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IRVINE
Phase 2 report.
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Room has electronic version

Fire at Garnock Court, Ir.....
11.06.99
Phase 2 Fire Tests on GRP cladding

Prepared for:
North Ayrshire Council

Prepared by:
Penny Morgan
Fire Protection Systems Centre

April 2000 **81310**

Final approval on behalf of BRE (Centre Head) :

Signed _____ *Date* _____

Nigel Smithies
Director Fire Protection Systems Centre

BRE
Bucknalls Lane
Garston
Watford
WD2 7JR

Tel : [redacted]
Fax :
Email : enquiries@bre.co.uk

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CONTENTS

EXECUTIVE SUMMARY — this is the same as conclusions [illegible]

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2. It is also highly likely that the GRP supplied would never have achieved Class 0.
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4. Fires in other parts of the building which were not overclad in this way did not trigger this kind of spread.
5. It is recommended that the performance of any related material should be carefully assessed before it is used on high rise residential blocks. This is where the strength of the new European tests will lie as there is additional information to be gained from this test over the current BS 476 tests.

INTRODUCTION

Garnock Court is one of five blocks owned by North Ayrshire Council. The external cladding of the block was extensively damaged in the fire in June 1999. As part of refurbishment and reinstatement scheme all five blocks have been reclad with insulated render and aluminium window frames. The GRP cladding was removed from all the blocks and spandrel panels from the undamaged side of Garnock Court were sent to FRS, BRE for examination. One of the main concerns was to establish why the cladding was so readily ignited once the fire had spread out of the fire flat on the fifth floor. The circumstances surrounding the fire have been described elsewhere[1] and should be read in conjunction with this report.

DESCRIPTION OF THE PROJECT

The first report expressed concerns about the likely performance of the cladding material. It was suspected that the material on the building at the time of the fire was not Class 0. The main indicator of this being that there were only negligible quantities of materials indicating flame retardants in the fire damaged sample tested. In addition the material was ignitable with a match and burning was easily sustained. In order to assess the performance a phased approach was planned with telephone discussions as to progress.

Test 1

Undamaged samples from the Floors 1 and 16 were sent to the Butterworth Laboratories for analysis of chlorine (Cl), bromine (Br), phosphorus (P) and antimony (Sb) as indicators of the presence of flame retardants. Antimony would be expected to be present in the 1-2 per cent range, bromine and phosphorus would be expected to be present in range 2-3 per cent, with chlorine as 5-6 per cent. A fire damaged sample had been tested in September and only traces of these indicators were found. Undamaged samples were also tested to check whether the fire had destroyed the retardants present.

Test 2

Undamaged samples of the panels were sent to the Loss Prevention Council to be assessed under BS 476: Part 6:1989 The fire propagation test[3] and to BS 476:Part 7: 1987 for surface spread of flame[4]. These two tests provide results that when combined indicate whether a material complies with Building Regulations as Class 0. This can be achieved if a material is composed throughout of materials of limited combustibility or a Class 1 material which has a fire propagation index (I) of not more than 12 and a sub index (i_1) of not more than 6.

After discussion it was decided to do the fire propagation test and only proceed to the surface spread of flame test if the performance was good.

Test 3

Undamaged samples from Floor 1 and 16 were tested at FRS for ignitability to the ISO test[2] which subjects the samples to the new European classification which adds an 'edge' test to surface performance. This test was selected to explore the fire performance of the sample when an edge was presented to a flame as in the fire in June 1999.

FINDINGS

The results are in Annexes 1-3. In summary there were only traces of Cl, Br, P and Sb which confirmed the tests on the fire damaged sample ie it is unlikely there were any retardants present in the sample provided. The fire propagation test results were so poor that repeat tests were abandoned; again confirming that the samples of GRP from the block would not have achieved Class 0. From the new ignitability tests with the edge test requirement surface tests gave good results with little ignition and no flaming droplets. However, all the specimens ignited and burned the full height when subjected to edge ignition.

