that because there were* tests *in 2007 and 2008 to BS 8414-2 that K15 failed spectacularly";* Transcript, Day 76, 24 November

have been wrong to assert that non-combustible mineral wool "failed spectacularly" in the January 2008 test. Both of the Sotech tests used the same cladding product and were of a whole cladding system which failed when tested with two different types of insulation. Unfortunately, this incorrect assertion was then repeated in numerous media reports, no doubt giving rise to real, but misplaced, anxiety on the part of many home owners and residents.[67]

52 It is vital that the Inquiry's Phase 2 report now accurately reflects the evidence put before the Inquiry: K15, of the type used on the Tower (and tested in the WP1 and WP2 experiments), has been part of 14 different cladding systems which have satisfied BR 135 criteria when tested to BS 8414.

53 It is important that the Inquiry corrects these public misconceptions, not least given that the UK Government guidance (PAS 9980) continues to permit K15 to be retained on existing cladding structures over 18m as part of systems which have been validly tested to BS 8414, subject to appropriate fire engineering judgements.

54 K15 also continues to be lawfully used in England and Wales for rainscreen systems above 18m, in buildings other than those that contain one or more dwellings; (ii) contain an institution; or (iii) contain a room for residential purposes (excluding any room in a hostel, hotel or boarding house), and residential buildings below 18m, as well as on certain types of buildings in many other countries.

F. IMPACT OF THE TIMING OF THE INQUIRY'S EXPERT EVIDENCE

55 The Inquiry now knows, as a result of the expert evidence, that combustible phenolic and PIR insulation were not a material cause of fire spread at the Tower. It is a fallacy that combustible phenolic and PIR insulation is somehow inherently unsafe. It is also a fallacy that the combustibility of the insulation

2020, page 78, lines 1-3: *"You had encountered* tests *in 2007 and 2008 on steel frame structures where it failed spectacularly, didn't it?".*

[67] See footnote 81, Kingspan Insulation's Module 2 Closing Submissions {KIN00025944/25}.

installed on the Tower was a cause of the speed of the fire spread. These twin fallacies permeated much of the questioning of certain witnesses during the course of Phase 2 prior to the evidence of Bisby and Torero, no doubt partly because they appeared to be supported by certain passages of the Phase 1 report (as explained above)[68]. It is therefore vitally important that the Inquiry revisits the factual evidence adduced in light of the expert evidence now provided by Bisby and Torero.

56 Even prior to the Inquiry's experts' evidence at the end of Phase 2, there was evidence which undermined these two false premises, including:

(a) Evidence provided by Bisby during Phase 1 of the Inquiry:

(i) Bisby was asked about the potential contribution of combustible PIR insulation to the heating of the ACM, Bisby explained *"anything that keeps heat in the system, as a low thermal inertia material[69] would, will contribute to a higher rate of temperature increase of anything else in the system*"[70] and *"if the cavity were not insulated in any way, it would lose heat more rapidly"*[71].

(ii) Bisby was also asked in Phase 1 about the impact on the vertical spread of the fire if the Tower had been insulated *"by something that was wholly non-combustible, if there is such a thing"*[72]. Bisby explained that it was important to consider the combustibility of the insulation and its insulating properties separately. He also explained that the key issue was *"the presence of the polyethylene"* and that *"the fact that you have polyethylene in the system which is freely burning" "hugely overshadowed"*[73] other factors.

[68] In particular, the conclusion that "*It is clear that the use of combustible materials in the external wall of Grenfell Tower, principally in the form of the ACM rainscreen cladding, but also in the form of combustible insulation, was the reason why the fire spread so quickly to the whole of the building"* Phase 1 Report, para 33.6.
[69] A description which can apply to both combustible and non-combustible insulation.
[70] Transcript, Day 78, 21 November 2018, page 174, lines 25, page 175, lines 1-3.
[71] Transcript, Day 78, 21 November 2018, page 175, lines 8-11.
[72] Transcript, Day 78, 21 November 2018, page 175, lines 12-13.
[73] Transcript, Day 78, 21 November 2018, page 176, lines 3-6.

(b) Evidence of real fires, for example:

(i) Lacrosse Building in Melbourne on 25 November 2014, where the fire spread rapidly on a building insulated by synthetic mineral fibre behind PE ACM panels[74];

(ii) Torre Ambar building in Madrid on 30 August 2020, where the fire spread rapidly on a building insulated by synthetic mineral fibre and clad in PE ACM panels[75].

(c) The 2017 DCLG large-scale testing. During Phase 1 of the Inquiry, Bisby explained how the 2017 DCLG testing illustrated that *"if you have an ACM PE rainscreen, the test, regardless of the backing insulation, escalates vertical fire spread very, very quickly"*[76]. Following this testing the Expert Panel came to the following conclusion: *"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"*[77] [78] (emphasis added).

57 It must now be recognised that the fact that the full evidence of Bisby and Torero was not heard until the end of the factual evidence has had three adverse consequences:

(a) First, **two false assumptions** pervaded much of the questioning of witnesses during Phase 2.

(b) Second, a disproportionate amount of time was spent investigating issues of **no material relevance** to the cause or the speed of the spread of the Tower fire, often in minute detail.

[74] https://www.melbourne.vic.gov.au/sitecollectiondocuments/mbs-report-lacrosse-fire.pdf. Information in relation to this fire was submitted to the Inquiry by Kingspan Insulation on 11 October 2018.
[75] Information in relation to this fire was submitted to the Inquiry by Kingspan Insulation on 8 September 2020.
[76] Transcript, Day 78, 21 November 2018, page 178, lines 1-4.
[77] Kingspan Insulation's Module 2 Closing, para 9 {KIN00025944/3}
[78] 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.

(c) Third, the Inquiry has **missed opportunities** to explore issues which, it is submitted, should have been of key relevance to the Inquiry had it fully appreciated the true causes of the Tower fire at an earlier stage.

58 As to the **two false assumptions**, many of the questions put to witnesses during Phase 2 were based on one or other of the false premises that (i) combustible insulation was inherently unsafe, and that (ii) combustible insulation was an underlying cause of fire spread at the Tower.

59 For example, during Module 1, an incorrect assumption that PE ACM was safe for use provided that it was combined with non-combustible insulation appeared to inform various lines of questioning. Counsel to the Inquiry asked questions about previous high-rise projects that Rydon and Harley had worked on which involved cladding systems incorporating PE ACM cladding with non-combustible mineral wool insulation. Mr Lawrence was asked whether he had taken steps to verify that a cladding system incorporating PE ACM with PIR insulation was "**as *suitable and safe***" as a cladding system incorporating PE ACM and non-combustible insulation.[79] This line of questioning clearly assumed that a cladding system incorporating PE ACM and non-combustible insulation was understood to be both "suitable" and "safe". Bisby and Torero have now made it abundantly clear that PE ACM cladding is not safe with either combustible or non-combustible insulation.

60 An equivalent question was also asked of Mr Blake of Rydon on 29 July 2020: *"In circumstances where it was clear that the cladding system being proposed for Grenfell was different from the system that you, as Rydon, had used at Chalcots and Ferrier Point -- because on Grenfell PIR was to be used instead of mineral wool -- did you take any steps to verify that the system proposed for Grenfell was equally suitable and safe as it had been at Chalcots and Ferrier Point?"*[80].

