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Ministry of Housing, Communities and Local Government Final Research Report

Fire Performance of Cladding Materials Research – Appendix B Prioritised list of materials/products for the experimental programme

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B1 Introduction

The authors of this report are employed by BRE Global. The work reported herein was carried out under a Contract placed by the Ministry of Housing, Communities and Local Government. Any views expressed are not necessarily those of the Ministry of Housing, Communities and Local Government.

This Appendix is part of a Main report and Appendices and should be read in conjunction with these.

This Appendix contains a prioritised list of the types of cladding materials/products to be assessed as part of the experimental programme of the project and forms the principal output for Task 4 to agree the types of cladding materials/products for the experimental programme.

The information within this report was developed with the participation of the Project Steering Group who have provided information to the Project team on materials/products which are in use and could be worthy of further experimental analysis in terms of their fire performance.

B2 Material/product review

B2.1 Introduction

Following the first Project Steering Group meeting, a request for information was sent on behalf of the Project team to Project Steering Group members based on three specific questions covering three of the Project tasks. These were:

- **Question 1** relating to the literature review – Do you have any relevant information that you would like to make the Project team aware of? Please give details, references and/or provide reports.
- **Question 2** relating to the type of products to be selected for experimental work – What are the materials/products currently being used as elements within a cladding system which you believe may give cause for concern in relation to fire performance? Please supply as much of the following information as possible:
- Trade name and generic description of product
    - Extent and use in cladding systems within England (and UK)
    - Reason why product is causing concern.
- **Question 3** relating to the methodology for the experimental work – At this stage, do you have any views or comments on what you would like to see in the methodology for the experimental work – please remember that this project is only considering elemental performance in fire of products, it is not considering system performance.

This review of materials and products is based on responses received via Project Steering Group members to Question 2. This report includes a summary of the responses received together with a comment from the Project team as to how each of these will be addressed.

At the first Project Steering Group meeting, MHCLG clarified that the focus of the project was on non-ACM materials/products forming the external face of the cladding system. The experimental programme of the project will evaluate and characterise such materials/products in relation to ignitability, flame spread and heat release to evaluate whether the outer cladding panel presents a specific risk in relation to fire performance when considered in isolation in a similar manner to that presented by (non-fire rated) ACM panels (for which the ACM panel in isolation supported rapid self-propagating spread of fire).

B2.2 Responses received

Table B1 summarises the responses received from the Project Steering Group members together with a comment from the Project team as to how each of these will be addressed.

Notes to Table B1

1. Yellow highlighting indicates materials/products to be included in the experimental programme.
2. For confidentiality reasons, no reference is made to the source of the information and any references to specific products or trade names have been removed.
3. The products have been classified according to a generic classification based on the main constituent of the panels.
4. Additional issues were identified in relation to specific components of the cladding system, such as the use of open state cavity barriers. While such issues are outside of the scope of the current project, all concerns have been captured so that they can be passed to MHCLG for their consideration and possible action at a later stage.

Table B1 – Summary of responses received

Material/product	Generic description	Issue(s) of concern	Project team comment
High pressure laminate (HPL) cladding panels	Wood fibre layers and thermosetting resins compressed under high pressure	Fire performance	Propose to include in experimental programme
Aluminium honeycomb panels	Sandwich panel consisting of aluminium plates (often coated) as face panels and aluminium honeycomb core adhesively bonded together with potentially combustible materials	Performance of organic adhesive and coatings in fire	Propose to include in experimental programme
Glass reinforced concrete (GRC) panels	Mixture of cement, fine aggregate, water, chemical admixtures and alkali resistant glass fibres	Potential explosive failure in fire	Not included at this stage
Combustible anciliary components	Various products including breather membranes, EPDM (Ethylene Propylene Diene Monomer) vapour control layers, plastic thermal breaks	Fire performance	Outside of scope of this project as relevant to system performance An option for resolving this issue would be to develop a test method that is suitable and appropriate to the intended uses of these products
Laminated glass	Combustible components (interlayer material)	Fire performance	Not included at this stage

Material/product	Generic description	Issue(s) of concern	Project team comment
Plywood backing/support material	Plywood support to rainscreen systems	Fire performance	Outside of scope of this project as relevant to system performance
Open state cavity barriers	Various intumescent products (can be used on metal grilles and in conjunction with stone/mineral wool)	Performance in early stages of a fire	Outside of scope of this project as relevant to system performance An option for resolving this issue would be to develop a test method that is suitable and appropriate to the intended uses of these products
ETICS (External Thermal Insulation Composite System)	EPS (Expanded Polystyrene) and acrylic based render	Fire performance	Outside of scope of this project as relevant to system performance
External balconies	Timber and additional fuel load on balcony	Fire performance	Outside of scope of this project as not currently considered in evaluation of system performance
Penetrations (through external wall systems of all types)	Polymeric materials used for kitchen and bathroom extract ducts and “air bricks” etc.	Fire performance and potential to allow fire spread into the different layers of the external cladding system	Outside of scope of this project as not currently included in the BS 8414 test used in the evaluation of system performance An option for resolving this issue would be to require fire resisting penetration seals and ducts wherever the external wall of a building is penetrated
Thermoset insulation	Phenolic/PIR/PUR	Fire performance in a constant air flow	Not included at this stage
Various ancillary products	Various materials	Durability of products, weather resistance, toxicity and smoke	Outside of scope of this project as not currently considered in evaluation of system performance
Green walls/living walls	Various materials	Fire performance of vegetation and different water supply substrates	Not included at this stage
Timber cladding and systems supported on timber battens	Timber (softwood/hardwood/ plywood)	Combustibility and durability (of fire retardant treatments)	Not included at this stage