Results of Test 1

From the analysis by Butterworth's there were traces only of the materials that would indicate the presence of flame retardants. This result was similar to that from the fire damaged sample. In addition BRE Materials Laboratory used X-Ray Diffraction Analysis to detect aluminium trihydrate . None was found. However in the absence of a reference sample of GRP containing the dihydrate this result is only indicative of the absence of that retardant. The results are presented in Annex 1.

Results of Test 2

Staff at LPC telephoned FRS to discuss the poor performance of the samples in the fire propagation tests. During the first test 'some flaming was observed outside the test box due to the chimney becoming blocked with soot'. The one test result gave an index of 19.9 with a subindex of 8.6. After discussion it was agreed to abandon any further testing and use this single indicative result only. The indications are that not only does the GRP fail but puts the integrity of the test equipment at risk of serious damage. With such a poor result it was concluded that this material would not meet a Class 0 and therefore no surface spread of flame test was carried out. The LPC report is in Annex 2.

Results of Test 3

These tests were done to both test the GRP sample and the brand new test equipment. The results are in Annex 3. The small flame is applied to either side of the material and performed well indicating a good surface spread of flame classification, Plate 1. However when the edge test was done where the flame is applied to the shorter edge of the sample, see Plate 2, ignition was rapid with the evolution of much black smoke. The six tests each of the two samples gave very similar results and the new apparatus has been truly fire hardened. This test result will be a crucial indicator in the future as to the possible involvement of materials where the broad flat surface resists flame spread but the cut edge does not.

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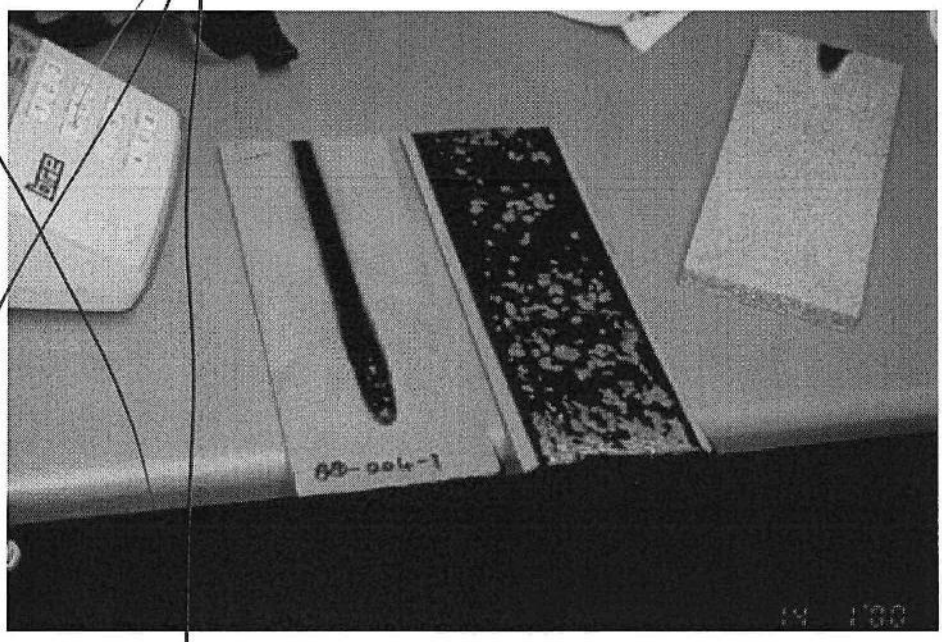
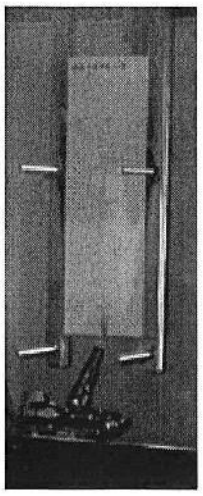
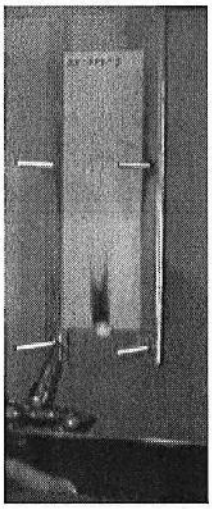


