

Fire performance of external cladding systems

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Part of the BRE Trust

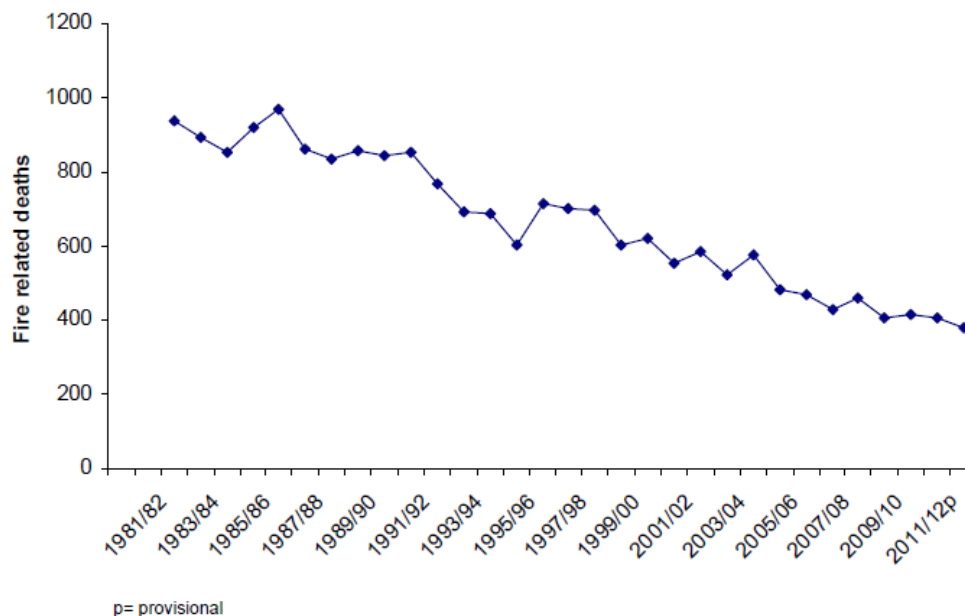
Trend in fire deaths in the UK since 1981



Department for
Communities and
Local Government



Figure 1.4: Fatalities from fires, Great Britain, 2000/01 – 2011/12



Cladding system

- Metropolitan Police Investigation revealed that external cladding system had played a role in rapid fire spread
 - Aluminium composite material (ACM) – 4mm thick in total, 0.5mm outer layers of Al with one of 3 types of core (PE, FR PE, A2)
 - ACM with PE core and PIR insulation behind

Compliance with building regulations

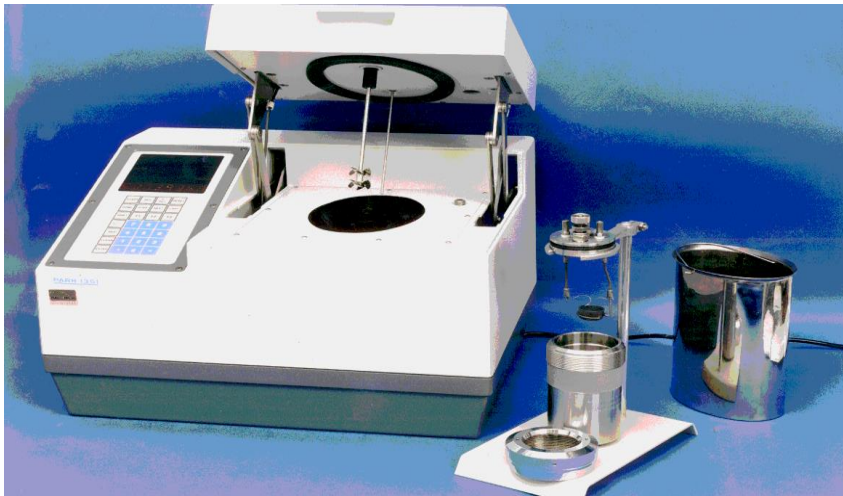
- Follow guidance in AD B
- B4 – External fire spread
 - Materials of “limited combustibility” or A2-s3,d2
 - Classification to BR 135 (using BS 8414 test results)
 - Desk-based assessments
 - FSE

Issue

- Question 1 (Department for Communities and Local Government [DCLG]): Could this combination of materials be on other high rise tower blocks?
- Question 2: Can BRE find a method that can quickly screen many samples of a relatively small physical scale (given they were to be removed from actual buildings) ?

