



Fire during the construction of a block of flats in Colindale, North London. Cause not established but probably discarded cigarette or malicious intent

London Fire Brigade

Introduction

Building using timber is not exactly a new idea. Indeed, from modern man's earliest times (and well before that...) good use has been made of the world's trees to provide both shelter and fuel. Here in the UK, the preference for wood as the predominant building material - rather than stone or brick, has come in and out of fashion but is increasingly being used by today's building industry attracted to the many environmental and commercial benefits that comes from building with properly-sourced timber.

Changes to the building regulations in 1991 cleared the way for timber frame (TF) housing to be built – even as high as eight storeys. This marked a significant shift, particularly in London, where timber framed building had effectively been outlawed since the Great Fire and Sir Christopher Wren's 1667 Building Act.

In recent years therefore TF building methods have proliferated, growing in popularity - particularly by specifiers of social housing. Unfortunately, despite acknowledging the benefits in using timber, it has to be accepted that fires do occur in all types of buildings

and those which start in TF buildings can be significantly more damaging than the same fire in a conventionally constructed building. Growing concern has been expressed about the fire risks posed by these buildings since the beginning of this century. There have been numerous cases of serious fires in these types of buildings, especially those taking place while buildings are being constructed and there have been significant losses.

WAKE UP CALL

In July 2006 a fire in a six-storey timber-frame housing development under construction in Colindale north-west London, became totally involved in less than nine minutes. The intensity of the fire caused Hendon Police Training College, a police station, student halls of residence and a number of homes to be evacuated. Up to 2,500 people had to be moved to safety and it took approximately 100 fire-fighters five hours to put out the resultant fire.

Cause for Concern

Although no one was seriously injured, in the Colindale fire, it and other blazes caused understandable concern among fire & rescue services, insurers and fire safety

"I have always been a stern critic of high rise timber-frame buildings having seen in my own area the results of a blaze. I personally wouldn't allow any high rise timber buildings – there needs to be a review of regulations."

Cllr Brian Coleman, Chair,
London Fire Authority, Sept 2010

RECOMMENDATION

By the end of 2011 the UK timber frame construction industry should actively promote to its members a variety of fire safety measures, **including fire suppression systems** and site security measures that are designed to reduce the risk of fire on construction sites during non-working hours when the danger of arson or accidental fires is highest.



experts. Indeed, this and other similar incidents prompted the Greater London Assembly to launch a detailed investigation into fire safety in high-rise and timber frame buildings in 2009.

Their report¹ was published at the end of 2010 and, in addition to recommending that sprinklers should be increasingly fitted in such structures, also called for an urgent review of the Building Regulations. However, such a review has yet to take place and is now unlikely before 2016.

The Fire Protection Association & the Role Played by Sprinklers in the USA

Other organisations have also expressed their concerns and the Fire Protection Association (FPA) has continued to highlight the problems associated with fire safety in timber frame constructions.

On behalf of RISCAuthority (RISCA), the FPA provided further words of warning in a report² published in 2011. This work draws on evidence from the USA and shows that sprinkler protection plays a vital role in preventing life loss and property losses in a building industry where timber frame construction accounts for

¹ Fire safety in London, Fire risks in London's tall and timber framed buildings - Dec 2010.

² Building Design and Management - Fire in timber frame buildings - A review of statistics from the UK and the USA – 2011

LIGHT TIMBER FRAME RESIDENTIAL MARKET SHARE 1998-2009

	ENGLAND	WALES	SCOTLAND
1998	2 %	3 %	43 %
2009	17 %	26 %	70 %

Source: FPA



approximately 90 per cent of the residential market. Furthermore, the report also reveals the threats to fire-fighter safety, as unsprinklered timber frame construction is shown to cause the majority of all deaths and injuries to fire-fighters in the USA.

However, American building codes impose more restrictions on such properties built without fire suppression than we do here. For example, the USA has for some time restricted the construction of timber frame buildings - without sprinklers - above 40 feet (typically three floors) and not allowed multi-occupancy timber frame buildings to be erected without sprinkler protection.

Fires During Construction

All the UK studies make it clear that fires during construction of TF buildings are a serious problem and recent guidance documents have sought to raise awareness of the issues.

The latest edition (8th, July 2012) of *Fire Prevention on Construction Sites: The Joint Code of Practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation* ("The Joint Code") published by the FPA, RISCA and the Contractors Legal Group contains significant new material on preventing fires in

The challenges posed by modern timber framed construction are increasing:

- *Taller heights of such buildings.*
- *Larger 'footprints'*
- *Modern insulation requirements and materials.*
- *Legal implications of fires that may affect persons outside the building of origin - 'relevant persons' as defined in current fire legislation.*

TF buildings. The most recent edition of HSG 168, the HSE's Guide Fire Safety in Construction also includes guidance on minimising the risks of and from fires in TF construction.

