

Executive Summary

- 1 This report examines the work of a wide range of parties involved with the over-cladding of Grenfell Tower that formed the major part of the 2012-16 Works; that is all the work related to the upgrading of the external walls from Level 4 to the Crown. This includes the thermal insulation as affixed to the outside face of the existing spandrel panels and columns; the cavity barriers; the rainscreen cladding system; the window infill panels within the new window system, and the insulation inserted behind the window linings at the internal head/jamb/sill interface. I consider these to be the five key elements of failure in the over-cladding design in terms of its non-compliance with the requirements of the Building Regulations.
- 2 The focus of my commentary is upon the architectural work of Studio E, but I also comment upon that part of the design work, as carried out by the specialist sub-contractor Harley, that relates to production documentation and falls under the scope of work that is described within the RIBA '*Plan of Work*' and which can be carried out by an architect under a 'full services' appointment. I also comment, albeit briefly, on the work of others such as the Building Control Department; the services consultant; the specialist fire consultant; the Design and Build Contractor; the cladding supplier; the BBA certification authority; and the manufacturers of the cavity barriers and insulation products that were incorporated into the design, and ultimately into the building. In these latter cases my commentary is that of an architect with experience of working with similar companies or organisations, not as an expert in those respective fields.
- 3 In **Section 3** I describe an '*Indicative Approach*' in which I seek to show *how* an architect would set about designing and specifying an over-cladding installation of this kind in a manner that complies with the guidance contained within Approved Document B (hereinafter referred to as ADB2) as issued by the Secretary of State, and in that process what such an Indicative Approach would yield in terms of the basis of a design that could be further developed in terms of achieving compliance with the guidance in ADB2. This section highlights the importance of working through a comprehensive strategy in terms of the extent and positioning of cavity barriers within the new cavities behind the rainscreen cladding, and particularly around the window openings.
- 4 In **Section 4** I examine the over-cladding work at Grenfell Tower through a series of '*Snap-Shots*' at the following stages:
 - Snap-Shot 1 (Stage D Design Report at Aug 2013);
 - Snap-Shot 2 (Tender Documentation Aug 13 - Jan 2014);
 - Snap-Shot 3 (Construction Documentation April 14 – 2016);

- Snap-Shot 4 (*'As Built'* Documentation May 2016).
- 5 I show within this section that the polyisocyanurate insulation, which was specified from the very outset of the design work, and inserted into the specification as issued by Studio E, was non-compliant with the guidance in ADB2 and therefore non-compliant with the requirements of the Building Regulations.
 - 6 A similar criticism pertains to both the window infill panels and the insulation inserted behind the linings at the internal head/jamb/sill interface: in both cases the products/materials used were non-compliant with the guidance in ADB2 and therefore non-compliant with the requirements of the Building Regulations.
 - 7 In terms of design, the failings with respect to the cavity barriers were multiple and serious. At no stage in the process could I find evidence of a comprehensive design strategy with respect to the provision of cavity barriers. Inadequacies and errors in the tender stage information remained uncorrected at production stage, the result of which was that the building failed, both as designed and as built, to provide any provision for inhibiting the passage of fire into the cavities to the cladding at their adjunction with the window openings. Thereafter, the further passage of fire within the cavities was not inhibited as required to meet the guidance in ADB2, due to shortfalls in both the detailing and installation work with respect to cavity barriers.
 - 8 The ACP cladding story is somewhat different. Whilst the type of cladding used, (essentially two thin layers of aluminium which combined to *'sandwich'* a core of polyethylene to which each was bonded and formed into shaped cassette panels) failed to meet the requirements of the Building Regulations, the BBA test certificate clearly endorses that product (albeit the certificate is qualified in relation to the colour of the sample tested) as being compliant with the guidance in ADB2. It is my opinion that those who specify products are entitled to rely on test certificates from organisations such as the BBA, on the work of fire testing stations that carry out tests and provide the information upon which such certificates are based, and on the provisions of the Approved Documents in terms of providing appropriate guidance in terms of performance standards. Clearly, in this case, very serious problems exist in the *'chain'* of work and information between product testing station, certification agency, manufacturer and product supplier, and the standards as stipulated within ADB2. Put simply, a product was tested, certified and marketed as compliant with ADB2, and therefore supposedly also with the Building Regulations, which quite clearly failed unequivocally to meet the requirements of Schedule 1, Part B of the Building Regulations.
 - 9 In **Section 5** I examine the statutory process; that is the way in which the dialogue was conducted between the design team, and thereafter the Design and Build team, with Building Control; the completeness or otherwise of the Full Plans application that was submitted to Building Control; whether in terms of timing and completeness Building Control received information that would properly allow it to discharge its statutory duties; whether Building

Control conducted itself properly in bringing any such deficiencies to the attention of the applicant; and whether Building Control's checking process was adequately and properly carried out both in terms of review and assessment of the information submitted, and in terms of review and assessment of the construction work as carried out. I also consider and comment on the 'as-built' record drawings as prepared and issued by Studio E.