[79] *"Would it follow, therefore, that you didn't take steps to verify that the cladding system as a system – PE ACM panels and PIR insulation – was equally suitable and safe?"* (emphasis added). Transcript, Day 24, 21 July 2020, page 63, lines 11 to 14.

[80] Transcript, Day 29, 29 July 2020, page 58, lines 12-19.

61 Some questions posed to witnesses from Studio E and Rydon may have given the impression that the Building Regulations (at the relevant time) did not permit the use of combustible insulation over 18m regardless of the choice of rainscreen cladding. The questions could have led observers to assume that the only route to compliance within Approved Document B was via the linear route which permitted only the use of products that are at a minimum of limited combustibility:

(a) On 15 July 2020, Mr Sounes of Studio E was asked: "*what I want to put to you is that, at this tender stage, Studio E should have at least specified that the insulation product should be of limited combustibility in accordance with guidance in paragraph 12.7 of Approved Document B; would you accept that?*"[81]

(b) On 21 July 2020, Mr Lawrence of Rydon was asked: "*Were you aware, or conscious, perhaps is a better word, of the guidance in ADB paragraph 12.7 that, in a building with storeys of 18 metres or more above ground level, any insulation product used in the external wall construction had to be or should be, as the guidance says, of limited combustibility?*"[82].

62 A key consequence of the timing of the expert evidence is that these false assumptions have continued, uncorrected, throughout Phase 2 of the Inquiry and have been represented as established fact in the media[83]. This has had a profound effect on homeowners, generating entirely unfounded fears as to the safety of many cladding systems.

63 As to the investigation of matters of **no material relevance** to the cause or the nature or speed of the spread of the Tower fire:

(a) Considerable emphasis was placed on the (modest) changes between what is known as “old technology” and “new technology” K15, with assertions being made to the effect that "new technology" K15 was

[81] Transcript, Day 21, 15 July 2020, page 122, lines 16-21.
[82] *Ibid*, page 121, lines 2-7.
[83]https://www.theguardian.com/business/2022/jan/23/gove-threatens-trading-ban-on-cladding-firms-unless-they-pay-for-repairs.

somehow less safe. Focus was placed on the December 2007 BS 8414 test of a system incorporating Sotech cladding with "new technology" K15 and it was incorrectly contended[84] that this test was evidence of the poor fire performance of new technology K15; again, these assertions were reported widely as if they were established fact.[85] Conversely, there was no examination whatsoever of the corresponding January 2008 test of the same system incorporating Sotech cladding with mineral fibre insulation which also failed, despite Kingspan Insulation drawing this test to the attention of the Inquiry.[86] There is absolutely no expert evidence to support the allegations that the type of K15 used on the Tower was any less safe than the pre-2006 K15. Moreover, the expert evidence was clear: the combustibility of the insulation was not a material cause of fire spread on the Tower; it was the insulating quality of the insulation that was relevant, not its combustibility.

(b) Kingspan Insulation accepts that it was appropriate to explore the certification and testing of K15, but the amount of time spent examining these matters detracted from the underlying issues that led to an "extremely hazardous" product being used on so many high-rise buildings and tragically value-engineered onto the Tower. The certification documents of K15, were neither read nor relied upon by anyone involved in the design of the refurbishment for determining whether K15 was suitable for use in the cladding system on the Tower in accordance with any relevant route to compliance, and were irrelevant to the nature or speed of the spread of the fire on the Tower.

[84] For example see Transcript Day 81, 2 December 2020, page 56, lines 9-16: *"So we were discussing whether you knew about the worse fire performance of the new tech K15 while you were head of technical…Just a few more questions on that"*; Transcript, Day 76, 24 November 2020, page 20, lines 12-14, 34, 71: *"Did you ever tell the BBA about the failed tests in 2007 and 2008 and the worse fire performance of the new technology K15 that you saw in those tests?"*; and page 34, lines 14-17, and page 71, lines 11-13; Transcript 25 November 2020, Day 77, p 80 (Mr Mills): *"Well, we know that because there were tests in 2007 and 2008 to BS 8414-2 that K15 failed spectacularly"*; Transcript 24 November 2020, Day 76, p 78 (Mr Meredith): *"You had encountered tests in 2007 and 2008 on steel frame structures where it failed spectacularly, didn't it?".*

[85] https://www.theguardian.com/uk-news/2020/dec/16/a-raging-inferno-testimony-reveals-how-deadly-cladding-ended-up-on-grenfell-tower;https://www.dailymail.co.uk/news/article-9009175/Makers-insulation-used-Grenfell-Tower-continued-sell-product-despite-inferno-2007-test.html;https://www.itv.com/news/london/2020-12-02/manager-did-not-know-grenfell-insulation-burnt-ferociously-in-failed-fire-test-inquiry-hears.

[86] On 16 and 23 October 2020 Kingspan Insulation disclosed to the Inquiry 53 documents regarding the BS8414 test carried out in January 2008.

64 As to the **missed opportunities:** in Module 6, the Inquiry did not examine (at least not in any detail) the BS 8414 testing programme carried out by the DCLG in 2017. Kingspan Insulation submitted questions to the Inquiry in respect of these tests to ask Brian Martin, as he had been involved in the testing programme. These questions were not put to the witness. We submit that the key issues which should have been explored with relevant witnesses in Module 6 were the findings of this testing programme and the conclusions drawn by the DCLG in respect of PE ACM cladding systems, and the role of insulation in these systems, in light of the testing.

65 Also, the Inquiry has spent no meaningful time exploring with relevant factual witnesses the fitness for purpose of the current building regulations, which proceed on the erroneous assumption that cladding systems composed of A1/A2 components will necessarily be safe. A key issue which could have been explored extensively with witnesses (particularly, with Government witnesses) was the fitness for purpose of the existing regulations, and how they can be improved in circumstances in which it is wrong to assume that all cladding systems comprised solely of non-combustible A1/A2 products will necessarily pass BS 8414 tests.[87]

66 Kingspan Insulation had tried to explain this important issue to the Parliamentary Select Committee in the summer of 2018. It provided the Select Committee with a series of examples of cases in which systems comprising A1/A2 cladding and insulation had failed to meet the BR 135 criteria when tested to BS 8414. This is an important point of public safety that following the linear route of compliance does not always guarantee a cladding system will be safe.

67 However, Kingspan Insulation was wrongly accused by Counsel to the Inquiry of misleading Parliament by raising these valid and important concerns about issues of public safety and of somehow attempting to "*ensure that the science was secretly perverted for financial gain*"[88] by so doing. Such attacks were

[87] Torero's evidence about the Regulatory and testing system is also relevant.
[88] Transcript Day 85, 9 December 2020, page 91, lines 9-13; the same question was also put to Richard Burnley, see Transcript, Day 113, 25 March 2021, page 55, lines 10-19: *"Is it true that Kingspan's position, even in 2018, in*

wrong in principle: it is a cornerstone of parliamentary democracy that those addressing Parliament, including those giving evidence to Parliamentary Select Committees, must be able to speak freely and are protected by law from allegations of misleading Parliament[89] and it is for Parliament alone to raise and determine and allegations that it has been misled. The allegations made against Kingspan Insulation were also wrong in fact. Professors Bisby and Torero have now made precisely the same points in their evidence and emphasised the key importance of this issue.

