

Chronological List of International High-rise Building Fire Incidents: 1986 - 2017

Over the 30 year period an increasing number of UK and international high-rise building fire incidents have been emerging, to such a degree that they can no longer be ignored and the associated issues resulting from detailed investigation demand more effective actions in developing rigorous preparedness strategies.

Unlikely to be fully comprehensive, none-the-less, the following chronological list identifies numerous serious and often fatal fire-spread incidents in high-rise properties, compiled from an 2017 on-line desk exercise, covering the period 1986-2017:

1986 Dupont Plaza Hotel, San Juan, Puerto Rico: 20 storeys

Governed by 1954 regulations, the 1960's non-sprinkled building was subjected to a rapidly growing fire that resulted in 97 deaths and 146 injuries and damage estimated at \$6-8 million.

<http://www.nfpa.org/news-and-research/fire-statistics-and-reports/fire-statistics/fires-by-property-type/high-rise-building-fires>

Accessed 23 June 2017

1987 Schomburg Plaza, New York, USA: 35 storeys

The fire started between the 27th and 29th floors, and travelled up a trash chute and through the walls into surrounding apartments. Investigations found that sprinklers in the chute either failed to work because they were clogged, or were not actually connected to the piping system.

<http://www.thecompanyofficer.com/2011/02/23/one-meridian-plaza-high-rise-fire-twenty-years-ago/>

Accessed 23 June 2017

1988 First Interstate Bank, Los Angeles, USA: 62 storeys

The fire source of was believed to be electrical on the 12th floor open-plan office. Except for the central core passenger lift lobby it quickly grew over the entire 12th floor and spread to the 16th floor through the gaps between the external cladding and floors. All external cladding from the 12th to 16th floors was destroyed and, becoming detached, fell off. Excluding business interruption, loss was estimated at over \$200 million.

<http://www.mace.manchester.ac.uk/project/research/structures/strucfire/CaseStudy/HistoricFires/BuildingFires/interstateBank.htm>

Accessed 20 June 2017

1991 Meridian Building, Philadelphia, USA: 38 storeys

One of the largest high-rise office building fires in modern American history to date started on the 22nd floor. It consuming eight floors, and was only controlled when it reached one that was protected by automatic sprinklers.

http://www.philly.com/philly/news/One_Meridian_Plaza_fire_1991.html?photo_24

Accessed 23 June 2017

1991 Knowsley Heights Apartment Block, Liverpool: 11 storeys

A fire was deliberately started in a rubbish compound outside the block and spread rapidly through a 90 mm gap between the building's rubberised, paint-covered concrete outer wall and recently installed rain screen cladding, reaching the highest floor and seriously damaged

the outer walls and windows. The rapid spread was caused by a lack of fire barriers in the cavity gap providing a flue for hot gases to rise.

Investigation of the fire at Knowsley Heights, Huyton, Liverpool, 5 April 1991: results and related correspondence, includes copy of demonstration project on assessment of over-cladding to Knowsley Heights: National Archives, Kew: Reference AT 66/389 (Hard copy Report, not digitised)

<http://discovery.nationalarchives.gov.uk/details/r/C11197377>

Accessed 19 June 2017

1999 Garnock Court, Irvine, Scotland: 14 storey

An on-line article on the tower block fire in *Building.co.uk* 2000 Issue 06 note:

The cladding on the outside of the building was suspected of contributing to the fire's severity, and concerns were raised that housing blocks around the country could be at risk. This triggered a parliamentary inquiry into the extent of the problem, which was carried out by the Environment, Transport and Regional Affairs Select Committee.

The committee's findings were contained in a report published last month, Potential Risk of Fire Spread in Buildings via External Cladding Systems. The report's recommendations, if implemented, could have a wide-ranging effect on manufacturers, specifiers and installers of cladding. More specifically, cladding may have to meet new requirements, to be contained in Approved Document B of the Building Regulations.