Plate 1 Sample tested in prEN ISO 11925-2, front face on the left, rear face on the right





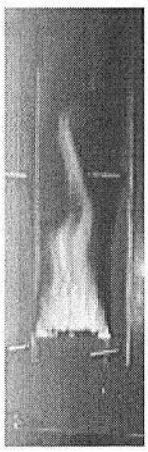


Plate 2 Edge test, prEN ISO 11925-2, stages in ignition to flaming

CONCLUSIONS AND RECOMMENDATIONS

1. It is highly unlikely that the material used as cladding for Garnock Court and the four sister blocks was Class ~~0~~ 0 at the time of the fire.
2. It is also highly likely that the GRP supplied would never have achieved Class ~~0~~ 0.
3. The poor fire performance would not have manifested itself until the circumstances of such a fire as in June of 1999 where a serious fire inside the block spread out of the window. Flames and hot gases from that fire were able to attack the exposed edges of the cladding material and ignite it. The design of the window pods and spandrel panels also contributed to this mechanism by affording a cut edge to be in the path of any flames and hot gases leaving a room on the inside of the cladding.
4. Fires in other parts of the building which were not overclad in this way did not trigger this kind of spread.
5. It is recommended that the performance of any related material should be carefully assessed before it is used on high rise residential blocks. This is where the strength of the new European tests will lie as there is additional information to be gained from this test over the current BS 476 tests.

REFERENCES

1. Penny Morgan, Brian Morris and Tony Morris. Fire at Garnock Court, Irvine on the 11 June 1999. BRE Client report number 79902, August 1999.

2. prEN ISO 211925-2: 1999. Reaction to fire tests for building products – Part 2: Ignitability when subjected to direct impingement of flame (ISO/FDIS 11925-2:1998).

3. BS 476: Fire tests on building materials and structures. Part 6: 1989 Method of test for fire propagation for products. BSI. London 1989.

4. Ibid.Part 7:1987 Method for classification of the surface spread of flame of products.

Fire protection Sytems Centre

BRE, Garston, Watford, WD2 7JR

Telephone: [redacted] Fax: [redacted] E-mail: morganp@bre.co.uk

Graham Wallace
Technical Services
North Ayrshire Council
Perceton House,
Irvine KA11 2AL

Your reference
06/RV/424/GDW/LW

Our reference BRE 136/45/73

20 April 2000

Dear Graham,

Phase 2 Fire tests following fire at Garnock Court 11 June 1999

I enclose two copies of our report of Phase 2, the fire tests, as promised. It is clear that the GRP samples that we collected from the Irvine site are not Class 0 and it is doubtful if they ever were.

Unless you wish us to do any more tests we propose to dispose of the material we collected from site. I have offered ~~it~~ the material to my colleague who does the cladding test at Cardington and she does not advise such an expenditure. ~~Nor, in view of the Fire Propagation results, does she wish to smoke log the Cardington hangar.~~ unless you require video material of a full scale fire test.

Yours sincerely

Penny Morgan

Senior Fire Consultant,
Fire Protection Systems Centre

BRE

Fire protection Sytems Centre

BRE, Garston, Watford, WD2 7JR

Telephone: [redacted] Fax: [redacted] E-mail: morganp@bre.co.uk

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5. It is recommended that the performance of any related material should be carefully assessed before it is used on high rise residential blocks. This is where the strength of the new European tests will lie as there is additional information to be gained from this test over the current BS 476 tests.