68 Torero explained in his oral evidence to the Inquiry why assumptions relating to combustibility in the current regulatory framework are simplistic and unreliable. His evidence reflects many of the points made by Kingspan Insulation to the Parliamentary Select Committee, for which Kingspan Insulation was wrongly criticised. His evidence included the following statements:

(a) *"… you can have a perfectly non-combustible [cladding] material that is an extreme hazard because it deforms and breaks apart very rapidly."*[90]

(b) "…*So whether we understand combustibility and whether we understand how to design combustible systems in many ways is very limited by the fact that we still don't even understand how to design non-combustible systems, and unless we put focus on how to design non-combustible systems, we are constantly introducing failure modes without paying any attention whatsoever*."[91]

(c) *"from my perspective, they*[92] *approached this in an erroneous way, you know, very similar to what has happened in the UK, that we implement a*

the face of a Government investigation into fire safety following the Grenfell Tower fire, was to do its best to ensure that science was secretly perverted for financial gain? A. No. Q. Do you accept that? A. I don't accept that at all".

[89] That fundamental protection is provided, in particular, by Article 9 of the Bill of Rights 1689: *"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.

[90] Transcript, Day 289, 9 June 2022, page 74, lines 13 – 16.

[91] Transcript, Day 289, 9 June 2022, page 98, lines 19 – 25.

[92] Referring to the approach taken in Australian states: Victoria and New South Wales.

pseudo ban, which is not really a ban, but you're banning certain things, but allowing others that actually are not that clearly correct…. So all of a sudden you are putting a ban, but that ban is really not a ban, and therefore you can still design systems that are dangerous, that are complicated, that don't perform appropriately; nevertheless, you've eliminated some of them, but you still are messing around with the rest. So this was done very rapidly and it was done fundamentally under political pressure."[93]

(d) Counsel to the Inquiry asked Torero whether it is *"potentially unhelpful to just have a banning approach because then the research, the development that is necessary to get to a better system is simply not needed because you've banned something?"*. Torero explained *"that's the collateral damage. So what you end up doing by putting a ban, you've created an oversimplistic, false sense of safety and the moment you create a false sense of safety there's a perception that no further work is needed"*[94] (emphasis added).

(e) *"Thus, even for façade systems made uniquely out of non-combustible materials, there is currently no means to conduct an adequate fire-performance assessment by way of testing. Consequently, a ban [on combustible materials] will not solve the problem. Most importantly it will not set us on a path towards solving the problem…"*[95] (emphasis added).

69 Bisby summed up the difficulty in this way:

"My experiments have highlighted the immense complexity of the heat transfer environment within a ventilated rainscreen cladding system, even for the relatively small and simple cladding system arrangements that I've tested. This suggests to me an intuitive understanding of the

[93] Transcript, Day 290, 15 June 2022, page 180, lines 3-25, page 181, line 1.
[94] Transcript, Day 292, 16 June 2022, page 123, lines 17-25, page 124, lines 1-10.
[95] Phase 2 Grenfell Tower Inquiry: Adequacy of Current Testing Regime {JTOR00000006/177-178}, paras 15.0.5 and 15.0.6

factors that govern fire initiation, growth, and spread in such systems can very easily lead to incorrect assumptions"[96].

70 Kingspan Insulation recognises that these important issues were raised by Torero and Bisby and so now form part of the evidence before the Inquiry. However these issues were not explored to any meaningful extent with factual witnesses, whether from Government or otherwise, during the course of the Inquiry, which questioning may have assisted a fuller understanding of the matters which were, and which were not, taken into account in respect of the formulation of the current Building Regulations.

71 It was only right at the end of Phase 2 that those following the Inquiry have been able to fully understand, from Bisby and Torero, the full extent of the dominant role played by PE ACM in the Tower fire. As a result of the evidence of Bisby and Torero the dangers and "*extreme fire hazards*"[97] posed by PE ACM cladding systems have now become clear. Equally, however, the evidence of Bisby and Torero emphasised that the simplistic assumptions that combustible insulation is inherently unsafe and/or that it was an underlying cause of fire spread at the Tower are fallacious. The truth is far more complex and that complexity must be fully understood.

72 The Inquiry's final report will inform public policy. The report and recommendations must be free from false assumptions. Industry needs a full and proper understanding about how to design safe cladding systems. Simplistic assumptions will only mislead.

73 The core purpose of the Inquiry is to ascertain the truth. Where misconceptions or false premises have arisen and developed, particularly where these have derived from the proceedings of the Inquiry, it is imperative that these are now corrected. The true facts must be distinguished from incorrect assertions, not least so that trust and confidence in the wider housing stock can properly be restored in respect of those cladding systems which are safe.

[96] Transcript, Day 289, 9 June 2022, page 183, lines 17-27, page 184, lines 1-6.
[97] Transcript, Day 289, 9 June 2022, page 185, lines 15-25, page 186, lines 1-3.

74 Accordingly, Kingspan Insulation respectfully submits that:

(a) It will be important for the Chairman and the Panel to consider the impact that the timing of the Inquiry's expert evidence has had on the Inquiry process when preparing the Phase 2 report.

(b) The Chairman and the Panel will need to be extremely careful to ensure that the entirety of the Phase 2 evidence is now considered through the lens of the Inquiry's expert's findings. In particular, allegations and assertions put to witnesses on the basis of any incorrect assumption that combustible insulation was dangerous or less safe, or caused or contributed to the nature and speed of the spread of the fire at the Tower, must now be corrected.

(c) The Chairman and the Panel will want to set aside any pre-existing assumptions that combustible products *per se* are unsafe and consider instead the complexities of cladding systems.

(d) The Inquiry will need to ensure that the final report and recommendations properly reflects the expert evidence of Bisby and Torero. It is clear that further consideration must be given to the means by which cladding systems can be rendered safe having regard to the fact that buildings must be properly insulated from an environmental and regulatory perspective. Any simplistic assumption that the use of only non-combustible materials will result in safe cladding systems has been demonstrated by Bisby and Torero to be wrong. This reality must be fully understood to ensure that the regulatory and testing regime are fit for purpose. Kingspan Insulation will address this topic further in its Recommendations paper.

(e) It is now known that the Government carried out a BS 8414 test of PE ACM in 2001 and that that test failed. The test was carried out because it was recognised that PE ACM was likely to be sold and used.[98] Despite

[98] For example, Dr Colwell explained in her evidence to the Inquiry that, as at 2001 PE ACM was *"available as a product"* –Transcript, Day 232, 15 February 2022, page 43m, line 13; and *"I understood it was a product that was*

recognising that this material was likely to be used in cladding systems, and despite knowing that its test result demonstrated that it failed, the Government "sat" on that test result and did not publish it. It took no steps to require further large-scale testing of PE ACM systems to determine whether this test was an anomaly. It took no steps to ensure that PE ACM systems were not sold on the market.

(f) The Government has already recognised the seriousness and importance of its failings[99].

(g) There is not a single successful BS 8414 test of a PE ACM system; Bisby defied anyone to achieve a successful pass of a BS 8414 test with any PE system. Yet it was allowed to be marketed.

(h) Conversely, whilst there were some shortcomings in respect of Kingspan Insulation's testing and certification of K15 in the period 2005 to 2014, those shortcomings were entirely irrelevant to the Tower fire. Whilst there has not been a single successful BS 8414 test of systems incorporating PE ACM, there have been 14 successful BS 8414 tests of cladding systems incorporating K15 – more than for any other type of insulation as far as Kingspan Insulation is aware.

G. RESPONSIBILITY FOR THE FAILINGS AT GRENFELL TOWER

75 In light of the Phase 2 evidence, Kingspan Insulation submits that it is critical that the Inquiry now identifies 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.