<http://www.building.co.uk/cladding-the-new-rules/1000582.article>

Accessed 19 June 2017

2002 High-Rise Condominium, Clearwater, Florida, USA: 11 storeys

The fire originated in a 5th floor apartment kitchen and fire-fighters encountered several problems, including radio communication issues, closed standpipe riser valves, and a damaged fire hydrant. It caused \$4m worth of damage and was retrofitted with sprinklers.

<http://www.thecompanyofficer.com/2011/02/23/one-meridian-plaza-high-rise-fire-twenty-years-ago/>

Accessed 23 June 2017

2003 Petershill Court, Red Road, Glasgow: 24 storeys

A serious fire broke out in a flat on the 21st floor of the multi-storey tower block and 28 families were evacuated, and 18 families had to be rehoused in the short term. The flat was severely damaged.

<http://www.kirkintilloch-herald.co.uk/news/families-forced-to-flee-as-fire-breaks-out-in-tower-block-1-363470>

Accessed 20 June 2017

2005 Windsor Tower, Madrid: 32 storeys

The commercial Tower's original structural design complied with the 1970s Spanish building codes, but these did not require fire protection to steelwork and sprinkler protection. The building was being subjected to a 3-year refurbishment programme when the fire broke out on the 21st floor and spread to all floors above the 2nd floor level. The building was beyond repair and had to be demolished

<http://www.mace.manchester.ac.uk/project/research/structures/strucfire/CaseStudy/HistoricFires/BuildingFires/default.htm>

Accessed 20 June 2017

2005 85 Harrow Court, Stevenage

A tea-light candle left burning whilst the occupants were asleep possibly caused the fire. It occurred in a 14th floor flat; an examination of the burning patterns indicated that it was fed by high wind gusts. This forced an intense fire burn inside the flat. Two fire-fighters and one occupant died.

[http://www.highrisefirefighting.co.uk/case/harrowct/Harrow Court 4 Paul Grimwood Final Report.pdf](http://www.highrisefirefighting.co.uk/case/harrowct/Harrow_Court_4_Paul_Grimwood_Final_Report.pdf)

Accessed 20 June 2017

2009 Waddell Court, Gorbals, Glasgow

A 61-year-old man died after fire in a fifth floor flat of a high-rise block in Waddell Court in Glasgow's Gorbals area.

<http://www.scotsman.com/news/man-killed-as-fire-breaks-out-in-gorbals-tower-block>

Accessed 20 June 2017

2009 Lakanal House, Camberwell, South London: 14 storey

On 3 July 2009, a faulty TV caught fire on the ninth floor of the block. The flames spread up and down the building, trapping people in their flats. Six people died in the council-owned tower block. In February 2013, the Inquest findings into their deaths found opportunities to prevent the tragedy were missed. The Emily Twinch report on the 11-week inquest and its verdict, published on-line at *Inside Housing*, indicated that changes in social landlords' approach to fire safety would be required. These changes were summarised as:

The inquest: what landlords need to know

- *The inquest revealed tenants lacked knowledge about what to do in the event of a fire in a high-rise building. Judge Frances Kirkham (pictured) recommends landlords improve their tenants' fire safety awareness and are encouraged to retrofit sprinklers. She also recommends the government publishes guidance clarifying when tenants should be told to 'get out' of blocks and when they should be told to 'stay put'.*
- *Part of the reason the fire in Lakanal House spread quickly was because of failures of fire safety measures inside the flats. Expert David Walker suggested landlords view a 10 per cent sample of flats inside a block when doing fire risk assessments.*
- *The panels on the outside of Lakanal House, fitted in a 2006/07 decent homes refurbishment, were not fire resistant and allowed the fire to spread in under five minutes from the flat where the blaze started to the flat above, where Catherine Hickman died.*

The jury concluded Southwark Council, its contractors and sub-contractors were guilty of 'serious failings' in relation to these panels because if they had been fire resistant they would have prevented the fire spreading so rapidly.

<http://www.insidehousing.co.uk/lakanal-house-the-verdict/6526499.article>

Accessed 19 June 2017

2010 Madingley, Cambridge Estate, Kingston upon Thames

The block of 60 flats, housed up to 150 people. A fire was deliberately started in a 12th floor flat and spread to the upper floors and roof. Evacuated residents were subsequently transferred to temporary accommodation. The block required extensive refurbishment with the residents not returning until 9 months after the incident.

