



FIRE SAFETY:

FIRE COMPARTMENTS & CONSIDERATIONS

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INTRODUCTION

Every building must be designed and constructed in such a way that in the event of an outbreak of fire within the building, fire and smoke are inhibited from spreading beyond the compartment of origin until any occupants have had the time to leave that compartment and any fire containment measures have been initiated. The object is twofold:

- To prevent rapid fire spread which could trap occupants of the building; and
- To reduce the chance of fires becoming large, on the basis that large fires are more dangerous, not only to occupants and fire service personnel, but also to those in the vicinity of the building.

As a by-product compartmentation will also reduce the chances of structural collapse and minimise fire losses. In the year ending March 2020, there were 243 fire-related fatalities. The most common cause of death for fire related fatalities (where the cause of death was known) was 'overcome by gas or smoke'. This amounts to around 30% (73) of fire-related fatalities.

Annually fire costs industry in excess of £8 billion. In the year ending March 2020 there were 243 fire related deaths. This year's figure is the lowest number in the annual series (from 1981 to 1982). In the same period there were 6,910 non-fatal casualties in fires, a decrease of 10 fatalities and around 150 non-fatal casualties since year ending March 2019.

Fire compartmentation is a vital part of any fire safety design and is often referred to in a number of different ways: fire walls (and floors); fire separation; protected corridors / stairs; firefighting shafts etc. all carry the same meaning. Compartmentation is basically the division of a building into cells, using construction materials that will prevent the passage of fire from one cell to another for a given period of time.

Compartment walls and floors should be provided in the following circumstances:

- A wall common to two or more buildings;
- Parts of a building occupied for different uses – this would apply to a cold store with office space attached;
- Places of special fire hazard – boiler rooms, electrical switchgear cupboards etc.
- Every wall used to sub-divide a building to observe the size limits on compartments;
- Every floor if the building has a floor height more than 30m above ground.

Over a period of time premises are frequently modified and adapted to keep up with business requirements and legislation changes. It is vital to ensure that any work which has an impact on any compartment wall or floor does not reduce the integrity of the structure. The main causes of this are the addition of pipes, services and ductwork. Where holes are made for these to pass through it is vital that suitable fire stopping is employed.

As can be seen below this is not always carried out. In the event of a fire smoke can easily pass from one compartment to another endangering people. This is also a route for fire spread. Hot gasses and flames will easily ignite combustible items in the adjoining compartment therefore assisting with a rapid spread of fire.



In areas where insulated composite panels are located it is particularly important to ensure that suitable fire stopping is employed to prevent ignition. Where works are identified as impacting on compartment walls or floors the making good to the appropriate fire resistance should be specified at the design stage. All works should be closely monitored and subjected to rigorous inspection regimes on completion.



In specifying the fire resistance of compartments there are three possible modes of failure of the partitions which comprise:

- (1) Ceiling above
- (2) Floor below
- (3) Walls/doors which form the compartment

When exposed to fire they should maintain:

- Stability (i.e. not collapse);
- Integrity (i.e. not be holed, cracked, or otherwise perforated);
- Fire stopping (i.e. prevent the passage of fire by conduction, convection or radiation).

The ability of a compartment to maintain these features giving effective compartmentation is measured in minutes. It is essential that for the component parts to work as they should in compartmentation, i.e. fire doors, then they must perform to the specified time required – given their location in a building and the building structure.

All openings in compartment walls and floors will have a specified fire resistance (usually 30 or 60 minutes). This applies to items such as doors, windows and roller shutters which will be constructed to meet this standard and should be properly maintained.

As a compartmented area forms part of a firefighting area, then damaged or inadequate compartmentation could hinder or affect the fire service response and in the worst instance give rise to serious risks for fire fighters. This could result in enforcement action being taken against the Responsible Person under Article 38 of the Regulatory Reform (Fire Safety) Order 2005 – 'Maintenance of measures provided for protection of fire fighters.'

<https://www.legislation.gov.uk/uksi/2005/1541/article/38/made>



These photos show the results of a break down in the compartmentation of a cold store. The fire was caused by an electrical fault which rapidly spread through the sandwich panel construction. The external compartment wall to the rear of the building was breached by the fire which spread to the adjoining building resulting in the loss of the whole structure.

Cold stores and food processing centres pose a unique problem in that they are frequently constructed from highly combustible materials. Many older designs also incorporate other hazards such as asbestos all of which can hinder firefighting operations and contribute to the loss of the building.



By maintaining your compartmentation to the correct standards you can reduce the severity and impact of any fire both in terms of business disruption and life safety risk. It is strongly advised that an inspection of all compartments is undertaken and remedial action carried out.

Compartmentation is one of the most overlooked of all fire safety measures yet on a pound for pound basis can have the most positive impact on a successful outcome.



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