Passive (Structural) Fire Protection: Compartmentation and Fire barriers (Fire Stopping)

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For delegates to understand the reason for compartmentation in buildings as a means of protection against the spread of fire and the products of combustion.
LEARNING OUTCOMES

As a result of this session the delegate will be able to:

- Understand the importance of compartmentation.
- Be able to identify breaches in compartmentation.
- Be able to identify acceptable compartmentation.
- Know the procedure to be adopted when unacceptable compartmentation is identified.
The Law

- The Regulatory Reform (Fire Safety) Order 2005 requires that an employer or controller of premises (the ‘responsible person’) manages the risk to employees and visitors etc from fire. This Order is enforced by the Fire and Rescue Service although the HSE also deal with specific risks associated with fire and/or specialist areas such as chemical and construction sites. Local authorities may be the enforcing authority for some premises such as sports grounds or places of entertainment.

- The most important duty is to ensure that a suitable & sufficient fire risk assessment is carried out by a competent person. In some low risk environments, this can be completed in-house but it must be carried out by following the relevant guidance document. Where there are 5 or more employees it must be recorded. For more complex environments it is advisable to seek specialist advice.

- Fire prevention systems must be put in place and these can take the form of equipment, maintenance of equipment, training and site rules.
Statutory guidance documents

- England & Wales – Building Regulations 2010
  Approved Document B (1-2)
- Scotland – Technical Handbook B 2010
- Northern Ireland – Technical Booklet E 2005
Other codes of practice
- BS 9999: Fire safety in the design, management and use of Buildings
- BS 9991: Fire Safety in the design, management and use of residential buildings
- BS 7974: Application of fire safety engineering principles to the design of buildings (ACOP)
Other relevant guidance

• Housing Act 2004
• PAS 7 (2013)
• PAS 79 (2012)
• Lacors ‘Guidance on Fire Safety provision for certain types of existing housing’
• Local Govt Group; Fire Safety in purpose built blocks of flats
• Fire Safety in Specialized Housing (CFOA)
• DCLG Fire Risk Assessment guides
Types of Fire Risk Assessment (Dwellings)

• Type 1 Common parts only (non-destructive)
• Type 2 Common parts only (destructive)
• Type 3 Common parts and flats (non-destructive)
• Type 4 Common parts and flats (destructive)

(LGG, Fire in purpose built blocks of flats)
Compartmentation

- Prevent spread of fire and smoke
- Subdivide buildings into manageable areas of risk
- Provide adequate Means of Escape
- Provision in statutory guidance documents
Section 8

8.1 The spread of fire within a building can be restricted by sub-dividing it into compartments separated from one another by walls and/or floors of fire resisting construction. The object is two fold:

a) To prevent rapid fire spread which could trap occupants of the building; and

b) To reduce the chance of fires becoming large, on the basis that large fires are more dangerous not only to the occupants and Fire and Rescue Service personnel, but also to the people in the vicinity of the fire.
8.20 Every compartment wall and compartment floor should;

a) Form a complete barrier to the fire between the compartments they separate and;

b) Have the appropriate fire resistance as indicated in Appendix A, Tables A1 and A7 (This refers to the duration of protection required, ie 30 mins, 60 mins or 120 mins)
Section 9:
Details the requirements for concealed spaces, cavities and voids.

It also details the use of cavity barriers and the requirements for double skinned corrugated roofing.
Section 10: Protection of openings and fire stopping.

10.1 Sections 8 & 9 make provisions for fire-separating elements and set out the circumstances in which there may be openings in them. This section deals with the protection of openings in such circumstances.
Section 10:

10.2 If a fire-separating element is to be effective, every joint or imperfection of fit, or opening to allow services to pass through the element, should be adequately protected by sealing or fire-stopping so that the fire resistance of the element is not impaired.

10.3 The measures in this section are intended to delay the passage of fire. They generally have the additional benefit of retarding smoke spread, but the tests specified in Appendix A for integrity does not directly stipulate criteria for the passage of smoke.
Section 10: Fire-Stopping

10.17 (b) All openings for pipes, ducts, conduits or cables to pass through any part of a fire-separating element should be:

i) Kept as few in numbers as possible; and

ii) Kept as small as practicable; and

iii) Fire-stopped (which in the case of a pipe or duct, should allow for thermal movement)
10.19 Propriety fire-stopping and sealing systems (including those designed for service penetrations) which have been shown by test to maintain the fire resistance of the wall or other element, are available and may be used, Other fire-stopping materials include:

- Cement mortar;
- Gypsum-based plaster;
- Cement-based or gypsum-based vermiculite/perlite mixes;
- Glass fibre, crushed rock, blast furnace slag or ceramic-based products (with or without resin binders); and
- Intumescent mastics
Protection from fire
Walls, Ceilings and voids

- New construction/alterations
- Is it fire resisting construction?
- Doors/walls/glazing/ceiling?
- Changes to means of escape layout?
- Role of suspended ceilings?
- Is compartmentation maintained in hidden spaces?
- Holes in hidden spaces?
- Third party certificated products/installers?
- RECORDS?
First floor

Fire-resisting floor construction to protect route above

Cavity fire barrier

Efficient smoke seal

False ceiling

Fire-resisting partition constructed up to underside of floor overhead

Protected route

Fire-resisting floor construction

Basement
Acceptable fire-stopping
Un-acceptable fire-stopping
Fire Doors

• Look at ALL fire doors on escape routes
• Is it a fire door?
• Voids
• Labels/plugs
• Correct door gaps around edges?
• ~3mm
• Frame fixed/sealed to opening?
• Suitable Ironmongery?
• 3 hinges
• Operation of lock/latch/striker
• Presence of self-closing device
• Secure knobs, handles etc
Other Passive Fire Safety measures

• Fire protection to structural frame (where visible)
• Good condition?
• Complete?
• Cavity barriers (where visible)
• IF THERE ARE PROBLEMS CALL IN A THIRD PARTY INSPECTOR
• Third party certificated products/installers?
• RECORDS?
Getting it wrong
How Fast Does Smoke Travel?

Consider this:

- A square room 6m x 6m x 3m has a pencil hole between compartments.
- How long will it take for the smoke to fill the room to a thickness such that you cannot see your hands half a metre in front of you?
END OF SESSION
(ANY QUESTIONS)