<http://www.bafsa.org.uk/pdfs/publications/1/00000111.pdf>

Accessed 20 June 2017

2010 Shanghai Apartment Tower, China: 28 storey

A report for Time on-line by Austin Ramzy on Thursday 18 November 2010 noted:

A devastating fire in a Shanghai apartment tower this week has raised concerns about the safety risks of China's ongoing building boom. Authorities say that a spark from an unlicensed welder's torch ignited the blaze in the 28-story building on Monday [15 November]. The fire raged for four hours and killed at least 53 people, with 47 still missing four days later.

"The accident should not have happened and could have been completely avoided," Luo Lin, director of the State Administration of Work Safety, said on Wednesday, according to the state-run Xinhua news service. The building, which was constructed in 1997 to house retired teachers, was wrapped in scaffolding as part of a project to install insulation. The procedure is common in China, where the government has ordered broad measures to improve energy efficiency. Insulation is frequently added to the outside of buildings and then covered with layers of paint.

<http://content.time.com/time/world/article/0,8599,2031985,00.html>

Accessed 19 June 2017

2011 Adamson Court, Lochee, Dundee: 15 storeys

Because of the ferocity of the 14th floor fire it spread to the flat above and caused considerable damage.

<http://www.bafsa.org.uk/pdfs/publications/1/00000111.pdf>

Accessed 20 June 2017

2011 Overtoun Court, Swinton Street, Clydebank: 14 storeys

4th floor fire, one fatality

<http://www.bafsa.org.uk/pdfs/publications/1/00000111.pdf>

Accessed 20 June 2017

2011 Salamanca Place, Lambeth: 17 storeys

4th floor fire. Firefighters rescued nine persons externally. Ten more residents led to safety down internal staircases.

<http://www.bafsa.org.uk/pdfs/publications/1/00000111.pdf>

Accessed 20 June 2017

2011 Andrew Reed House, Linstead Way, Wandsworth: 15 storeys

9th floor fire. Fire crews rescued five people using the stairs and four people from the 10th floor via a turntable ladder within minutes of arriving. A further 150 people were evacuated.

<http://www.bafsa.org.uk/pdfs/publications/1/00000111.pdf>

Accessed 20 June 2017

2011 Clem Attlee Estate, Fulham: 17 storeys

6th floor fire. 25 residents evacuated.

<http://www.bafsa.org.uk/pdfs/publications/1/00000111.pdf>

Accessed 20 June 2017

2011 Markham Tower, Bowers Avenue, Mile Cross, Norwich: 10 storeys

The fire started in an 8th floor flat when a resident was absent. It filled the upper levels of the block with smoke and had started to affect the floor above before being extinguished.

One flat was badly fire damaged, and 10 others water damaged. The flats were fitted with

battery-operated smoke detectors and the block had an up-to-date fire risk assessment but was not fitted with a sprinkler system.

<http://www.bafsa.org.uk/pdfs/publications/1/00000111.pdf>

Accessed 20 June 2017

2011 Marine Tower, Abinger Grove, Deptford, South London: 17 storey

Over 100 fire-fighters fought the fire that was started deliberately in a flat on the 16th floor. Crews rescued two women from another flat on the same floor but sadly both were pronounced dead at the scene. An on-line report by London Fire Brigade noted:

The investigation by fire safety officers revealed serious safety failings relating to the failure to maintain fire doors, which directly contributed to the spread of the fire. The flat in which the fire started was fitted with a metal security door, which prevented the existing fire door behind it from being closed. The severity of the fire and the lack of protection between the flat where the fire started, and the building's communal areas meant fire and smoke rapidly entered the lobby and also the adjacent flat in which the two women who died were trapped.