76 At the end of the Phase 2 hearings, the Chairman said, *"In the course of the hearings, it has become apparent that many mistakes were made, and many witnesses have acknowledged that they or the organisations they represented*

available to the market and therefore it was of interest…". Transcript, Day 232, 15 February 2022, page 96, lines 8-11.

[99] See DLUHC's oral Opening and Closing Submissions for Module 6: Transcript, Day 215, 7 December 2021; and Transcript, Day 294, 22 June 2022.

failed in one way or another to meet the standards to be expected of them. However, in order properly to identify and evaluate the underlying causes of the fire, the panel will have to consider the evidence in detail to determine the extent to which such failures contributed to the disaster. When seeking to identify the causes of a major tragedy in which so many people died, it is important that criticism should be directed at those who truly bear substantial responsibility for what occurred"[100] (emphasis added).

77 It is clear from the evidence that the responsibility for the tragedy lies with the PE ACM cladding which was falsely classified and not safe for use on a high-rise residential building with any form of insulation. It is also clear that those responsible for the design, build and Building Control approval of the refurbishment of the Tower in a manner that was clearly in breach of the Building Regulations must bear some responsibility. It is equally clear that Kingspan Insulation is not responsible for the tragedy. When it comes to determining responsibility, we submit that it is important to consider the following:

(a) The expert evidence has shown that the presence of the PE ACM cladding was the primary and overwhelmingly dominant cause of the nature and speed of the spread of the fire at the Tower. The expert evidence was that Arconic's PE ACM product *"presents extreme fire hazards"*[101]*, and* is *"uniquely hazardous"*[102] and that such panels were unsafe when combined with either combustible or non-combustible insulation. Arconic bears responsibility for the fact that those panels were on the market for use in rainscreen cladding.

(b) Whilst Arconic is responsible for holding out its PE ACM product as fit for use as a rainscreen cladding product and was responsible for its incorrect certification (Arconic claimed Euroclass B, but the product had only achieved Euroclass E in the hook-on cassette form used on Grenfell Tower), it was always apparent that none of the routes to compliance

[100] Transcript, Day 308, 21 July 2022, page 128, lines 6-18.
[101] Transcript, Day 289, 9 June 2022, page 185, lines 15-25, page 186, lines 1-3.
[102] Transcript, Day 289, 9 June 2022, page 185, lines 15-25, page 186, lines 1-3.

permitted the use PE ACM panels with combustible insulation, even with the incorrect certification. Legal responsibility for failure to achieve compliance with the Building Regulations in respect of the cladding system used in the Tower refurbishment lay with the parties responsible for the design,[103] construction and approval of those works.

78 Kingspan Insulation respectfully invites the Inquiry to include the following conclusions in its Phase 2 report:

(a) Kingspan Insulation had no part in the design or construction of the cladding system installed during the refurbishment of the Tower.

(b) K15 was only used as an insulation product because of a temporary shortage of Celotex RS 5000. Kingspan Insulation had no knowledge that K15 was to be used on the Tower.

(c) Kingspan Insulation had no contractual relationship with the Council, or the TMO, or any of the designers/contractors engaged on the refurbishment project.

(d) Kingspan Insulation provided no specific advice or technical guidance in respect of the suitability of K15 to those responsible for the design or the implementation of the Tower refurbishment[104].

(e) None of the parties involved in the design, construction and approval of the refurbishment (nor SIG or CCF who supplied the K15 from stock) placed any reliance on the testing, certification or marketing materials relating to fire performance of K15 current at the time of supply. To the extent that materials or certification were considered at all[105], the focus was on insulating values and not fire performance.

(f) None of the designers, architects or contractors who built the cladding system considered the route to compliance with the Building Regulations

[103] Transcript, Day 291, 15 June 2022, page 38, lines 11-15.
[104] As explained more fully at footnote 37 of Kingspan Insulation's Opening Statement for Phase 2, Module 2 {KIN00023794/9}, a generic u-value calculation was provided at a very early design stage. The calculation was provided by Kingspan Insulation prior to any knowledge of the cladding being used.
[105] Limited checks appear to have focussed on "u-values" i.e. insulating properties, rather than fire performance.

adequately or at all. Had they given this issue any consideration it would have been readily apparent that combustible insulation could not lawfully be used with PE ACM cladding. None of the K15 certificates or marketing materials current at the time of the supply stated otherwise nor represented K15 to be non-combustible or limited combustibility.

(g) K15 accounted for only approximately 5% of the rainscreen insulation (by area) purchased for use on the Tower. It is not clear how much of this purchased product was actually installed on the Tower.

79 Kingspan Insulation submits that Arconic knowingly permitted unsafe Reynobond PE ACM to be marketed with misleading fire performance certificate for use in tall buildings.

80 In addition, during Phase 2, the Inquiry has heard evidence of the multiple failings on the part of those involved in advising on designing and installing the cladding system which resulted in Arconic's PE ACM being used and those involved in the process (including Building Control), who failed to give any, or any adequate consideration, to the safety issues posed by the use of this dangerous product[106]. There was never any lawful basis for using combustible insulation behind the PE ACM; it is now known that had non-combustible insulation been used it would have made no material difference to the nature and speed of the spread of the fire and the refurbishment works would still not have complied with the functional requirement of the Building Regulations.

H. CRITICISMS MADE OF KINGSPAN INSULATION AND K15

81 The various criticisms which have been made of Kingspan Insulation need to be considered in the light of the expert evidence of Bisby and Torero.

BS 8414 testing of K15

82 During the Phase 2 hearings, there was a particular focus on four BS 8414 tests carried out by Kingspan Insulation on systems incorporating K15. These

[106] For further detail, see para 14 of Kingspan Insulation's Module 1 Closing {KIN00025945/7-9}.

were the 2005 test involving "old technology" K15, a test in 2007 involving "new technology" K15, and two tests in 2014 involving a research and development version of K15.

83 As detailed in its previous submissions (and below), the process shortcomings in respect of these four specific tests have been fully acknowledged by Kingspan Insulation, but none of those shortcomings was in any way relevant to the Tower fire. The position in respect of each of those four tests is summarised below.

84 Furthermore, none of the criticisms made in respect of these four tests detracts from the reality that: (i) there are 14 other successful BS 8414 tests of systems which did incorporate the type of K15 used on the Tower and (ii) no criticism whatsoever has been made of any of these 14 tests. These 14 successful system tests were all submitted by Kingspan Insulation to the Inquiry. Counsel to the Inquiry indicated that each would be carefully analysed[107]. They presumably have been carefully analysed. They provide unequivocal evidence that multiple different cladding systems incorporating K15 of the type used on the Tower have met the relevant criteria set by BR 135 for fire performance of cladding systems in BS 8414 tests. The totality of the testing evidence relating to the K15 product used on the Tower must be taken into account when it comes to any assessment of the suitability of K15 for use as a rainscreen insulation material.[108]

85 The critical point in terms of the Tower fire is **the absence of a single** successful BS 8414 test of any cladding system incorporating Arconic's PE ACM system or, indeed any PE ACM system. It is now known that the Government had tested a cladding system using PE system back in 2001 and that test failed. Following the Tower fire the Government (DCLG) carried out further tests of systems using PE ACM cladding with both combustible and non-combustible insulation. They failed. In fact, the system incorporating non-combustible insulation failed marginally more quickly than the system

[107] Transcript, Day 113, 25 March 2021, page 60, para 16 -18.
[108] Any assessment of the safety or suitability of a product for a particular use must have regard to the totality of the testing evidence available as at the date of that assessment.

incorporating combustible insulation. The expert evidence is clear as to the unique hazards of PE ACM.

