FIRE SAFETY DURING THE CONSTRUCTION OF LARGE TIMBER FRAMED BUILDINGS

SUMMARY

This Practice Note has been compiled by construction fire safety expert, Stewart Kidd, in response to APS concerns about this common form of construction, the recent spate of large timber framed building fires and the need for CDM Co-ordinators to engage effectively with the fire prevention aspects of their duties.

1.0 INTRODUCTION

1.1 Whilst timber-framed buildings have been around as long as people have been building houses, concerns have recently arisen following several serious fires which have taken place during the erection of timber framed blocks of flats. There have been at least six such fires reported in the UK since 2006.

1.2 Fires in large timber-framed buildings have occurred in Blackpool, Colindale, Edinburgh, London, Newcastle upon Tyne and the West Midlands. In all of these incidents, the project’s external structure was completely destroyed. In the case of the Colindale fire, in July 2006, a six storey, timber-framed block was reportedly totally destroyed in nine minutes. The most recent and most serious fire was in Peckham, SW London on 26 November, 2009. This fire not only destroyed the block under construction but also spread to other buildings and resulted in the evacuation of more than 300 people and serious damage to two blocks of maisonettes and a pub.

2.0 THE NATURE OF THE PROBLEM

2.1 Even before the Peckham fire, concern had been expressed by a range of authorities including the Fire Protection Association (FPA) which undertook a review of the Colindale Fire1 in which it concluded that fires in large timber-framed structures, during construction, could result in serious impact. More specifically, the FPA identified the following potential problems:

- Escape problems for site staff due to distances involved and very rapid spread of fire
- Proposed occupancy of blocks in a project before completion of the rest of the project
- Lack of fire fighting shafts in a structure which would have had a height in excess of 18m2
- Issues regarding the suitability of timber in principle and detailed questions regarding the treatment of the timber used and the design of the joists

2.2 Following concerns expressed by the Chief Fire Officers’ Association (CFOA), the Business and Community Safety Forum and the Fire and Rescue Services Forum submitted through a The Joint Ministerial Submission3 identified problems resulting from timber construction. This document drew attention to the following:

- The volume of timber used in the buildings created a hazard for both the construction workers and firefighters
- Timber-framed buildings are likely to be at their most hazardous during the early stages of construction where there is no active protection and probably very little passive fire protection
- Rapid fire spread, large amounts of heat and early structural collapse are all probable consequences of such fires

1 Constructive criticism, Fire Risk Management, March 2007
2 Under Scottish Building Standards, such a block would also have required a full sprinkler system
3 The Dangers of Fires in Timber Construction: 2 April 2009. This was sent to Sadiq Khan MP, Parliamentary Under Secretary at Communities and Local Government.
2.0 THE NATURE OF THE PROBLEM continued

- Poor workmanship can contribute to rapid fire spread even in completed buildings.
- In the longer term, there are concerns that wear and tear, poor maintenance and alterations (both professional and ‘DIY’) will increase the risk of fire spread even in those structures where the original construction is good.
- Partial occupancy could be a major life risk.
- The use of timber-framed buildings for social housing will negate the conventional approaches to fire safety in dwellings such as early detection and ‘defend in place’ compartmentation.

3.0 GOVERNMENT RESPONSES

3.1 The Joint Ministerial Submission also proposed a range of measures including the need for better project management, more detailed risk assessment, liaison with the fire and rescue service, better scrutiny of large timber-framed projects and more research into the wider risks of such fires. Additional training for the fire and rescue service should also be provided both in respect of recognising the risks implicit in such structures and also in fire fighting operations in such buildings under construction.

3.2 In July 2009, the Department for Communities and Local Government (GLG) issued a Circular to all fire and rescue services which assessed the risks for timber-framed construction as follows:

“At incidents involving timber framed buildings, particularly during the construction phase, fire spread is likely to be extremely rapid and the unprotected structure liable to early collapse. High levels of radiated heat are also likely, constituting a hazard to fire-fighting personnel with the possibility of offsite fire spread to adjacent structures. Evidence relating to a number of fires in large timber framed buildings under construction indicates that once the fire is established, fire-fighting tactics are likely to be in the defensive mode.”

The Circular suggests that Fire Authorities (the legal entities which employ the fire and rescue services) should use their powers under Section 7(2)d of the Fire and Rescue Services Act 2004 to visit such construction sites to obtain information for ‘operational planning’. Fire and rescue services are also encouraged by the Circular to collaborate with Building Control departments and the HSE in respect of information gathering about potentially hazardous projects and in respect of enforcement activity ‘using both the Regulatory Reform (Fire Safety) Order 2005, (FSO) and the Construction (Design and Management) Regulations 2007, (CDM)”.

4.0 MANAGING FIRE SAFETY IN TIMBER-FRAMED BUILDING PROJECTS

4.1 The principles of fire safety management are the same for timber-framed buildings as they are for those using more conventional construction materials. What differs is the need for the planning process to consider the following:

- The fire risk assessment informed by the higher probability of easy ignition and increased fuel load
- The need for special considerations for the safety of operatives and more specifically the means for giving warning of fire and means of escape in case of fire
- An awareness of the high risk at earlier stages of construction than on sites using more conventional materials.

4.2 Insurers concerns should also be taken into account – anecdotal evidence suggests that some construction risks insurers may now be reluctant to underwrite large timber-framed project. Others may do so but may impose special terms and conditions.

The most likely conditions imposed by insurers will be those found in the Joint Code and it is worth noting that the most recent (7th) edition of the Code now classifies timber-framed buildings as being ‘high risk’.

