



Figure 4-1: Opening not fire stopped.

Source: FST.



Figure 4-2: Fire stopping carried out correctly.

Source: FST.

### PROTECTION OF CONCEALED SPACES (CAVITIES)

Another factor to consider in the prevention of fire spread within buildings is the control of large voids within the building. Fire will quickly spread unnoticed through any large concealed space, for example, an open ceiling void above a false ceiling. To prevent fire spread in this way a form of compartmentation of the cavity is carried out. This is often done using fire retardant blankets which are suspended from the upper face of the void and span the entire void space. The material often used for the fire retardant blankets is rock wool mineral fibre. In this way a fire barrier is created which provides a degree of compartmentation of the cavity and limits fire to spread.

### Internal fire growth and lining materials

#### SANDWICH PANELS

In modern buildings one type of construction which is commonly used, but is causing great concern, is 'Sandwich Panels'. These consist of two outer skins of sheet metal (normally a light alloy) with an infill of heat insulating material. In some cases the insulating material used is polyurethane or styrene foam.

This type of construction is causing problems in buildings when they are on fire due to sudden and unannounced building collapse as the panels fall out of their framework. In addition, they can cause very rapid fire spread once the internal foam is on fire as the fire spreads inside the sandwich panels.

As a result of these problems, the Fire and Rescue Services may have to consider attacking a fire in a building of this type from outside the building, in order not to endanger the lives of firefighters.

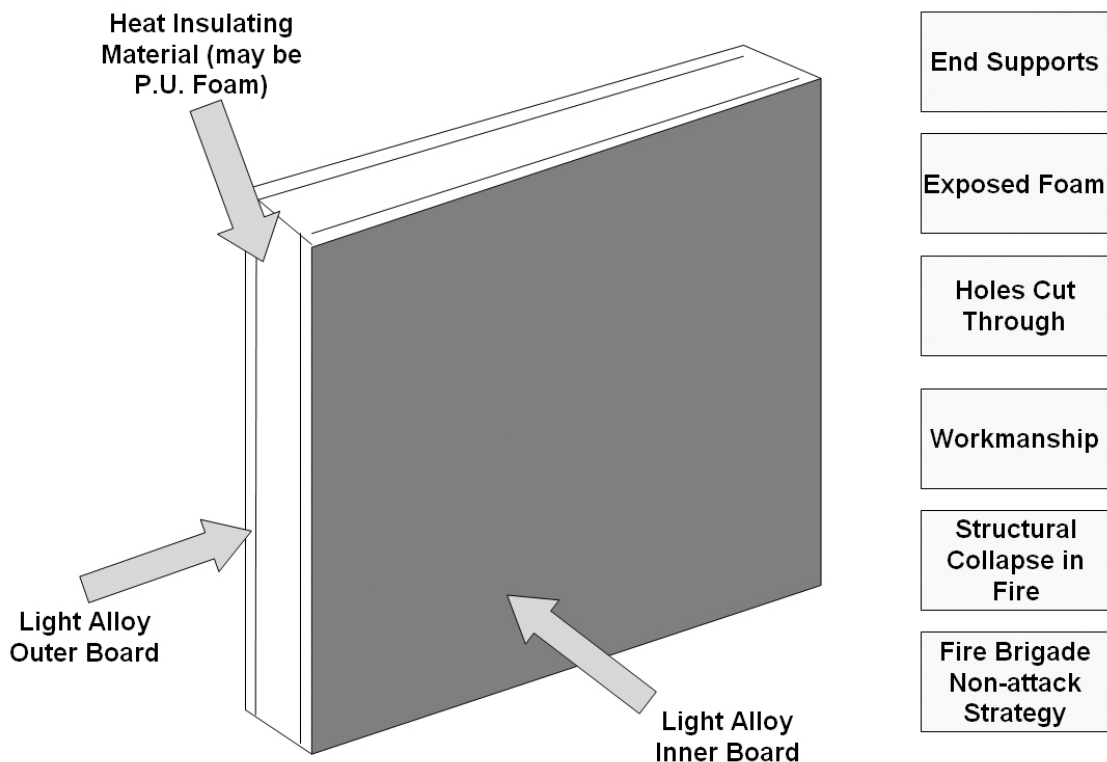


Figure 4-3: Sandwich panel.

Source: FST.

## BUILDING BOARDS AND SLABS

The characteristics of fire resistance and surface spread of flame are inherent qualities of board materials. If the performance qualities of boards are low it may be possible to increase their qualities by the use of a fire resistant substance which is either attached to or impregnated in the board material. As part of the fire risk assessment process we need to consider both the speed at which fire will spread across the surface of a building material and the effects or contribution if any the material would have on the fire itself. As an example: a building board with metal light alloy facing covers will have an excellent fire spread characteristic as the metal sheet will not burn. However, if the filling inside the building board is polyurethane foam this will decompose with the heat from the fire, give off large quantities of flammable gasses which can then cause a flashover in the building as the fire propagates through the flammable gas layer.

Testing systems for the surface spread of flame characteristic gives an indication of the speed that fire would spread across a material's surface. Class 1 materials would present the slowest speed of flame spread and class 4 the fastest. Class 0 is often mentioned in literature; it is not a true classification, but to be categorised as Class 0 a material must be Class 1 and must not contribute greatly to the propagation of the fire.

Escape routes and circulation spaces within buildings should have both ceilings and walls comprising materials of Class '0' standard. Some examples of materials with different classification are given below:

Plasterboard	Class '0'
Woodwool slabs	Class '0'
Mineral fibre board	Class '0'
Chipboard	Class '3'
Softboard	Class '4'
Plywood	Class '3'

Figure 4-4: Material classifications.

Source: FST.

## WALL LININGS

Room linings should not be easily ignitable. Consideration should be given to the effects of the wall linings on the growth of a fire as it may lead to a flashover occurring.

This is illustrated in the table below, which is extracted from test results achieved by the Building Research Establishment.

Wall Lining	Flashover Time
Dense non-combustible material, e.g. brick	23 minutes 30 seconds
Fibre insulating board with skim of plaster	12 minutes
Hardboard with 2 coats of flat oil paint	8 minutes 15 seconds
Non-combustible insulating material	8 minutes

Figure 4-5: Wall lining test results.

Source: Building Research Establishment.

As can be seen, even materials that are classed as being non-combustible can affect the development of a fire due to their insulating properties raising the temperature within the compartment.

## Means of preventing external fire spread

The construction of external walls and the separation between buildings to prevent external fire spread are closely related. The likelihood of a fire spreading across an open space between buildings depends on:

- Size and intensity of the fire in the building concerned.
- Distance between the buildings.
- Fire protection given by the facing sides of the buildings.

The requirements for the control of external fire spread will be met:

- If the external walls of the building presumed to be on fire are constructed of a material that prevents or reduces the risk of ignition from any external source, and the spread of fire over their surfaces will be limited.
- If the amount of unprotected openings in the side of the building presumed to be on fire is limited so as to reduce the amount of thermal radiation that can pass through the wall and affect an adjacent building. When doing this the distance between the wall, the boundary and adjacent buildings is taken into account.
- If the roof of the adjacent building is constructed so that the risk of spread of flame and/or fire penetration from an external fire source is limited.