2005 Test of "old technology" K15[109]

86 Kingspan Insulation accepts that following the change from "old technology" to "new technology" K15 in 2006, it should have carried out a replacement of the 2005 BS 8414 test with "new technology" K15 or had the 2005 BS-8414 test result validated by the test house for "new technology" K15. However, this was not a deliberate or fraudulent act committed with any intention to mislead or deceive anyone. Dr Malcolm Rochefort, former Technical Director of Kingspan Insulation, explained that the new technology K15 used substantially the same chemistry and there was no basis for thinking that the production changes would make any significant difference in terms of fire performance.[110]

87 Furthermore, there is no evidence that any designers, architects or contractors responsible for the refurbishment at the Tower relied on the 2005 BS 8414 test in order to support the use of K15 on the Tower. Again, any competent consideration of the building regulations would have shown that combustible insulation (with or without Class 0) could not be used with PE ACM without a BS 8414 test or a desktop assessment or holistic fire engineering assessment of the rainscreen system proposed to be built. No such testing or assessments were undertaken.

88 It has also wrongly been contended[111] that a classification report was required to state that the 2005 test had met the criteria set out in BR 135. However, the requirement for a classification report did not come in until 2015.[112] The test data for the 2005 test remained available for analysis and the BRE was able to issue a positive classification report in 2015, and did so, when the requirement for a classification report was introduced.

[109] See Kingspan Insulation's Module 2 Opening Submission, paras 44-45 {KIN00023794/17-18} and Kingspan Insulation's Module 2 Closing Submission, para 43.1, 43.2 and 44-65 {KIN00025944/14-22}.
[110] See para 61 of Kingspan Insulation's Module 2 Closing Submission {KIN00025944/22}.
[111] See footnote 54 of Kingspan Insulation's Module 2 Closing Submission {KIN00025944/20}.
[112] See para 57 and footnote 61 of Kingspan Insulation's Module 2 Closing Submission {KIN00025944/20}.

2007 BS 8414 test of a system incorporating Sotech cladding using new tech K15 [113]

89 It has been asserted that “new technology" K15 *“failed spectacularly”*[114] when tested in a BS 8414 test in December 2007. It has then been asserted that this somehow proves that “new technology” K15 had a worse fire performance than "old technology" K15.

90 These assertions are wrong. We refer to paragraph 49 above where we explained that no valid comparisons can be made between the "old technology" 2005 test and the "new technology" 2007 test. The differences between the tests would render any objective comparison of the performance of the insulation in the two tests impossible.

91 The 2007 test was of a system incorporating Sotech cladding which incorporated "new technology" K15 and the system failed. When tested the following month, a system incorporating Sotech cladding and non-combustible mineral fibre insulation also failed. The failure of these system tests demonstrate that those cladding systems as a whole were not capable of passing the BR 135 criteria.

92 Where a system using the same cladding fails when tested with both non-combustible insulation and combustible insulation, the clear conclusion is that the choice of insulation is not the dominant factor in the test failure. Unfortunately, whilst there was substantial focus placed in numerous questions to different witnesses about the December 2007 test which used K15, there were only a very limited number of questions asked about the January 2008 test which was identical save for its use of non-combustible insulation. Despite the 2008 test being drawn to the attention of the Inquiry, and Kingspan Insulation disclosing documents to the Inquiry in respect of this test (as detailed in previous submissions)[115], as far as we are aware, these

[113] See Kingspan Insulation's Module 2 Opening Submission, paras 46-47 {KIN00023794/18}; Kingspan Insulation's Module 2 Closing Submission, paras 22.2, 43.4, 66-72 {KIN00025944/8-9}, {KIN00025944/16} and {KIN00025944/22-27}; Kingspan Insulation's Module 6 Closing Submissions, paras 60-72 {KIN00026320/24-29}.
[114] See for example, Transcript, Day 77, 25 November 2020, page 80, lines 11-12 *"Well, we know that because there were tests in 2007 and 2008 to BS 8414-2 that K15 failed spectacularly"*.
[115] See for example, Kingspan Insulation's Module 2 Closing Submission para 68.3 {KIN00025944/24-25}; and Kingspan Insulation's Module 6 Closing Submission paras 60-72 {KIN00026320/24-29}.

documents have not been disclosed to Core Participants or made part of the public record.

93 There was extensive media coverage of the “failed” 2007 test, repeating the incorrect allegations that this test should somehow be seen as a failure of K15. There was no media coverage of the January 2008 test with non-combustible insulation. This reflected the lack of emphasis in the questioning on this corresponding 2008 test and the lack of disclosure to core participants of the 2008 test.

94 It has quite rightly, never been asserted that the failed January 2008 test demonstrates that non-combustible mineral fibre insulation is generally unsafe; any such suggestion would be preposterous. The suggestion, which has been advanced, that the December 2007 test demonstrates that new technology K15 was generally unsafe is similarly flawed.

95 Not surprisingly, there has been no scientific or expert evidence to support the allegations made during the questioning of factual witnesses that the December 2007 somehow shows that new technology K15 had a worse fire performance than old technology K15. It seems clear from the evidence of Bisby and Torero that the assertions put to factual witnesses in this regard would not be supported by either of the experts.

96 Kingspan Insulation is concerned by the very different treatment of the December 2007 and January 2008 tests. If the December 2007 test was to be put to factual witnesses as relevant to the safety of K15 then fairness dictates that the January 2008 test should have been put to those witnesses too.

97 The January 2008 test of the system incorporating Sotech cladding using non-combustible mineral fibre insulation was also relevant for a second important reason. It provides a clear example of a system incorporating A1 / A2 cladding and insulation which nevertheless failed to meet the BR 135 criteria when tested to BS 8414. It was therefore a further example of the important point of public safety which has now been emphasised by Torero, that systems using only non-combustible and limited combustibility (Euroclass A1/A2) insulation

materials and cladding can be unsafe. This is an issue which is of direct relevance to the Inquiry's terms of reference.

2014 BS-8414 testing of R&D versions of K15[116]

98 Two tests were carried out, in March and July 2014, on systems incorporating research and development variants of K15. Kingspan Insulation has accepted that it failed to make clear that those tests were of "non-standard" K15 and that it should have done so. It repeats the submissions made previously in relation to these tests.[117]

99 The failure to properly explain the R&D aspect of the 2014 tests was not intentional; there was no intention on the part of anyone at Kingspan Insulation to deceive the market in relation to these tests.

100 In any event, as with the 2005 and 2007 tests, no one involved in the refurbishment at the Tower relied on the systems tested in 2014 in order to assess the suitability of K15 on the Tower. Any assessment of the building regulations would have led to the conclusion that no form of combustible insulation could be used with PE ACM. Furthermore, as set out above, there are 14 successful BS 8414 tests of cladding systems incorporating the type of K15 used on the Tower.

101 The expert evidence of Bisby and Torero demonstrates that the issues raised in respect of historical testing of K15 are of no causative relevance, let alone any causative potency, in relation to the Tower fire. The nature and speed of the spread of the fire at the Tower fire would not have been materially different had non-combustible insulation been used. The critical issue in relation to testing is the absence of any successful BS 8414 testing of systems incorporating PE ACM whatsoever.