Screening tests

- Bomb calorimeter was effective in discriminating between different types of ACM products;



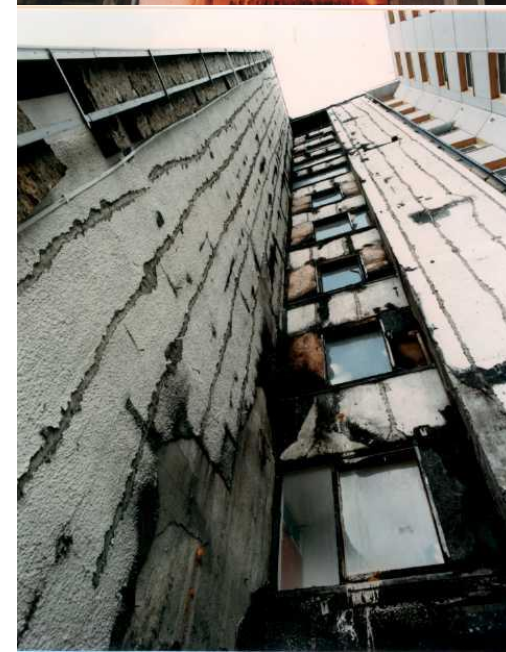
External fire spread – a recognised issue in the UK

- BR 135 first published 1988
- *“SUMMARY - The application of external thermal insulation is a technique relatively new to the UK. The use of appropriately designed systems particularly on walls of high rise buildings provides an attractive method of energy conservation. To identify the design principles affecting the safety of occupants and the probable extent of fire spread, BRE has conducted large-scale tests in a four storey experimental building. The rig was insulated externally either by direct application of a range of insulation/weathering systems or by a ventilated cladding system. An insulated timber cladding system typical of current [1988] accepted practice was used as the basis for comparison. A series of fundamental design recommendations has been drawn up to minimise the hazard to life and to restrict the extent of necessary reinstatement following a serious fire.”*

Loss Prevention Centre was contracted to carry out this work by the Department of Environment/BRE pre 1988

External fire spread – a recognised issue in the UK contd

- External fire spread – control of insulation materials and performance of cladding systems for use above 18m
- Can't regulate and control/manage fire performance based on material test performance
- Must make sure that we understand and control system performance



BS 8414 parts 1 and 2

- Part 1 – Masonry substrate
- Part 2 – Steel-framed substrate

- Cavity barriers and fire breaks in insulation are important details along with quality of installation

- Heat source is 400kg timber crib producing 3 MW heat release over 25 min duration

Compliance with building regulations

- Following Approved Document B (guidance document on how to satisfy the functional requirements of the Building Regulations)
- B4 – External fire spread
 - Materials of “limited combustibility” or A2-s3,d2
 - Classification to BR 135 (using BS 8414 test results)
 - Desk-based assessments
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Large-scale test programme

- Department for Communities and Local Government (DCLG) commissioned a series of large-scale BS 8414-1 tests
- Identify which combinations of ACM with insulation pass the classification criteria in BR 135
- Test arrangements were defined by DCLG with Industry Stakeholder oversight – included cavity barriers (as required by AD B) and fire breaks in the insulation
- Contractors used to installing “rainscreen cladding systems” were contracted by DCLG
- BRE tested the installed systems

Large-scale testing (BS 8414-1) programme on ACM systems – summary of results

	PE core	FR PE core	A2 core
PIR foam	Test 1 – FAIL	Test 3 – FAIL	Test 5 – PASS
Stone wool batts	Test 2 - FAIL	Test 4 – PASS	Test 6 - PASS
Phenolic foam	Not tested	Test 7 - FAIL	Not tested

Full results and guidance

- DCLG have made all of the results from the large-scale testing programme publicly available
- All 7 test reports plus detailed guidance on fire risk management in the buildings affected is available at
- <https://www.gov.uk/government/publications/fire-test-report-dclg-bs-8414-test-no>
- <https://www.gov.uk/government/collections/grenfell-tower>

Questions?

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