- 10 I explain within this section that the Building Regulations process remained in a state of serious disorder throughout the life of the project. During the pre-application stage Building Control complained that the information provided was not adequate to '*enable effective consultation with the Fire Authority*'. When eventually submitted, the Full Plans application for Building Regulations approval was woefully inadequate – signed but undated and submitted without any drawings attached. Thereafter, when drawings were submitted, they were consistently issued too late and in their content were seriously inadequate in terms of compliance with the guidance in ADB2. However, multiple deficiencies in terms of the information supplied went unchallenged by Building Control who also failed to spot those deficiencies when 'translated' into construction work during their many site inspections. Ultimately, Building Control issued a Completion Certificate in which it certified that '*as far as could be ascertained, after taking reasonable steps, the building work carried out complied with the relevant provisions*'. The work did not so comply.
- 11 In **Section 6** I examine and report on Studio E's quality assurance processes based on their registration as an ISO 9001 registered operation. I find that despite seemingly good work to other parts of the project, the over-cladding work and the Building Regulations application process for this project consistently, and in serious ways, failed to meet the standards that would have been met had the ISO 9001 processes and procedures been properly adopted and effectively applied.
- 12 Evident within all this, in terms of the many errors and serious inadequacies in the work as carried out by the respective parties, is a failure in terms of what would normally be considered to be a proper management and co-ordination of teams. I comment that neither Building Control, nor Rydon as Design and Build Contractor, prepared or operated a '*tracker*' which is routinely used to monitor and manage building regulation applications in circumstances where substantial information is submitted sequentially. Furthermore, very serious problems arose because Studio E simply failed to produce the proper amount of design work that fell to their responsibility under the pre-novation stage appointment under which they were employed for a full and substantial service by KCTMO. As a result, the project was tendered, and thereafter entered production stage, with inadequate design and specification work being available. Despite being employed on terms which again required the provision of such information under Rydon's post-novation appointment, Studio E do not appear to have produced that information. Harley's work thereafter also led to seriously inadequate outcomes. Despite their claims to expertise as cladding specialists, Harley clearly did not understand what was required in terms of meeting the requirements of the Building Regulations. In addition, there was a

combination of poorly defined responsibilities, inadequate quality assurance processes on the part of Studio E and Rydon (who were both ISO9001 registered), and poor performance by Building Control.

- 13 Further testimony to the chaotic manner in which this project was run and delivered is evidenced by the fact that the '*as-built*' record drawings indicated that the cladding as applied was Zinc as opposed to an aluminium composite panel (ACP). It is also evidenced by the fact that the final installation comprised the incorporation of PIR insulation which constituted a simple and most serious error in terms of non-compliance with the guidance in ADB2.
- 14 What part each of these failings played in terms of their respective contributions to the fire at Grenfell Tower is for others to determine. As architect advising the Inquiry, I can affirm that from an architect's perspective, ADB2, despite poor drafting, was clear and reliable in all aspects of its guidance in terms of meeting the requirements of the Building Regulations with respect to the thermal insulation as affixed to the outside face of the existing spandrel panels and columns; the new window system; the cavity barriers; the window infill panels and the insulation inserted behind the linings at the internal head/jamb/sill interface. That the work, as designed and constructed, failed to meet the guidance in ADB2, and therefore also the requirements of the Building Regulations, represents a serious indictment of the services provided and the statutory controls process that was meant to operate.
- 15 With respect to the rainscreen cladding I reach a different conclusion. In terms of product selection (as opposed to design and installation where I do express some concerns) I am not critical of Studio E. I am, however, critical of Exova who I believe should, as a specialist fire consultant, have drawn Studio E's attention to the need for very careful consideration in terms of the specification of a composite cladding system with a polyethylene core, particularly into a high rise residential building. I am also critical of those who manufacture ACP, as an evidently dangerous product, without due warning as to its appropriate use whether in buildings above or below 18 metres height (if at all); I criticise the BBA who certified ACP as a product within a document that was, in my opinion, both poorly drafted and inconsistent; I criticise Alcoa as manufacturer and supplier of the Reynobond Duragloss 5000 cassette cladding panel as a product unfit for such an installation; and I criticise those who drafted ADB2 as a guideline that prescribed fire performance standards that were clearly inadequate to meet the requirements of the Building Regulations.

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List of Characters, Organisations, and Acronyms

Characters	Company / Employer
John Allen	Building Control
John Hoban	Building Control
Paul Hanson	Building Control
Terry Ashton	Exova
Daniel Anketell-Jones	Harley
Andrew McQuatt	Max Fordham
Simon Lawrence	Rydon
Bruce Sounes	Studio E
Neil Crawford	Studio E
Organisations	
Artelia UK	CDM Coordinator, Employer's Agent, Quantity Surveyor
Building Control	Royal Borough of Kensington and Chelsea
Exova	Fire Consultant
Harley Facades	Specialist Cladding and Window Subcontractor
Max Fordham	Building Services Engineer
Rydon	Design and Build Contractor
Studio E	Architect (also known as SELLP and SEAL)
Acronyms	
ACM	Aluminium Composite Material
ACP	Aluminium Composite Product
BCA	Building Control Alliance
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method
CWCT	Centre for Window and Cladding Technology
EFSS	Existing Fire Safety Strategy
FRA	Fire Risk Assessment
KALC	Kensington Academy and Leisure Centre
KCTMO	Kensington and Chelsea Tenant Management Organisation
LFB	London Fire Brigade
OFSS	Outline Fire Safety Strategy
PIR	Polyisocyanurate
RBKC	Royal Borough of Kensington and Chelsea
RIBA	Royal Institute of British Architects
RRO	Regulatory Reform Order
SEAL	Studio E Architects Limited
SELLP	Studio E Limited Liability Partnership