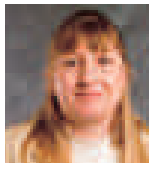
Is a Towering Inferno Possible in Ontario?

By Dale D. Kerr

Eighty dead, another seventy injured, and over three hundred people homeless. Many say that the Grenfell Tower apartment fire in London, England was a disaster just waiting to happen. One must wonder, "Could such a fire happen here in Ontario?"



The 24-storey Grenfell Tower building was originally constructed in 1974, with a concrete structure, concrete walls with strip windows, exterior concrete columns, and a single stairwell in the centre of the building. It had recently undergone renovations to improve its appearance and its energy efficiency. The renovations included the addition of exterior insulation, new exterior cladding and new windows. Polyisocyanurate rigid insulation (PIR) was adhered to the exterior of the concrete walls. Aluminum composite material (ACM) panels, consisting of aluminum sheets bonded to either side of polystyrene insulation, were hung on aluminum clips on the outside of the wall, leaving an air gap of approximately two inches behind the panels. The aluminum composite panels were intended to deflect most of the rain, while the air gap was intended to prevent any rain that bypassed the panels from being driven further into the wall.

The fire was reportedly caused by a faulty refrigerator in a fourth floor unit. While firefighters were able to extinguish that fire relatively easily, they did not do so before the fire spread out the window and ignited the cladding. Within 15 minutes, the fire had spread the full height of the building. Both the insulation and the aluminum composite panels were supposed to be fire resistant. However, it has come to light that the fire-resistant aluminum panels that were supposed to have been installed were substituted with less fire-resistant panels to reduce costs. It has also been reported that, despite claiming one of the highest fire-resistance ratings, the polyisocyanurate insulation failed safety tests conducted after the fire. The combination of the combustible materials on the exterior of the building fuelling the fire and the air gap behind the ACM panels acting like a chimney allowed the fire to rapidly migrate up the exterior of the building and into other units through open or melted windows. Firefighters were hampered by the height of the fire (their hoses and ladders could only reach so far) and by the remaining exterior aluminum panels that blocked water from getting to the fire behind the panels. Many residents were unable to escape when thick smoke filled the only stairway in the building.

So, could Ontario ever experience a towering inferno like Grenfell Tower?


Photo 1

Many older condominiums in Canada have also been keen to improve the exterior appearance of their buildings and improve energy efficiency. In the 1980s and 90s, many older apartment buildings were over-clad with non-combustible fibreglass batt insulation behind industrial-looking steel siding. More recently, condos have been over-clad with EIFS (Exterior Insulating Finish System) cladding that offers a more attractive finish. However, most EIFS incorporate expanded polystyrene insulation, a combustible foam plastic insulation, which has some condo owners worried.


Photo 2

The Ontario Building Code has particular requirements for use of combustible materials on the exterior of buildings. Foam plastic insulation can be used on the exterior of a high-rise building only if it is protected on its exterior surface by either: a) concrete or masonry at least 25 mm thick, or b) a non-combustible material that has passed the CAN/ULC-S101 fire test. This fire test requires that a large-scale test sample (minimum 100 square feet) remains in place for at least 15 minutes when exposed to fire without developing holes or allowing the fire to propagate along the surface. An EIFS cladding must pass this test before it can be used on a highrise building.

The combustible insulation used in an EIFS cladding is encapsulated with a reinforced, non-combustible base coat (referred to as the lamina). The lamina covers the front face of the insulation, all edges or terminations, and the back face of the insulation at all wall penetrations, such as windows and doors; the backside application is referred to as back-wrap. The expanded polystyrene insulation (EPS) used in most EIFS behaves much differently in the event of a fire than the polyethylene or polyisocyanurate insulation used at Grenfell Tower. While the EPS insulation may melt in the event of a fire, the back-wrap contains the insulation. The insulation is typically fully adhered to a structural substrate-like block so there is no wide air gap to act like a chimney in an EIFS wall.

A building in Windsor, clad with EIFS, recently experienced an extensive fire within a suite on the fifth floor (Photo 1). A textured finish system (no insulation) was installed on the balcony walls and EIFS was installed on either side of balcony. The paint finish on the metal conduit beside the balcony burned off, there was smoke staining on the walls and balconies above the fire unit, but the encapsulated EPS insulation was contained and did not contribute to the spread of the fire (Photo 2).

Another fire occurred in a garbage bin at the base of a building clad with a textured finish system on the ground floor and EIFS starting on the second floor. The fire did not spread past the back-wrapped EIFS at the second floor.

In addition to the restrictions on exterior combustible materials that will help ensure a fire does not scale a building, the Ontario Building Code requires at least two means of egress from every floor in a highrise. And since April 1, 2010, sprinklers have been mandatory in newly constructed multi-unit residential buildings, such as condos and apartment buildings.

So could Ontario ever experience a towering inferno like Grenfell Tower? The requirements in our Building Code make it unlikely. ■

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