

# FIRE PERFORMANCE OF EXTERNAL THERMAL INSULATION FOR WALLS OF MULTISTOREY BUILDINGS

THIRD EDITION

Sarah Colwell and Tony Baker



bretrust

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Sarah Colwell and Tony Baker



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## EXECUTIVE SUMMARY

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The risk of fire spread in multistorey buildings is an issue of concern, and recent fires have continued to highlight this. Since the external cladding system of the building offers one potential route for fire spread through a multistorey building there is a need for guidance to address these concerns. This latest edition of BR 135 – *Fire performance of external thermal insulation for walls of multistorey buildings* presents revised guidance that, while continuing to address the principles and design methodologies related to the fire-spread performance characteristics of non-loadbearing external cladding systems, also considers the changing drivers in this market, such as the recent increase in the new-build market for these types of system, and increasing thermal performance requirements. This new edition of BR 135 seeks to bring together the experience gained in this area by updating the guidance on external fire performance for the materials and technologies now used in the construction of external cladding systems.

The first edition of BR 135 was published in 1988 in response to the increasing use of thermal insulation as part of refurbishment programmes on existing multistorey residential tower blocks. The guidance presented detailed design solutions based on the range of products in the marketplace at the time. It is an interesting document to

review when considering the current levels and types of thermal insulation system employed 25 years later, and being addressed by the third edition of this document.

The illustrations and scenarios presented in this current edition are based on typical examples of current practice, but, as has already been identified, this field is subject to rapidly changing designs and materials, and so this guidance focuses on the issues surrounding the topic, to enable designers and end users to understand better the parameters impacting on the fire-safe design and construction of external cladding systems.

The third edition also consolidates the fire performance classification systems for the full-scale fire tests in the BS 8414 series and found in Annex A of the second edition and Annex B, which was published as Digest 501, into a single document.

As part of the revision process for this document, a consultation exercise was undertaken with the key stakeholders to try to ensure that their experiences and issues in this rapidly changing market were addressed. The level of engagement and support from these stakeholders has been encouraging, and their input is reflected in the increasing range of systems identified and described in this third edition of the document, which we hope will continue to provide useful guidance in this field.

# 1 INTRODUCTION

The first edition of BR 135 – *Fire performance of external thermal insulation for walls of multistorey buildings* was published in 1988<sup>[1]</sup> in response to the increasing use of thermal insulation as part of refurbishment programmes on existing multistorey residential tower blocks. The guidance presented detailed design solutions based on the range of products in the marketplace at the time. It is an interesting document to review when considering the current levels and types of thermal insulation system employed 25 years later, and being addressed by the 3rd edition of this document.

At the time that the first edition was produced, there was no standard full-scale fire test available, and the test work behind the guidance was based on a single-faced, large-scale test facility similar to the test facility that now forms the basis of the BS 8414 test series<sup>[2,3]</sup>, but without the wing return wall.

During this period a fire occurred in a refurbished block of residential flats in Liverpool. The Knowsley Heights fire in 1991 (Figure 1) suggested that a full-scale fire test method was necessary to fully understand the overall fire performance of the complete system as

installed in these applications, using a representative fire scenario rather than relying solely on an elemental approach to try to control the overall fire performance of the system.

Additionally, the range of materials and potential design solutions available in the market was beginning to change, and was falling outside the range of guidance available in the first edition. As a result of this need to review the guidance and develop a full-scale test method, the then Department of the Environment worked with industry in a collaborative project to develop a full-scale test method, which was subsequently published by BRE in 1999 as Fire Note 9 – *Test method to assess the fire performance of external cladding systems*<sup>[4]</sup>.

In June 1999, a fatal fire occurred in a multistorey residential housing block in Scotland (Figure 2). A resulting parliamentary inquiry was undertaken by the Environment Subcommittee of the Environment, Transport and Regional Affairs Committee to investigate the potential risk of fire spread in buildings by way of external cladding systems. As part of their recommendations<sup>[5]</sup>, the subcommittee asked that the relevant guidance in