[116] See for example, Kingspan Insulation's Module 2 Opening Submission paras 48-56 {KIN00023794/19-21}; Kingspan Insulation's Module 2 Closing Submission para 43.3 and 73-78 {KIN00025944/16} and {KIN00025944/27-30}.
[117] *Ibid.*

Class 0 Testing of K15[118]

102 "New technology" K15 was a phenolic foam product that was very similar to another phenolic foam product produced at Kingspan Insulation's Dutch manufacturing site in Kesteren; the chemistry was largely identical. The Kesteren product had a Class 0 classification. The Class 0 classifications for the Kesteren product were supplied to BBA who accepted that the two products were identical so far as Class 0 classification was concerned. It is understood that this type of "read-across" between products using the same chemistry was commonplace.

103 In any event, Class 0 classification is not a relevant classification for determining whether K15 as part of a cladding system met the requirements of the Building Regulations. The linear route set out in ADB requires insulation to be of limited combustibility; Class 0 is irrelevant to the use of insulation under the linear route (it was mentioned in ADB in respect of only the outer surface of cladding panels).

104 The relevance and utility of the Class 0 classification has also received criticism during Phase 2 of the Inquiry. Torero explained how Class 0 testing *"does not reproduce the system behaviour"*; *"is not testing the system behaviour"*[119] and the reference to Class 0 in ADB diagram 40 is *"wholly inappropriate"*[120].

105 As explained in its Module 2 closing[121], Kingspan Insulation subsequently undertook a test on K15's foil facer to BS-476 Parts 6 and 7 and Class 0 was achieved[122]. This approach was based on Kingspan Insulation's interpretation of the wording in Approved Document B. Approved Document B requires either *"the product or surface material of a composite product"* (emphasis added) to achieve the necessary fire propagation index and surface spread of flame

[118] See for example, Kingspan Insulation's Module 2 Opening Submission paras 39-43 {KIN00023794/15-17}; Kingspan Insulation's Module 2 Closing Submission paras 82-90 {KIN00025944/31-33}.
[119] Transcript, Day 289, 9 June 2022, page 90, lines 11-24.
[120] Transcript, Day 292, 16 June 2022, page 40, lines 16-25, page 41, line 1.
[121] Kingspan Insulation's Module 2 Closing Submissions, para 84-90 {KIN00025944/31-33} and see Kingspan Insulation's Module 2 Opening Submissions, para 40 {KIN00023794/16}.

results to BS-476 Parts 6 and 7. Kingspan Insulation maintains that its position is a reasonable, valid and legitimate interpretation of the relevant statutory guidance.

106 Kingspan Insulation's interpretation was supported by Dr Lane's explanation of the changes to the Class 0 classification. She explained that: *"in 1985 the definition of class 0 was significantly changed"*. Further, she explained that *"the requirement to consider the substrate with the surface was removed from the text in the statutory guidance document. This remained the definition to the time of the Grenfell fire"*[123]. Dr Lane also explained in her Phase 1 evidence to the Inquiry that *"Class 0 is to do with the surface yes. It's not an insulation test"*[124]. Kingspan Insulation understood the test, consistently with Dr Lane's explanation, to be concerned solely with the spread of flame across the surface of the product. Thus testing of the surface material (the foil) was appropriate, in accordance with the amended wording in Approved Document B.

107 Bisby disagreed with Kingspan Insulation's interpretation. It seems that he therefore disagreed also with Dr Lane's understanding of the test, although Dr Lane's evidence on the issue was not put to him. It is apparent that this is an issue on which experts can properly hold different views.

108 In any event, any competent consideration of the building regulations would have shown that combustible insulation (with or without Class 0) could not be used with PE ACM without a BS 8414 test or a desktop assessment or holistic fire engineering assessment of the rainscreen system proposed to be built. No such testing or assessments were undertaken.

Certification, Marketing and Promotion of K15[125]

109 The evidence heard in Phase 2 has shown that none of the parties involved in the design, construction and approval of the works (or SIG or CCF who supplied the K15 from stock) relied on the marketing or certification materials

[123] Transcript Day 68, 10 November 2020, page 57, lines 23-25, page 58, lines 1-7.
[124] Transcript, Day 79, 22 November 2018, page 136, lines 12-13.
[125] Kingspan Insulation's Module 2 Opening Submissions paras 57 – 65 {KIN00023794/22-24}; and Kingspan Insulation's Module 2 Closing Submissions paras 30 – 32 and 91-110 {KIN00025944/10-11} and {KIN00025944/33-38}; and Kingspan Insulation's Module 6 Closing Submission paras 74-79 {KIN00026320/29-31}.

relating to the fire performance of K15 current at the time of its supply to the refurbishment project. To the extent that materials or certification were considered at all, that investigation was insufficient for determining whether K15 was suitable for use in the cladding system on the Tower. The K15 marketing materials and certification were thus irrelevant to the decision to use K15 (as a substitute for the Celotex product) in the refurbishment.

110 If those concerned with the refurbishment had looked at any of the certification or product literature current at the time of supply, or contacted Kingspan Insulation for advice on suitability of K15, they would have been aware that K15 could only be used in a cladding system for which there was suitable evidence (either through a successful BS 8414 test, desktop study or holistic fire engineering assessment).

111 In respect of earlier versions of the LABC and BBA certificates (not current at the time of supply), Kingspan Insulation accepts that aspects of these certificates were capable of being misunderstood. Kingspan Insulation recognises that these issues should have been drawn to the attention of the issuing bodies and Kingspan Insulation apologises for these omissions. This shortcoming could not occur again following changes make to Kingspan Insulation's marketing processes since the fire.

112 In respect of earlier marketing and promotion of K15 (**prior to 2014**), Kingspan Insulation accepts that certain statements made in early K15 product literature, trade press advertisements and bespoke advice provided to customers were not sufficiently clear in specifying the limitations of the 2005 BS 8414. Again, Kingspan Insulation apologises for those shortcomings. These were not dishonest.

113 The rationale behind this initial approach was that fire engineering professionals would be able to utilise the 2005 test result when considering the suitability of K15 for use with a variety of other non-combustible outer layers.

114 Extrapolation has come to be accepted by regulators as a legitimate route to compliance, for example, with the introduction of the desktop study route in

2014 on the BCA TGN. Evidence heard during Phase 2 of the Inquiry indicates that extrapolation may have been an acceptable route to compliance prior to 2014, for example, Bisby noted in his evidence that: *"Taken together, The Building Act 1984, The Building Regulations 2010, and Approved Document B, very clearly in my opinion, permit the use of assessments in lieu of tests"*[126]. In addition, Steve Evans of the NHBC explained that *"BCA didn't introduce desktop studies, they were already there in the regulations*[127]*".*

115 As at the time of supply of K15 for use on the Tower, the literature was far clearer in explaining that BS 8414 tests were a test of the specific system.

116 In any event, the use of K15 in a particular cladding system was (and always has been) a matter for designers, architects and cladding contractors concerned with the cladding on a particular construction. They would have had to be satisfied with the fire safety of the whole design. Kingspan Insulation, a manufacturer of one product within that system, is not responsible for the failure of the designers, architects, contractors and Building Control to pay proper attention to the fire safety issues inherent in the refurbishment.