<http://www.london->

[fire.gov.uk/news/LatestNewsReleases_Fatalhighrisefireshouldbewakeupcallsays.asp - .WUfngcbMxBw](http://www.london-fire.gov.uk/news/LatestNewsReleases_Fatalhighrisefireshouldbewakeupcallsays.asp-.WUfngcbMxBw)

Accessed 19 June 2017

2012 Swiss Cottage, North London: 22 storey

Fire crews were called to tackle a blaze in a 22-storey Swiss Cottage tower block on 16 January 2012. Eight fire engines and around 40 fire-fighters were sent to deal with the incident. The fire gutted a four room flat on the 17th floor and 130 people were evacuated from the building to a local community centre. With many people were inside the building fire crews worked extremely hard to get the fire under control and confine the fire to just one flat on the seventeenth floor. No-one was injured and the cause was accidental, believed to be the result of a candle setting some papers alight.

http://www.london-fire.gov.uk/LatestIncidentsContainer_16Jan12m.asp

Accessed 19 June 2017

2012 Tamweel Tower, Jumeirah Lakes Towers, Dubai: 34 storeys

The fire broke out at around 2 am on 18 November 2012 and was extinguished around 7 am. The tower was partially gutted as a result, and an estimated 160 property owners were unable to occupy or rent their apartments. A dropped cigarette outside the building caused the fire triggering the non-fireproof cladding to burn up the buildings' height in 10 minutes. There were no casualties. The cost of repairing the Tower was \$13.5 million.

<http://www.thenational.ae/news/uae-news/tamweel-tower-fire-started-by-cigarette-butt-say-dubai-police>

Accessed 19 June 2017

2012 Polat Tower, Istanbul, Turkey: 42 storey

The Polat Tower in Istanbul's Fulya business district has both residential flats and offices and a faulty air conditioner may have triggered the blaze. The building's fire-extinguishing system automatically activated, and the inside of the tower had not been damaged.

<https://www.rt.com/news/istambul-sky-scraper-fire-362/>

Accessed 19 June 2017

2012 Al Nahda Tower, Sharjah, UAE: 43 storeys

This incident on 28 April 2012 came 95 days after a fire ravaged a 25-storey residential high-rise, also in Sharjah, leaving 125 families homeless.

<http://gulfnews.com/news/uae/emergencies/fire-breaks-out-at-sharjah-tower-1.1014750>

Accessed 19 June 2017

2012 Mermoz Tower, Rue Dunant, Roubaix, France: 18 storey

One person died and ten others were injured in a fire that spread rapidly upwards from a second-floor flat to the top of an 18-storey tower block in Roubaix, France, apparently via its flammable outer cladding, penetrating other apartments. The fire directly affected four apartments, but all 250 residents were being rehoused locally. The building, also known as the Aviator Tower, was reportedly owned by a social landlord organisation.

<http://www.blog.plumis.co.uk/2012/05/high-rise-blaze-in-18-storey-block-in.html>

Accessed 19 June 2017

2013 Grozny-City Tower Hotel, Chechnya: 40 storeys

The fire took hold on one side of the 40-story building and burned up the façade for approximately 8 hours. No one was killed or injured.

https://en.wikipedia.org/wiki/Grozny-City_Towers

Accessed 23 June 2017

2014 Lacrosse Building, Australia: 21 storey

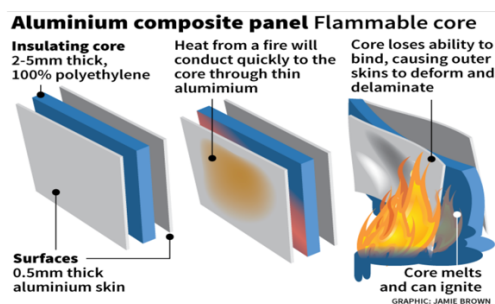
In 2014, a fire ripped through Melbourne's 23-storey Lacrosse Building, which turned out to be covered in non-compliant combustibile external cladding.

400 people were evacuated from the four-year-old building, with the city's fire brigade saying it was lucky nobody was killed. The cladding was blamed for the fire's rapid spread from the 8th floor to the top of the building. Now, the building's owners have launched a legal claim against the builders to cover the £10 million repair costs.

