

# Compartmentation – a real life saver



There is a worrying statistic that 44% of fire related deaths happen to people who were outside the room of origin of the blaze; worrying because these deaths are preventable, suggests Andy Kay, Chairman, Association for Specialist Fire Protection (ASFP)

In April 1996, a fire broke out in Düsseldorf airport. A welder had set fire to some polystyrene insulation and the resultant blaze led to seventeen deaths. Eight people were killed in a VIP lounge, several hundred metres from the seat of the fire. Smoke and noxious gasses had spread uncontrollably though the ventilation ducts and caught the occupants of the lounge unawares. Had the compartmentation within the building been adequate, these deaths would not have occurred.

In another tragic case, in January 2004, a faulty fuse led to the deaths of 14 residents in the Rosepark Care Home in Glasgow. The fire remained in a fairly contained area, but the build up of pressure led to thick smoke being forced though every part of the home and the elderly patients all died of smoke inhalation.

Chief Superintendent Tom Buchan said at the time: "It was not what you would call a significant fire, in the sense

that the premises were destroyed. There is, in fact, very little damage."

Again, these deaths were preventable.

There are five main strands to an effective fire strategy within a building:

- Prevention - this speaks for itself. Prevent fires from breaking out and everyone is happy. However, the reality is that fires are inevitable and with arson on the increase, the best housekeeping and preventative measures have only a minimal effect on fire statistics
- Detection – this is provided by smoke and fire alarms
- Suppression – suppression systems include mechanically activated systems (referred to as active) such as sprinklers and gas suppression systems, as well as fire extinguishers and blankets
- Evacuation – the Building

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Regulations are designed to save lives and ensure the safe evacuation of a building

- Containment – keeping the fire, smoke and noxious gasses to a restricted area; achieved by dividing a building up into fire rated compartments. This not only aids evacuation and thus saves lives, but it is also the primary strategy for property protection. Insured losses from fires in Great Britain annually break the £1 billion mark, but combined with uninsured losses the true figure is somewhere between £6-7 billion.

When a building is designed there are regulations governing the size of compartments within the building in order to reduce the risk of fire spread. The walls, floors and ceilings of these compartments will have a fire and insulation rating, generally ranging from 1/2 hour to a maximum of 4 hours – depending on the usage of the premises, the sighting of the compartment or the presence of sprinkler systems. The idea is that in the event of fire the flame, heat and smoke produced will stay within the compartment, thus reducing the risk to both lives and property. This process is called compartmentation.

The construction of the walls, floors and ceilings will be carried out in accordance with these design criteria, but in order for any compartment to be usable by its occupants, breaches have to be made for such elements as doors,

## Compartment Weak Points

1. Unsealed / Open Joints
2. Unsealed Cables
3. Penetrations
4. Unsealed Pipes
5. Penetrations / Ducts
6. Doors / Windows
7. Curtain Wall / Slab Edge





mechanical and electrical services, and expansion joints. It is these breaches that need to be addressed through the installation of built-in (passive) fire measures.

The most commonly recognised built-in fire protection is the fire door and most of us now know that propping them open, usually with a handily placed fire extinguisher, is not best practice! However, a compartment wall has to run from floor slab to ceiling soffit. The fire door may well be sat on top of a computer deck/raised access floor with a suspended ceiling above. Take a moment to push up some ceiling tiles above a fire door and you will often be faced with multiple services passing through the wall. If these services have not been adequately protected then the money spent on the fire door has been wasted. Fire is not discriminatory – it will find the least line of resistance to pass from one compartment to another.

The types of products used to protect these services are generally referred to as fire-stopping. There are whole sections of Approved Document B of the England and Wales Building Regulations devoted to compartmentation. Similar

guidance is given in the Scottish Technical Manuals, Part E of the Northern Ireland Regulations and Technical Guidance Document B in Eire.

Passive products need to not only provide a flame, heat and smoke barrier, but also need to accommodate the possibility of services burning away and leaving holes in the compartment. A good example is a sanitary soil pipe passing through a wall. These are generally 110mm plastic pipes. Just sealing around these pipes will be inadequate because the fire will cause the pipe to melt and burn away very quickly, leaving a large hole for the fire and smoke to pass through. One solution to this is a pipe collar that is wrapped around the pipe and fixed to the wall. Inside the pipe collar is a material that, when exposed to heat will expand and exert pressure on the plastic as it softens, eventually crushing the pipe before the flame and smoke can pass through the wall.

So who carries the can if the compartmentation measures are proved to be inadequate after a fire has occurred? If we look at the two examples of Düsseldorf and Rosepark, we can see that it is invariably the building owners that are first in the firing line. In Düsseldorf, the

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airport authorities were sued by four insurance companies and were ordered to pay \$11m in compensation.

The court judged the airport’s building contractors to be negligent and so in turn the airport sued the contractors. There were also criminal prosecutions brought against the airport owners by the families of the deceased.

In the Rosepark case, as partners of the firm running the home, three members of the Balmer family were accused of a total of twelve charges, including breaches of the Health and Safety at Work Act 1974, the Health and Safety at Work Regulations 1999, and of the Electricity at Work Regulations 1989. Legal delays have meant that an outcome has not been reached in the case but once again, families are awaiting the verdict in order to launch their own prosecutions.

The fact is that everyone involved in the design, construction, product supply and running of a building could end up in court should the unthinkable occur.

Compartmentation is a simple strategy that can have a major effect on improving life safety and reducing property losses. It could also keep you out of court!