The "seminally causative" allegation

117 The representatives of certain core participants have alleged that Kingspan Insulation, was "seminally causative" of the Tower fire.[128] The allegation has no basis in law or fact.

118 The basis of the allegation appears to be that Kingspan Insulation set the precedent that combustible insulation could be used in cladding systems which pass BS 8414 tests. However, there is no doubt whatsoever that combustible insulation *can* safely be used in appropriate cladding systems and that numerous such cladding systems have successfully met the stringent BR 135 criteria when tested to BS 8414. The problem does not lie with K15. The

[126] Transcript, Day 291, 15 June 2022, page 77, lines 13-22, page 78, lines 11-12.
[127] Transcript, Day 220, 15 December 2021, page 204, lines 1 – 8.
[128] See for example, Transcript, Day 66, November 2020, page 25, lines 3-7 *" Furthermore, in a general sense, Kingspan's actions were seminally causative, in that it was at this time regarded as the industry leader, and it set the precedent that combustible insulation could genuinely pass a BS 8414 test and so be used over 18 metres."* See also, Transcript, Day 293, 20 June 2022, page 37, lines 23-26 and page 38, lines 1-8.

problem lies with PE ACM. Bisby's evidence makes clear that the reason for the speed and spread of the fire was the presence of Arconic's PE ACM and not the type of insulation used.

119 The allegation also ignores the fact that it was the Government, who in 2006, amended Approved Document B to allow combustible insulation to be used as part of a system that met the BR 135 requirements when tested to BS8414. In fact, as early as 1985, the Government allowed combustible cladding to be used on tall buildings (if the external surface was Class 0).

120 The reality is that since at least 2001 the Government has been alive to the fact that PE ACM cladding was likely to be used in cladding systems[129] and that a BS 8414 test of such a system had failed. The problem was that this testing was not made public and the Government took no action to stop PE ACM being used in cladding systems notwithstanding this test. All of this was well known before K15 insulation even came to the market (in 2005). Neither the existence of PE ACM systems nor their use in the UK has anything whatsoever to do with Kingspan Insulation. The failure lies with those responsible for a regulatory regime which permitted the use of such PE ACM systems notwithstanding the Government's knowledge of its own 2001 BS 8414 test which demonstrated the dangers of such a system. Arconic bears responsibility for manufacturing and marketing such a product for use in cladding systems notwithstanding the absence of any successful full-scale testing of such systems.

121 In Bisby's view, there is no prospect at all of Reynobond PE ACM being part of a compliant system. Conversely, the type of K15 used on the Tower has been used in no less than 14 cladding systems which have passed BS 8414 tests (satisfied the BR 135 criteria); that is more than any other type of rainscreen insulation as far as Kingspan Insulation is aware. K15 has been

[129] See footnote 98 above. K15 was not introduced to the 18-metre market until after this date.

demonstrated in large scale testing to be suitable for use with appropriate rainscreen systems.

122 It is impossible to sustain the argument that Kingspan Insulation is responsible for the fire or for Arconic's failings. The nature and speed of the spread of the fire would have not been materially different had non-combustible insulation been used. The allegation is a rhetorical flourish lacking any evidential basis.

123 In any event, the use of any particular insulation in a particular cladding system was (and always has been) a matter for designers, cladding contractors and architects concerned with the cladding on a particular construction. They would have had to be satisfied with the fire safety of the whole system. Kingspan Insulation is a manufacturer of one specific type of insulation that has been demonstrated to be capable of being safely used in appropriate cladding systems. Kingspan Insulation is not a proxy for the industry or responsible for the actions of others in the industry.

Corporate Culture

124 In its Module 2 Closings[130], Kingspan Insulation addressed allegations made about the company's corporate culture. Kingspan Insulation fully accepts that a small group of employees in this part of the business behaved in a way that fell far short of its culture in certain areas, but that these areas had no material impact on the fire at the Tower. Within Kingspan Insulation, this was isolated behaviour which was the exception and not reflective of Kingspan Insulation's core values. Beyond Kingspan Insulation, however, there is some evidence that an inappropriately lax approach to fire safety may have been widespread within the wider construction industry at this time, as has become apparent from the many fire safety issues that have subsequently been identified in respect of high-rise buildings, such as inappropriate material choices, building designs and installation practices.

125 With the benefit of hindsight it can be seen that successive Governments oversaw a lax regulatory regime in relation to the fire safety of cladding. This

[130] Kingspan Insulation's Module 2 Closings paras 114 – 125 {KIN00025944/40-43}.

lax approach probably reflected a general lack of awareness of the significance of the risks that could be posed by a dangerous cladding system such as PE ACM. The lax regulatory approach affected the way in which other bodies, including the BBA and LABC, dealt with certification issues. But such a lax approach to regulatory issues was not set by, and could not have been set by, industry itself.

126 Kingspan Insulation accepts it did attempt to extrapolate from test results, for example from the December 2005 test. This was at a time when it was widely understood that the need for extrapolation was inherent in the regulatory process as not every individual system could be subject to a full-scale test. Most importantly, however, the testing processes carried out by Kingspan Insulation were never dishonest or intentionally manipulated. The proof of this is that the BS8414 tests central to the Inquiry can, and have been reproduced to assess and confirm their accuracy. Kingspan Insulation is absolutely confident as to the safety of K15 when used in appropriate, tested, cladding systems.

127 Whilst criticisms can no doubt be made of numerous manufacturers, the Tower fire was the result of the complete failure of the regulatory system to prevent a company like Arconic manufacturing and marketing a PE ACM product knowingly with an incorrect Euroclass classification and notwithstanding the absence of any BS 8414 testing. The large-scale testing of PE ACM which has taken place, by the Government in 2001 and in 2017, has demonstrated the unique dangers of this product. It should never have been permitted to be marketed.

I. CLOSING REMARKS

128 Kingspan Insulation respectfully submits that the Chairman and the Panel members must be particularly careful to consider all the Phase 2 evidence through the lens of the expert evidence in Module 7.

129 Kingspan Insulation also respectfully submits that the Chairman and the Panel members must be particularly careful when considering the evidence to ensure

that any false impressions are corrected in the Phase 2 report. The facts, being those supported by evidence, must be distinguished from incorrect assertions and allegations. Where a serious allegation has been put to a witness by Counsel to the Inquiry which is not supported by the evidence, then this must be made clear in the final report.

130 Kingspan Insulation has acknowledged that the Inquiry process has revealed historical shortcomings in its processes and procedures. Kingspan Insulation deeply regrets the fact of those shortcomings and has apologised for them. None of those shortcomings, however, caused or contributed to the Tower fire in any way.

131 Responsibility for the tragedy of the Tower fire rests with: (i) the regulatory regime which failed to prevent the use of *"uniquely hazardous"*[131] PE ACM cladding systems, notwithstanding the Government's own 2001 BS 8414 testing which demonstrated its dangerousness; (ii) with Arconic as the manufacturer of the uniquely dangerous PE ACM product used on the Tower, which it knew was dangerous and which it incorrectly classified as Euroclass B) (iii) with the parties responsible for the design, construction and approval of the refurbishment works and (iv) with Building Control for permitting the refurbishment to be constructed notwithstanding its patent failure to comply with the building regulations.

