

## Comparative Study on Fire Safety Evaluation Methods for External Cladding Systems: ISO 13785-2 and BS 8414

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**Abstract :** Technological development has led to the construction of super-tall buildings and insulators are increasingly used as exterior finishing materials to save energy. However, insulators are usually combustible and vulnerable to fire. Fires like that at Wooshin Golden Suite Building in Busan, Korea in 2010 and that at CCTV Building in Beijing, China are the major examples of fire spread accelerated by combustible insulators. The exterior finishing materials of a high-rise building are not made of insulators only, but they are integrated with the building's external cladding system. There is a limit in evaluating the fire safety of a cladding system with a single small-unit material such as a cone calorimeter. Therefore, countries provide codes to evaluate the fire safety of exterior finishing materials using full-scale tests. This study compares <ISO 13785-2: Reaction-to-fire tests for facades-Part2: Large-scale test> and <BS 8414-1: Fire performance of external cladding systems- part 1: Test method for non-loadbearing external cladding systems applied to the masonry face of a building> to examine the applicability of the methods to Korea. Standard analysis showed differences in the type and size of fire sources and duration and exterior finishing materials also differed in size. In order to confirm the differences, fire tests were conducted on identical external cladding systems to compare fire safety. Although the exterior finishing materials were identical, varying degrees of fire spread were observed, which could be considered as differences in the type and size of the fire sources and duration. Therefore, it is deduced that extended studies should be conducted before the evaluation methods and standards are employed in Korea. The two standards for evaluating fire safety provided different results. Peak heat release rate was 5.5MW in ISO method and  $3.0 \pm 0.5$  MW in BS method. Peak heat release rate in ISO method continued for 15 minutes. Fire ignition, growth, full development and decay evolved for 30 minutes in BS method where wood cribs were used as fire sources. Therefore, follow-up studies should be conducted to determine which of the two standards provides fire sources that approximate the size of flames coming out from the openings or those spreading to the outside when a fire occurs at a high-rise building.

**Keywords :** external cladding systems, fire safety evaluation, ISO 13785-2, BS 8414

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