<http://metro.co.uk/2017/06/19/australia-to-strip-buildings-of-flammable-cladding-after-grenfell-disaster-6719166/#ixzz4kSzT3qXW>

Accessed 19 June 2017

Australian buildings are cloaked in "millions of square metres" of flammable cladding, and authorities have been aware of the safety threat since at least 2010. In the wake of London's deadly tower fire, Fairfax Media can reveal the Australian Building Codes Board was told seven years ago that combustibile cladding was widely installed across the nation. An ongoing audit has identified at least 20 buildings in Melbourne with non-compliant cladding, including the Lacrosse apartments engulfed by a major fire in November 2014.



<http://www.smh.com.au/national/london-tower-fire-could-happen-here-australian-buildings-cloaked-in-flammable-cladding-20170615-gwrpfu.html>

Accessed 19 June 2017

2015 Address Downtown Hotel, Dubai, UAE: 63 storeys

Civil Defence workers put out the New Year's Eve blaze that was accidental and originated from the exterior parts of the building at the 20th floor. At least 16 people sustained minor injuries and smoke inhalation in the blaze that broke out hours before the city's New Year's Eve fireworks event.

<http://www.thenational.ae/uae/new-years-eve-blaze-at-the-address-downtown-dubai-put-out>

Accessed 19 June 2017

2015 Residential Building, Baku, Azerbaijan: 16 storey

17 people were killed and more than 60 injured on 19 May 2015 in a fire that ripped through a multi-storey residential building in Azerbaijan's capital, Baku. As the fire consumed the 16-story Soviet-era high-rise, which had been renovated in recent years, a traffic jam formed as onlookers gathered on the surrounding streets. Gas canisters kept by the building's inhabitants began to explode. Eventually more than 40 fire vehicles and ambulances were called to the scene. Two helicopters circled the top floor, though officials say they were "ineffective." Footage showed panicking residents begging the emergency staff to let them back inside the building, where their relatives remained trapped.

<https://www.rt.com/news/260125-azerbaijan-building-fire-fatal/>

Accessed 19 June 2017

2015 Charles Street, Springburn, High-rise Flats, Glasgow

The 2015 blaze came just two years after improvement works that saw balconies enclosed to make the flats warmer. But locals feared external improvements to the tower block, in Charles Street, Springburn, left it vulnerable to fire that spread up through eight storeys during the incident.

<https://www.sundaypost.com/fp/scotlands-tragic-record-of-high-rise-fires-the-questions-raised-and-the-human-cost/>

Accessed 19 June 2017

2016 Shepherds Court, Shepherd's Bush, London: 18 storeys

The fire started in a kitchen on the 7th floor and quickly spread up the exterior of the building. In response to a Freedom of Information Act (FOIA) request, the LFB released research, dated 30 November 2016, into the white external insulation panels that were attached below the building windows. The report found:

- *The panels comprised a 17-23 mm plywood board, covered by blue polystyrene foam, mm steel sheet and decorative white paint*
- *When exposed to high flames, the polystyrene foam melted away, causing the metal sheet to fall and exposing the foam and wood to the flames*
- *This is "likely" to have occurred to the panels above the flat where the fire started, with flaming droplets falling and flames spreading up*
- *The experts concluded this is "likely to have assisted the fire in spreading up the outside of the building, as this mechanism progressively exposes a plywood surface to a developing fire"*

<http://www.insidehousing.co.uk/a-stark-warning-the-shepherds-bush-tower-block-fire/7019879.article>

Accessed 20 June 2017

2017 Grenfell Tower, London: 24 storeys

The disastrous and unprecedented Grenfell Tower fire occurred on 14 June 2017 in a 220-foot (70 m) high block of public housing flats in North Kensington, West London. An entry in Wikipedia notes:

The 24-storey tower block was designed in 1967 and as part of phase one of the Lancaster West redevelopment project construction, commenced in 1972 with the building being completed in 1974. The 67-metre (220 ft) tall building contained 120 one- and two-bedroom flats (six dwellings per floor on twenty of the twenty-four storeys, with the other four being used for non-residential purposes), housing up to 600 people. It was renovated in 2015–16 but, like many other high-rise buildings in the UK, the tower had only a single central staircase as UK regulations do not require a second staircase. The tower had been designed with attention to strength following the Ronan Point high-rise building collapse in 1968.