Gowling WLG (UK) LLP

Geraint Webb KC

Tim Green KC

3 October 2022

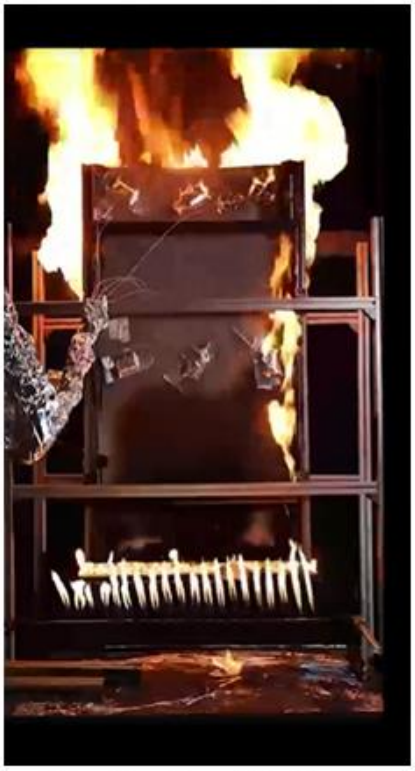
[131] Transcript, Day 289, 9 June 2022, page 185, lines 15-25, page 186, lines 1-3.

APPENDIX

The photographs below are taken from Bisby WP2 experiments[132]. They are extracted from four tests – Phenolic tests 21 and 22 and Mineral Fibre tests 32 and 33. The photographs allow a comparison to be made between the tests at the point Bisby identifies as being significant (ie the critical time and time of peak heat release rate). Although the times are different for each test it is clear that taking an average for each insulation material shows that the test system which used mineral wool gets to these critical time points marginally more quickly than the test system which used phenolic and that a visual comparison would suggest that they are performing on average much the same at each time point.

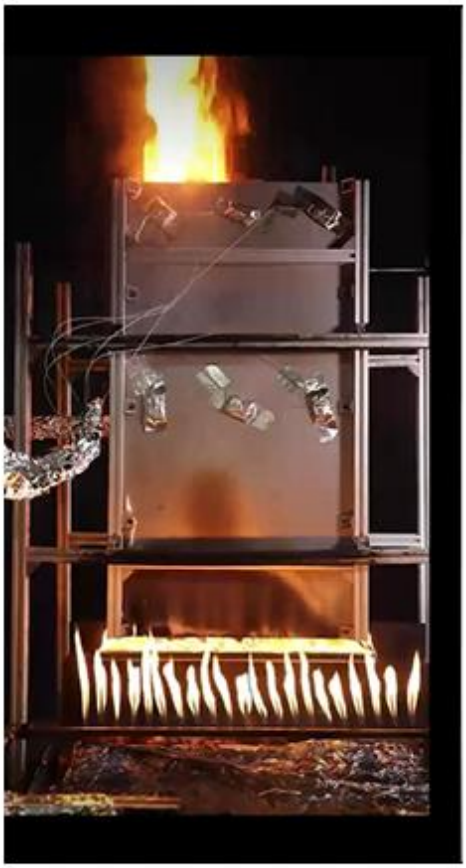
[132] {LPYWP200000001}.

Critical Time



Mineral Fibre Experiment 32 – 11:55 mins

Mineral Fibre Experiment 33 – 10:37 mins

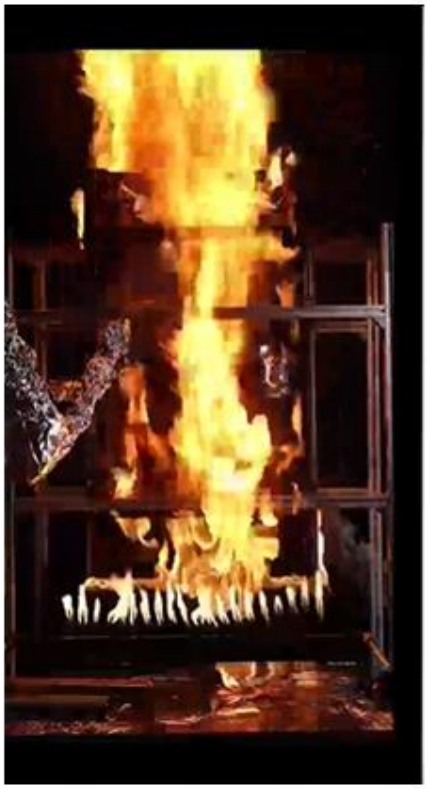


Phenolic Experiment 21 – 10:14 mins

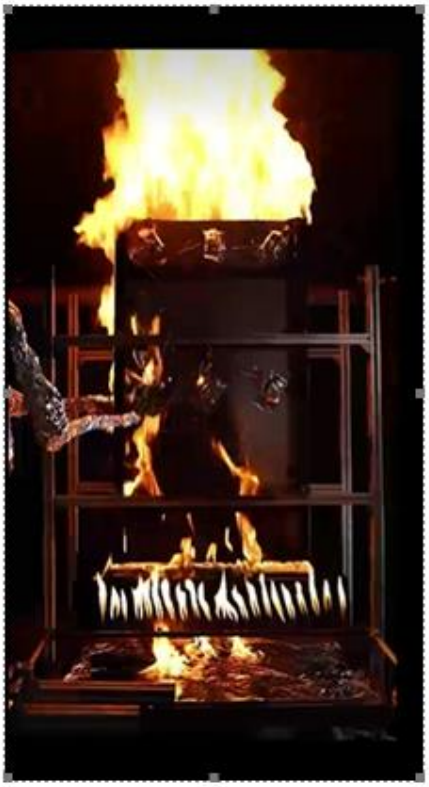
Phenolic Experiment 22 – 13:14 mins

Average time to Critical Time for PF = 12:14 mins, for MW = 11:16 mins

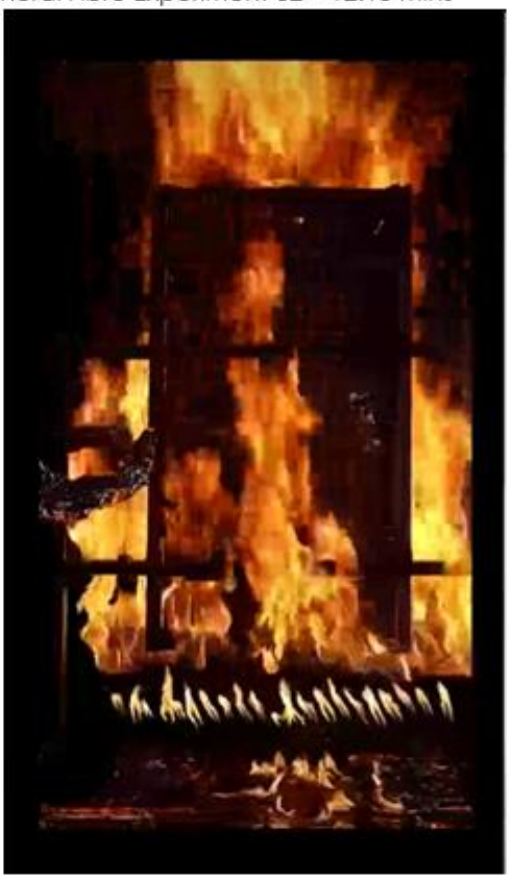
Time of Peak Heat Release



Mineral Fibre Experiment 32 – 12:18 mins



Mineral Fibre Experiment 33 – 11:12 mins



Phenolic Experiment 21 – 10:50 mins

Phenolic Experiment 22 – 14:00 mins

Average Time to Peak Heat Release for PF = 12:25 mins, for MW = 11:45 mins