Material/product	Generic description	Issue(s) of concern	Project team comment
Low melting point metals	Zinc/copper	Effect on fire performance	Not included at this stage
Brick slip systems	Brick slips (including fired clay and acrylic based slips) fixed into a range of different carrier systems (including polyurethane, galvanised steel)	Fire performance	Propose to include in experimental programme
Reconstituted stone panels	Crushed stone with organic binders	Impact of organic binders on fire performance	Propose to include in experimental programme
Adhesives and paint finishes	Polyester powder coatings, polymeric based coatings	Fire performance	Mostly relevant to ETICS. Not included at this stage
Membranes	Various materials	Fire performance	Outside of scope of this project
High density cellular glass thermal block	Various materials to avoid thermal bridging	Fire performance	Outside of scope of this project
Polymeric DPC (damp proof course) sheets	Plastic	Fire performance	Outside of scope of this project
Solid cavity barriers	Stone wool	Durability (with and without intumescent strips)	Outside of scope of this project
SIP (Structural Insulated Panels)	Timber (OSB (Oriented Strand Board) and PUR (Polyurethane) or EPS)	Fire performance	Outside of scope of this project
Coated solid metal	Metal and organic coating	Fire performance	Not included at this stage
Glass fibre reinforced plastic (GFRP) panels	Plastic (may be used in combination with other combustible materials as a sandwich panel)	Fire performance	Not included at this stage

B2.3 Prioritised list of materials/products for the experimental programme

Table B2 summarises the choice of materials/products to be assessed in the experimental programme of this project in order of priority (1 being the highest). The materials/products to be selected for the experimental programme have been based on the responses received from the Project Steering Group, discussions within the Project team and a meeting with the client (MHCLG).

The choices and methodology for ranking have been based on the following general principles:

- The focus of the project is on material/product rather than system behaviour
- The focus of the project is on the external face of the cladding system
- The focus of the project is on ventilated rainscreen systems
- Priority is given to those materials/products identified as being widely used within the UK based on the Steering Group responses
- Priority is given to those materials/products identified as being used in high rise construction (i.e. buildings with a floor level > 18 m above ground level) based on the Steering Group responses.

Table B2 also includes one calibration material/product and three ACM materials/products.

Calcium silicate board will be used to provide a non-combustible substrate to allow for characterisation of the fire load and incident heat flux to the samples. It is important to emphasise that the intent of this phase of the work will be to develop an experimental research methodology to provide indicative information that will highlight materials and products of potential concern within the context of fire safety.

The concerns relating to combustibility and fire spread on the external cladding panels have arisen following the Grenfell Tower fire. ACMs have been the subject of large-scale tests and the results are in the public domain [1]. Although not part of this project, these initial experiments will allow for benchmarking of non-ACM materials/products against materials/products that have been through large-scale standard tests. In this way the performance of the products considered in this research project can be directly compared to those panels identified previously as constituting a particular risk in relation to fire spread. It should however be noted that this experimental research methodology will not be appropriate for assessing the fire performance of external cladding systems. It is expected that any materials or products identified as being of potential concern would then be subjected to further evaluation and analysis on a larger scale and when incorporated into a cladding system.

Table B2 – Prioritised list of materials/products for the experimental programme

Material/product	Priority	Comment	Issue
Calcium silicate board	-	Control panel for calibration purposes	
ACM with polyethylene (PE) core (CAT 3)	-	For development of the ignition source and to establish a base level of performance. 100% PE core 0.5 mm aluminium panel, 3 mm PE core and 0.5 mm aluminium panel	
FR ACM with PE and mineral core (CAT 2)	-	For comparison to establish base level of performance. Approximately 30% PE core and 70% mineral core	
Limited combustibility A2 ACM with mineral core (CAT 1).	-	Approximately < 7% PE core and 93% mineral core	
Aluminium honeycomb panels	1	Core size from 6-20 mm, Class 0 performance	Initial selection provided by MHCLG
HPL panels	2	Thicknesses range from 6-13 mm, Classification ranges from D-s2,d0 to B-s2,d0	Initial selection provided by MHCLG
Brick slip systems	3	Brick slip bonded to PUR foam insulation	Potential combustible substrate Potential organic content in brick slips
Reconstituted stone panels	4	Crushed stone and polyester binder	Potential combustible binders

B3 Next stages

The next stages of the project were to:

a) Agree with MHCLG the experimental methodology and analysis criteria (Task 5)

b) Agree with MHCLG the selected materials/products which will be examined in the experimental programme of the project.

B4 Reference for Appendix B

[1] https://www.gov.uk/government/collections/grenfell-tower#fire-test-reports, last accessed 8 May 2018.

Report Ends