Fire Prevention on Construction Sites: 8th Edition, July 2012

Precautions for the Construction of Large Timber Framed Buildings

- Building to be compartmented and fire-stopped at earliest stage possible
- Generators and similar heat-producing machinery should not be used in structures where the timber is exposed
- Refueling of equipment must be undertaken in a designated area 20m away from building under construction
- Gas cylinders and flammables must be removed from the structure at the end of the day and stored in a secure compound 20m away from building under construction
- If temporary buildings need to be located closer than 20m, then risk assessments must be undertaken by competent professional in consultation with insurers; temporary buildings closer than 20m must be non-combustible
- All power and utilities – apart from those required for safety, fire detection and security systems must be disconnected outside working hours
- Automatic fire detection should be linked to an ARC unless there is a 24 hour security presence on site.
- Hot work to be minimised – where this is carried out it should be under permit and the site monitored for at least one hour after completion and subsequently visited two hours after completion to close the permit
- Where multiple structures are being constructed, consideration must be given in the risk assessment to the possibility of fire spread from building to building and this hazard minimised. One way of doing this is to provide fire breaks by separating incomplete structures from those with completed fire-rated facades.

The Joint Code also contains recommendations that fire protection, planned for the fully completed building, should be brought forward. This includes:

- Permanent fire escape stairs inc compartment walls
- Fire compartments
- Fire stopping
- Protected structural steelwork
- Fire fighting shafts
- Wet/dry risers
- Lightning conductors
- AFD where planned

- Sprinklers etc where planned

The final point regarding sprinklers is an interesting one and is something, hitherto, that the fire sprinkler industry is unused to. However, BAFSA is aware of others, principally fire & rescue service chief officers, who also want to see sprinklers installed at the earliest opportunity on a TF construction site.

Case Study

Indeed, one such approach has been used in Hampshire where a residential fire sprinkler system was installed and made operational during the construction phase of a new build, TF apartment block.



New build, timber frame apartment block consisting of twenty four units and common areas over four floors in Farnham, Surrey.

- The system was 'live' during construction and at night.
- A 'temporary dry' system installed.
- This overcomes the problems of freezing etc.
- However, upon completion, the system would become 'wet' and in line with BS 9251.



Temporary BS 9251
sprinkler system using
approved CPVC pipe

However, whilst the Hampshire initiative is to be commended, BAFSA is cautious about embarking wholeheartedly into such projects because, as good and effective as sprinklers might be, the challenges posed to such systems by a fire in a TF building under construction are significant and should certainly not be underestimated.

Nevertheless, where such an approach is decided upon it would be prudent to at least consider the installation

of a sprinkler system at the earliest opportunity; and consult early with the local water company to agree upon connection details:

- Only fit sprinklers where a ceiling/floor has been installed above sprinkler heads
- Where the water company insist on metering that a suitable bulk meter is specified - where appropriate

New Developments

- Plan and coordinate with the water company re town main pipe infrastructure around their development ensuring at least a 90mm supply pipe is laid in the roads
- Check the time lapse for a dry system to fill with water and operate, and be confident that the delay is acceptable.
- Consider the use of copper or steel pipe.

BAFSA firmly believes that large, new TF buildings should be sprinkler protected as a matter of course and urges the authorities having jurisdiction to introduce such measures in the next reviews of building regulations.

Sprinklers for Property Protection and Life Safety

Fire sprinklers were invented more than 150 years ago; however, until fairly recently were used primarily, for property protection purposes in large commercial and industrial premises only. They have been successful worldwide in reducing fire risks in buildings and protecting their contents as well as the occupants of large retail and public buildings.

It was not until the latter part of the 20th century when developments in the USA, combined with a growing interest from UK fire & rescue services, saw sprinklers evolving as a 'life safety' tool - especially for domestic and residential properties where most lives are lost.

Legal Requirements for Sprinklers

In some circumstances in the UK, legislation requires fire sprinklers to be installed in new buildings - timber

DEFINITION OF 'LARGE' TIMBER FRAMED BUILDINGS

- 4 storeys and above, or
- With a footprint of 2,500m² or more, or
- Of a contract value in excess of £2.5 million.

CLG Fire Service Circular 38/2009

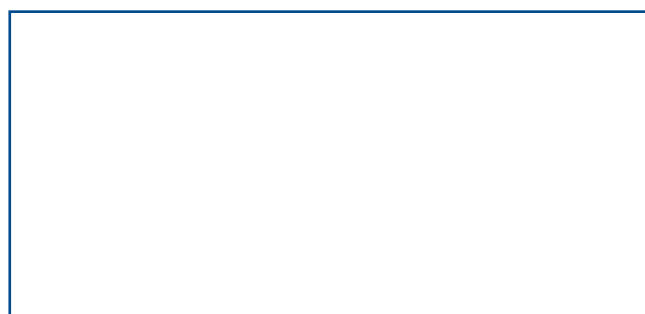
framed or not. However, the rules can differ widely depending on the intended use of the building, where it is located and other circumstances such as the height of the property. In Scotland, for example, any new 'high rise' residential building (i.e. a building with a floor over 18m) will have to be sprinkler protected, but this may not always be the case in England.

But in Wales, in order to comply with the Domestic Fire Safety (Wales) Measure 2011, all new residential care buildings, certain hostels and new student accommodation will now require to have sprinklers installed where applications for building regulations' approval are submitted post 30th April 2014.

A fully functioning automatic fire sprinkler system will:

- Reduce death and injury from fire
- Reduce the risks to fire-fighters
- Protect property and heritage
- Reduce the environmental impact of fire
- Reduce the effects of arson
- Reduce the true costs of fire and disruption to communities, businesses, local and wider economy
- Reduce insurance premiums
- Sound an alarm, alert the fire and rescue service and control or extinguish a fire.

Presented by



"When timber-framed buildings catch fire the actual structure burns. It often leads to total collapse and that puts the safety of our firefighters at risk.."

John Bonney, CFO Hampshire F&RS

bafsa

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