The fire started in the small hours of 14 June 2017. The London Fire Brigade were first called to a fridge fire at 00:54 BST (UTC+1), the first responders arriving six minutes after the alarm. Fire-fighters put out the fridge fire within minutes, but by then it had set the exterior of the building on fire, where it began to spread at a "terrifying rate". Residents alerted neighbours and began to evacuate the building. Due to Ramadan, many observing Muslim residents were awake for the pre-dawn meal of suhur, which enabled them to alert neighbours and help them to escape.

A team of 250 fire-fighters from 45 fire engines attempted to control the blaze. Fire-fighters entered the building to rescue people, undertaking efforts that broke their own safety protocols, but reported they were hindered by the extreme heat. At the height of the blaze, a hundred or more fire-fighters were inside the building.

The fire on the exterior moved upward and to the other side, re-entering the building. Fire-crews with breathing apparatus searched for people trapped in the building and carried them out; they reported thick smoke and zero visibility above the fourth floor. After three hours, the original teams of fire-fighters were replaced by new crews. London Fire Brigade reported fire-fighters rescued 65 people from the building and reached all 24 floors.

https://en.wikipedia.org/wiki/Grenfell_Tower_fire_-_Construction

Accessed 20 June 2017

Select Bibliography Regarding High-rise Building Fires

REP LPR 11 Fire spread in Multi-storey Buildings with Glazed Curtain Wall Facades: Loss Prevention Council: 1999

Gives the findings of an extensive research programme of full-scale fire testing and examines the factors that influence fire spread in multi-storey buildings, via the curtain wall.
No URL

Select Committee on Environment, Transport and Regional Affairs - Appendices to the Minutes of Evidence: 1999

<https://www.publications.parliament.uk/pa/cm199899/cmselect/cmenvtra/741/741a01.htm>

Accessed 20 June 2017

Memorandum by the Loss Prevention Council (ROF 35): 1999

Select Committee on Environment, Transport and Regional Affairs Appendices

This memorandum addresses and offers views on the questions raised in the notice and presents LPC's experiences of the construction styles and building products used. It also discusses the views and practices of the insurance industry, based on recent research and experimental findings.

<https://www.publications.parliament.uk/pa/cm199899/cmselect/cmenvtra/741/741a14.htm>

Accessed 20 June 2017

Potential Risk of Fire Spread in Buildings Via External Cladding Systems (*Prepared 5 January 2000*)

Following the multi-story fire in the block of flats at Garnock Court, Irvine in June 1999 the UK Parliaments' *Select Committee Environment, Transport and Regional Affairs* agreed to and produced a First Report. The opening two paragraphs noted:

1. *A fire which occurred in a multi-storey block of flats in Irvine, Ayrshire on 11th June 1999 drew the Committee's attention to the potential risk which could be posed by fire spread involving external cladding systems.*
2. *The necessity of ensuring that steps be taken to minimise this risk should it prove a serious danger to life and/or property prompted us to undertake a brief inquiry, with the following terms of reference:*
 - *Whether a risk is posed by such cladding;*
 - *The extent of the use of external cladding systems;*
 - *The adequacy of the regulations pertaining to their use;*
 - *What action may be necessary to counter any risks posed in existing buildings and to avoid any risks in new buildings or alterations to existing buildings;*
 - *Other matters which may arise in the course of questioning.*

After considering external cladding systems, pertaining regulations and their adequacy, the reports' Conclusions, at paragraphs 18 – 20, were:

Whether a risk is posed by such cladding

18. *The evidence we have received during this inquiry does not suggest that the majority of the external cladding systems currently in use in the UK poses a serious threat to life or*

property in the event of fire. There have been few recorded incidents of serious fire spread involving external cladding, and, although in our view any loss of life in incidents such as these should be prevented if at all possible, neither have there been many deaths (indeed, it is uncertain whether any of the deaths in the fires of which we have been informed can be directly attributed to excessive fire spread via the external cladding). Furthermore, the responsible attitude taken by the major cladding manufacturers towards minimising the risks of excessive fire spread has been impressed upon us throughout this inquiry.