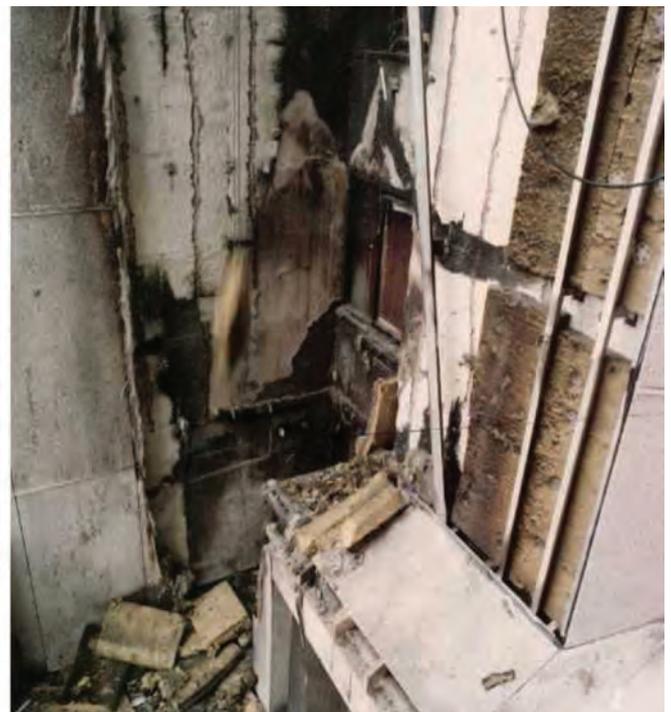
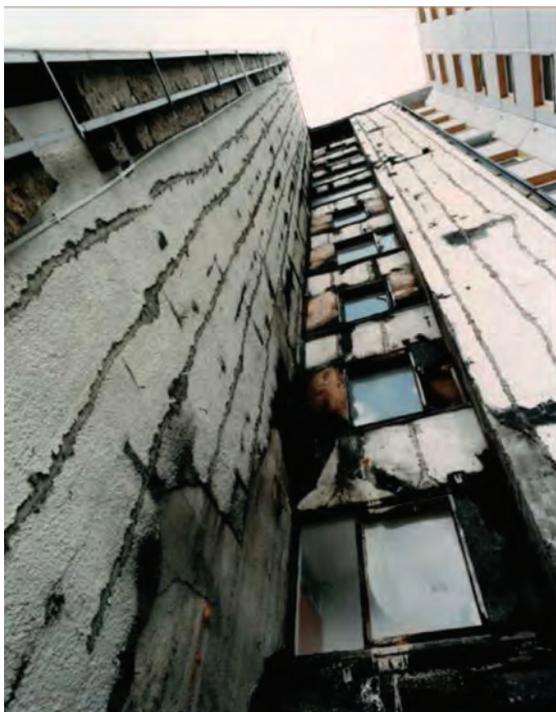
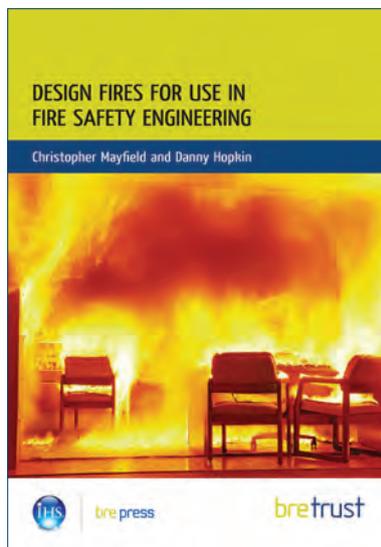


Figure 1: Knowsley Heights

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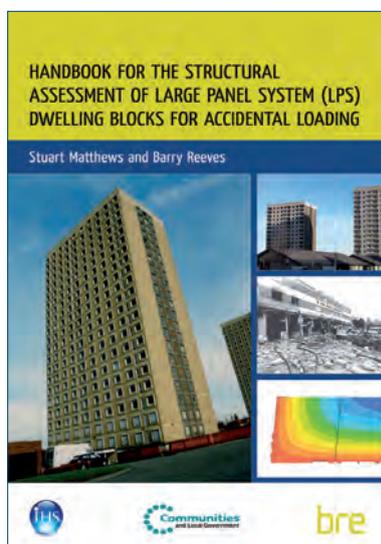
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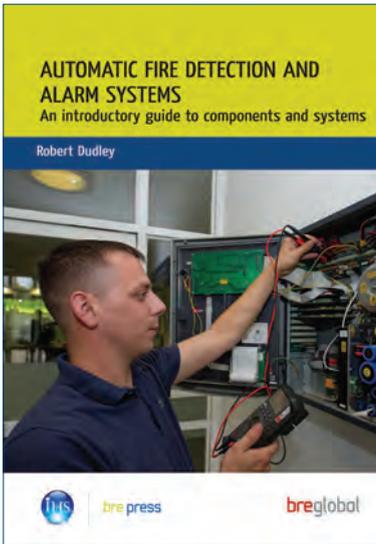
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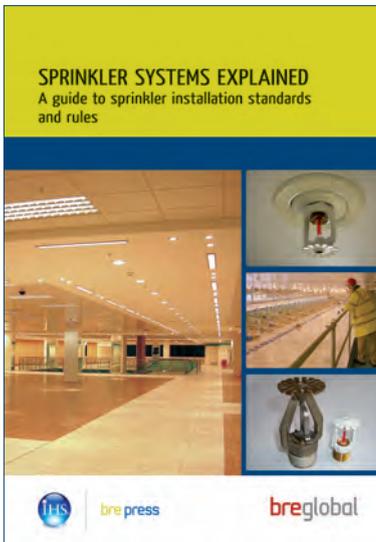


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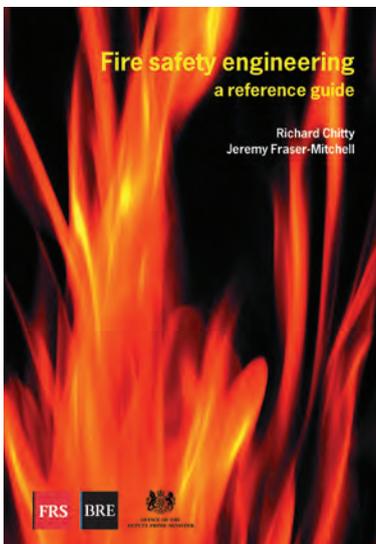


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## **FIRE PERFORMANCE OF EXTERNAL THERMAL INSULATION FOR WALLS OF MULTISTOREY BUILDINGS**

External cladding systems offer a potential route for fire spread through multistorey buildings. This third edition of BR 135 sets out the principles and design methodologies related to the fire spread performance characteristics of non-loadbearing cladding systems, and provides revised guidance in the light of the growing market for cladding systems and increasing thermal performance requirements. It also updates the guidance on fire performance of currently used materials and technologies.

The illustrations and scenarios given are based on typical examples of current practice, but, in view of the rapid changes in designs and materials, the guidance aims to enable designers to understand the parameters relating to fire safety design and construction of external cladding. It also consolidates the fire performance classification systems for full-scale fire tests in BS 8414.

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