

FLASHOVER VELOCITY

Flashover events and Travelling fires in Buildings

In this issue:

- What defines a flashover?
- What defines a Travelling Fire?
- What speeds (velocity) are these ignition events likely to reach?
- A 100 m² five roomed apartment can flashover within 60 seconds

Rapid Fire Behaviour How Rapid?.... How Fast?

The speed (velocity) of a flashover is strongly dependent on the ventilation and fuel load configurations, as well as the geometry of the fire compartment. In general, a flashover will travel even faster through doorways, in narrow corridors or upwards in stairways.

Rapid Fire Phenomena

Every time you consider how fast a hot smoke layer or flashover can move, without the influence of wind effects, ask yourself:

Q: What defines a flashover?

A: Sustained flaming combustion throughout the compartment with temperatures at the ceiling exceeding 600°C, heat flux at the floor exceeding 20 kW/m² and a combustion velocity through the gases exceeding 8 metres/second (18 mph).

Q: What defines a travelling fire?

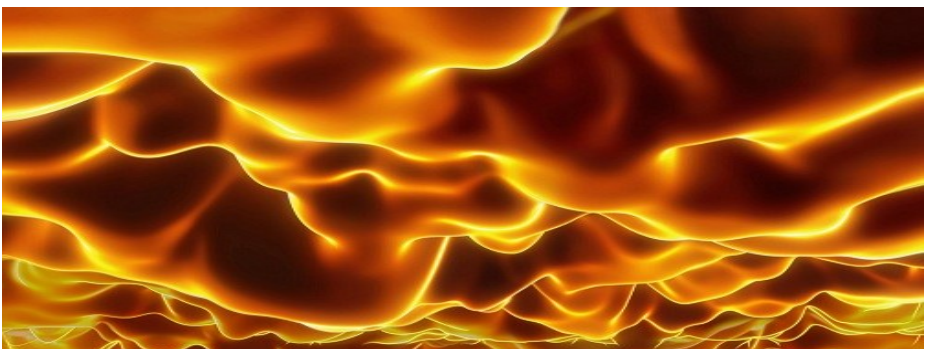
A: Flashovers are unlikely to occur in large compartments exceeding 150 m² in floor area with ceiling heights to 4 metres. Beyond these dimensions a fire is most likely to 'travel' across floor space at a reduced velocity, compared to a flashover. Typical travelling fire velocities, moving across the large compartments, are around 30 mm/s (0.03 m/s or just 0.07 mph).

Q: What defines a hot gas layer?

A: A hot gas layer (ceiling jet) consists of a mixture of hot smoke and fire gases. The gas layer may hang in a hot buoyant position near the ceiling or more likely move within the air currents created by the fire plume and the flow path. A hot gas layer can move across the ceiling at typical speeds of 0.5 m/s (large office spaces) or 2-6 m/s (5-15 mph) in smaller residential compartments.

A hot gas layer may spread across the floor space and ignite in an un-sustained 'flash-fire'. Such an occurrence may also include the fire plume bending as it reaches the ceiling. This fire spreading through the gas layer is not termed a flashover unless fuel loads at the floor are also ignited. Such an ignition is defined as a Fire Gas Ignition (FGI) or 'Flash-Fire'.

This type of fire spread through the gas layers can occur in any sized compartment with low or high ceilings.



Flashovers cannot occur in large open-plan compartments and the fire spread is more likely to advance (travel) at a slower rate at around 15-25 m²/min.