The adequacy of the regulations pertaining to their use

19. *Notwithstanding what we have said in paragraph 18 above, we do not believe that it should take a serious fire in which many people are killed before all reasonable steps are taken towards minimising the risks. The evidence we have received strongly suggests that the small-scale tests which are currently used to determine the fire safety of external cladding systems are not fully effective in evaluating their performance in a 'live' fire situation. As a more appropriate test for external cladding systems now exists, we see no reason why it should not be used.*

20. *We believe that all external cladding systems should be required either to be entirely non-combustible, or to be proven through full-scale testing not to pose an unacceptable level of risk in terms of fire spread. We therefore recommend that compliance with the standards set in the 'Test for assessing the fire performance of external cladding systems', which has been submitted to the British Standards Institution for adoption as a British Standard, be substituted in Approved Document B for previous requirements relating to the fire safety of external cladding systems.*

[https://www.publications.parliament.uk/pa/cm199900/cmselect/cmenvtra/109/10907.htm - note20](https://www.publications.parliament.uk/pa/cm199900/cmselect/cmenvtra/109/10907.htm-note20)

Accessed 19 June 2017

Harrow Court: 4 Final Report: 2005

This report for the Fire Brigade Union Region 9, dated July 2005, considers the consequences of the fire which occurred the 14th floor of the 17 storey residential block that led to 2 fire-fighters and one resident being killed. It focuses on the 'history of incorrect and ineffective tactical responses to high-rise building fires in the UK'.

[http://www.highrisefirefighting.co.uk/case/harrowct/Harrow Court 4 Paul Grimwood Final Report.pdf](http://www.highrisefirefighting.co.uk/case/harrowct/Harrow_Court_4_Paul_Grimwood_Final_Report.pdf)

Accessed 20 June 2017

Introduction to Fire Safety Management: 2007

Andrew Furness and Martin Muckett

The Preface to the book indicates that the:

Introduction to Fire Safety Management has been produced for all students taking the NEBOSH Fire Safety & Risk Management Certificate, whether as part of a face-to-face training course or as part of a distance-learning programme. It will also be of significant use for those undertaking a programme of study for Level 3 and 4 S/NVQ in Fire Safety. The book is the approved reference material for those undertaking IOSH certified Fire Risk Assessment, Principles and Practice programmes and the Fire Safety Management programmes at the Institute of Occupational Safety & Health (IOSH).

This book has been produced to provide those establishing fire safety management systems within their workplace and those undertaking fire risk assessments, on behalf of the responsible person, with an all encompassing reference book without the need to initially access the huge range of British and European Standards in relation to fire and risk management.

<http://studylib.net/doc/8847416/introduction-to-fire-safety-management>

<http://studylib.net/download/8847416>

Accessed 20 June 2017

**Analysis of Needs and Existing Capabilities for Full-Scale Fire Resistance Testing
NIST GCR 02-843-1 (Revision) by Jesse Beitel and Nestor Iwankiw, Hughes Associates, Inc: October 2008**

In the Executive Summary it is noted that:

The study was commissioned to analyze the needs and existing capabilities for full-scale fire resistance testing of structural connections. The Scope of Work consisted of three separate tasks. The tasks were:

Task 1. Identification of Building Collapse Incidents - The objective of this Task was to conduct a survey of historical information on fire occurrences in multi-story (defined as four or more stories) buildings, which resulted in full or partial structural collapse

Task 2. Survey of Fire Resistance Test Facilities - The objective of this Task was to perform a survey of private and public facilities capable of testing the structural integrity of building elements under fire conditions.