Phase 2

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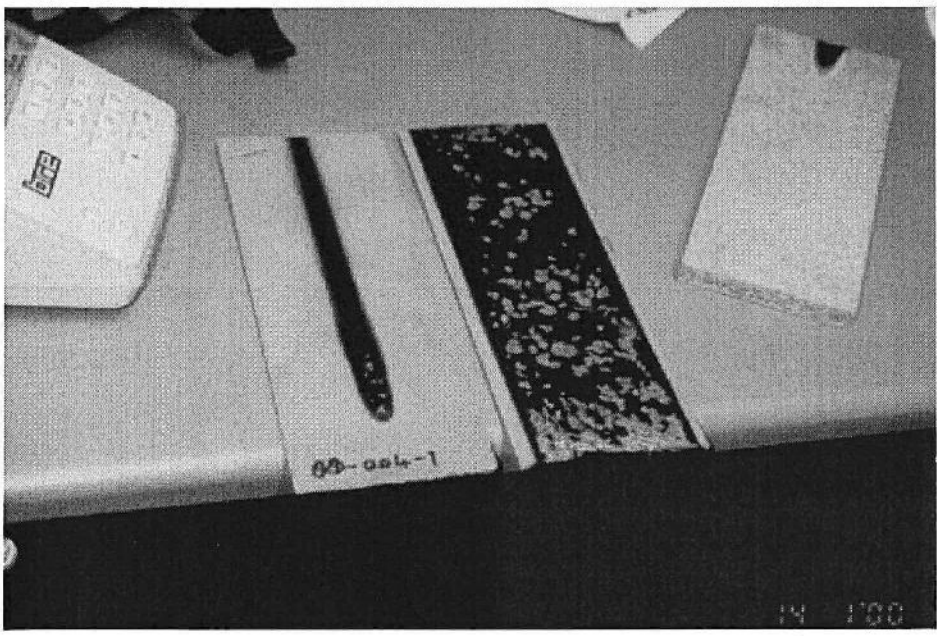

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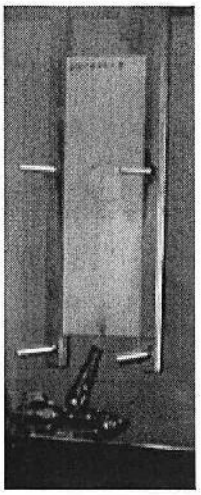

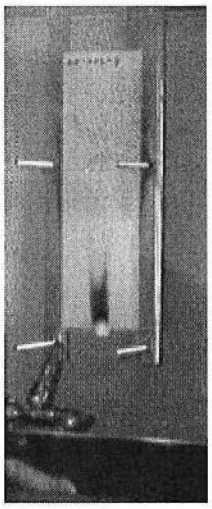

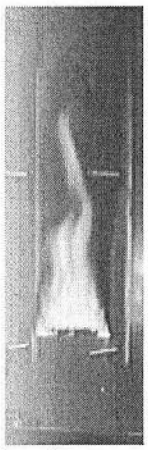

Plate 2 Edge test stages in ignition to flaming

ANNEX 1 Results of Phase 1

ANNEX 3 Results of Phase 3

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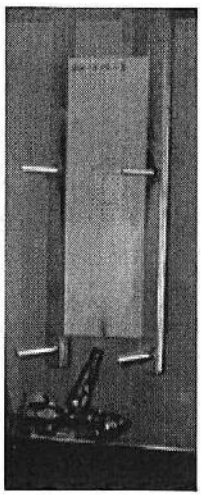

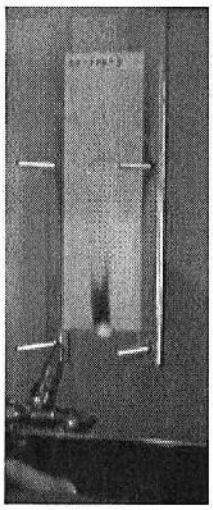

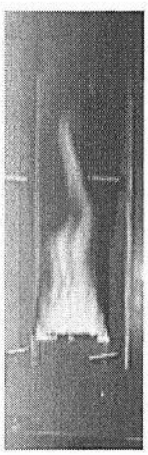

Plate 2 Edge test, prEN ISO 11925-2, stages in ignition to flaming

ANNEX 1

Results of Test 1

ANNEX 3

Results of Test 3