



4.3. Flame Spread on Exterior Façade

- 4.3.1.** Building fires that envelope the façade may be initiated externally from outside the building sources such as BBQ activity in the balconies, trash can fires, fire works displays, careless disposals of cigarette butts, electrical fires from cables running in façade cavities or arson. Fires can originate internally from internal room fire loads of the building and spread to exterior façade through openings on the exterior walls such as doors, windows, shattered glazing because of flashover.
- 4.3.2.** Interior fires are intervened and controlled by automatic sprinkler system or by fire fighters. However, when the fire outgrows fire fighter's efforts or the sprinkler system and reaches flash over stage, it leaps out from the openings onto the exterior façade or cavities behind the façade of the building causing "leap frog" effect.
- 4.3.3.** At this stage, if the façade material delaminates, exposing the core, if the core of the facade material is combustible, if the cladding system components such as sealants, linings, insulation are combustible, the flames start consuming the combustible material on the façade, spreading along the surface of the façade and along the cavities behind the façade.
- 4.3.4.** If the floor slab fire stopping is absent or fire stop material is not approved and not installed as per standards, if the curtainwall is not listed, the flames penetrate through the gaps and reach for the upper floors. Flames can even propagate downwards if the material on façade is flammable.
- 4.3.5.** Such propagated flames find the other openings of the building from exterior and enter back into the buildings, feeding on the interior fire loads. This "Reverse leap frog" effect continues along the building from floor to floor, to height and width, consuming the building façade swiftly.
- 4.3.6.** Cavity can be part of the façade system by design or cavity can be created by combustible materials on façade system or poor integrity of the façade panels or poor performance of perimeter joint systems and fire stopping systems or combinations of these factors. As flame propagates and enters this cavity behind façade system, it can elongate ten times its length in its search for oxygen in the confined space of such cavity, thus burning behind the façade system unnoticed from outside for many floors above the fire origin.
- 4.3.7.** As the intense heat develops behind the façade and flames continue to grow, façade panels delaminate, exposing more core material to the flame, resulting in a sudden engulfing of vast area and multiple stories of the building façade under fire.
- 4.3.8.** Apart from combustible façade materials, poor installation, poor joint detailing, poor mechanical detailing in fixing insulation and façade panels and poor railing system installations contribute to the rapid façade flame spread and collapse of façade panels and frames, making external fire fighting extremely difficult.