Task 3. Needs Assessment - The objective of this Task was to perform an assessment of the need for additional testing and/or experimental facilities to allow the performance of structural assemblies and fire resistance materials to be predicted under extreme fire conditions within actual buildings; and if a need does exist, options for meeting those needs.

<http://fire.nist.gov/bfrlpubs/fire02/PDF/f02028.pdf>

Accessed 20 June 2017

**Safer High-rise Living The Callow Mount Sprinkler Retrofit Project
Sprinkler Coordination Group: 2012**

The Executive Summary explains:

High-rise social housing blocks create a number of specific fire safety and firefighting challenges that may not exist in other properties. The majority of such blocks were built between 1950 and 1970 when the design and fire protection standards of that time were lower than those required by current building regulations. After about 1968, the numbers of such blocks being constructed declined as they fell out of favour with both their intended occupants and local authorities.

This report demonstrates that it is both cost-effective and practical to retrofit automatic fire sprinklers in occupied, high-rise social housing blocks of that period, without disturbing residents. The report details how a pilot project, sponsored by the sprinkler industry through the British Automatic Fire Sprinkler Association, was undertaken in September 2011. The project resulted in the retrofitting of a fully comprehensive sprinkler system in a 1960's high-rise residential block, 13 storeys high with 47 flats. Sheffield City Council owns the block, which is operated by Sheffield Homes as sheltered housing.

External fire spread: New research: 2016

In a two-part Red Book feature, BRE global reports on the latest findings the commode of its work on the 'Investigation of real fires' for the Department of Communities and Local Government (DCLG)' By Ciara Holland, Dr David Crowder and Martin Shipp: PDF 6pp, April 2016

Having considered the background research, existing guidance, BS 8414 test series, and three case studies, this report concluded:

With the exception of one or two unfortunate but rare cases, there is currently no evidence from BRE Global's fire investigations for DCLG to suggest that current Building Regulation recommendations, to limit vertical fire spread up the exterior of high-rise buildings are failing in their purpose.

However, as the need to improve energy efficiency grows, more innovative ways to insulate buildings to improve their sustainability and energy efficiency are changing the external surfaces of buildings, with an increase in the volume of potentially combustible materials being applied. A number of significant files, such as those discussed, have demonstrated the potential risks.

In the light of the June 2017 Grenfell Tower disaster and the speed of fire spread across, and virtually around the entire four elevations of the residential tower block, such a conclusion may have been relevant at the time (April 2016). But, with hindsight, that is now inappropriate, and more might have been made of the perceived potential risks.

<http://www.redbooklive.com/filelibrary/PressArticles/External-Fire-Spread---New-Research.pdf>

Accessed 19 June 2017

National Fire Protection Association Research: High Rise Building Fires: Marty Ahrens 2016

In this comprehensive investigation:

This report provides estimated annual averages of fires and associated losses in U.S. high-rise building fires during five-year period of 2009-2013. This includes any fire in a structure at least seven stories in height above ground. Details are provided about high-rise fires in five occupancies: apartments or other –multi-family housing; hotels; dormitories or dormitory type properties; facilities that care for the sick; and office buildings. Fire protection, fire spread, areas of origin, and fire causes in high-rise buildings are compared with those in shorter buildings.

In 2009-2013, U.S. fire departments responded to an estimated average of 14,500 reported structure fires in high-rise buildings per year. These fire create an annual average of:

- 40 civilian deaths
- 520 civilian injuries
- \$154 million in direct property damage

<http://www.nfpa.org/news-and-research/fire-statistics-and-reports/fire-statistics/fires-by-property-type/high-rise-building-fires>

Accessed 23 June 2017

**Building regulations 2010 Fire safety Approved document B
Volume 2 – Buildings other than Dwellinghouses
2006 Edition incorporating 2007, 2010 and 2013 amendments. (Online version)
For use in England**

Building Regulations

- B1 Means of Warning and Escape
- B2 Internal Fire Spread (Linings)
- B3 Internal Fire Spread (Structure)
- B4 External Fire Spread
- B5 Access and Facilities for the Fire Service

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/441669/BR_PDF_AD_B2_2013.pdf

Accessed 20 June 2017