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4 To be defined as any timber framed building of four storeys or above, or with an area of 2500m² or of a contract value of more than £2.5 million
5 FRS Circular 38/2009 Timber Framed Buildings
6 This means that all fire fighting will be done externally and that efforts will normally be directed to preventing the fire from spreading to other structures,
8 The Joint Code is referenced in the new HSE 186 guide to fire safety on construction sites and in the UKTFA ‘Guidelines’ and ‘Fire Safety on Timber Frame Construction Sites’.
9 For example, determining whether acetylene is actually required for a project or whether it can be replaced by a safer alternative such as propane.
4.0 MANAGING FIRE SAFETY IN TIMBER-FRAMED BUILDING PROJECTS continued

4.3 The requirements of the Joint Code can be summarised as follows:
- Development of a fire safety plan in step with the building’s design and construction
- Appointment of a fire safety co-ordinator to implement the plan
- Fire risk assessments – to be undertaken and reviewed regularly as the project develops
- Managing out fire risks such as smoking materials, ignition sources and flammable materials and gases
- Controlling temporary buildings and structures
- Managing waste
- Good materials storage
- Providing security against arson
- Hot work controls
- Training and induction of operatives
- Fire drills (including evacuation)
- Record keeping
- Liaison with the fire and rescue services

The Joint Code suggests that one very definite contribution to reducing the risks of and from fire can be achieved by advancing the completed building’s fire protection measures as early as possible in the project. It is probably the difficulty of doing this in a timber-framed building that is a fundamental reason why such projects are now seen as more dangerous than conventional buildings.

It has to be accepted that it is very difficult to introduce passive fire safety measures early into some projects. In the case of timber-framed buildings, it is probable that fire compartmentation will normally be achieved by using lightweight material such as gypsum board and synthetic ‘wool’ insulation. Often, these can only be installed close to the end of the construction cycle. Equally, the completed building’s fire escape routes will usually depend on fire rated doors and enclosures which will often only be finished at a late stage of construction.

Indeed it is the absence of these very features (together with means of detecting and giving warning of fire) which makes partially-completed timber-framed buildings so dangerous when a fire does occur.

5.0 SO WHAT CAN BE DONE?

5.1 Given the clear risks of fires on this kind of site it is suggested that whilst the conventional approaches to fire safety management (as laid out in the Joint Code and in HSE 168) are still appropriate, there is a greater need to ensure that particular attention is paid to risk assessment, housekeeping, and control of specially hazardous materials. It is also suggested that sites where timber-framed construction is taking place should also be subject to more regular checks and compliance inspections – especially during the stages of construction when unclad framework is in place.

The specific measures in addition to the measures laid down in the Joint Code which must be considered are:
- Strict controls of smoking and hot work
- Regular removals of waste (especially combustible materials)
- Enhanced training and tool box talk frequency
- Segregation of materials from the building under construction – especially flammable liquids and compressed gases
- Site security against arson
- Constant reviews of means of escape in case of fire including site alarms, exit signs and lighting where necessary
- Provision of temporary fire protection measures (if the building’s own fire systems cannot be installed early) for example:
  - Temporary fire detection and alarm system
  - Temporary escape lighting
  - Adequate water for fire fighting – perhaps with a temporary site fire main on the largest sites
  - Temporary wet riser and hose reels to be installed on each level as soon as the level is complete
  - Consideration to the provision of a temporary automatic fire sprinkler system for very large structures

10 This provision is often included as a ‘Special Requirement’ and included as a warranty in some insurance contracts, for example, MunichRe Special Terms 112
6.1 Whilst it is clear that the fires referred to (and others which are known to have taken place) have caused great concern to the suppliers and builders the industry position is that timber-framing offers considerable advantages over other building methods. It’s equally clear that government as a whole favours this method of construction as a solution to the need for more rapid construction of social housing and utilisation of brown-field sites where timber-framing is thought to be particularly suitable.

It is worth noting that the timber-framed industry’s own guidance documents propose sensible approaches to fire safety which mirror the Joint Code’s contents. In Fire Safety on Timber Frame Construction Sites the main trade body, the Timber Federation, advises that particular emphasis is placed on the need for a thorough fire risk assessment and regular reviews of this as well as the need for a proper site security programme to minimise the risks of and from arson.

However, unlike the Joint Code which will normally be imposed (and policed by insurers) the Timber Federation’s documents are purely advisory and there are no sanctions that can be imposed for non-compliance.

7.1 Compliance with the CDM Regulations 2007 is fundamental, regardless of the type of construction and adherence to HSE guidelines together with the Joint Code of Practice will ensure that the legal duties of the CDM Co-ordinator are complied with, that insurers are kept happy and that the fire and rescue service will be content. Do not forget that in the case of buildings undergoing refurbishment, or being extended, the enforcing authority for fire safety may be the fire authority rather than the HSE. Also do not overlook the importance of training and induction, surveillance, good record keeping and the possible benefits of advancing fire protection installation as noted above in ‘Provision of temporary fire protection measures’.

8.1 The wider use of timber-framing and its application in larger buildings has resulted in some significant, costly fires. Such fires have the potential to involve injury and life loss as well as destroy buildings under construction and also spread to nearby structures.

Whilst there may be pressure to restrict very large timber-framed buildings they offer significant advantages in certain circumstances and the technique is unlikely to be banned or subject to further controls. The existing public domain guidance on managing fire safety on construction sites is still highly relevant and if followed should ensure that the probability of a fire is reduced and if one should occur, its impact will be minimised.
9.0

BIBLIOGRAPHY

CLG Fire Service Circular, 38/2009 Timber Framed Buildings (1 July 2009)


Lane, T ‘Fire report throws future of timber-frame into doubt’ in Building, 13 April 2007


Munich Reinsurance Company. Munich: Special Terms 112

UKTFA Fire Safety on Timber Frame Construction Sites, July 2008

UKTFA 16 steps to Fire Safety on Timber Framed Construction Sites, November 2009
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