High Rise Buildings-What's Going On? (The Walls)

Worldwide Problem Combustible exterior wall assemblies are found around the world. As fires involving those assemblies occur, safety officials seek out buildings that utilize similar materials.

1 MARRIOTT WATERFRONT HOTEL
Baltimore, Maryland
According to published reports, the 32-story hotel may have been built with the same combustible exterior panels as the Grenfell Tower in London.

2 ADDRESS DOWNTOWN DUBAI HOTEL, Dubai, UAE
A fire on New Year's Eve 2015 heavily damaged the 63-story hotel, with flames rapidly ascending the building's exterior wall assembly.

3 APARTMENT BUILDING
Shanghai, China
An exterior wall assembly was blamed in published reports as contributing to a 2010 apartment fire that killed at least 58.

4 LACROSSE BUILDING
Melbourne, Australia
A fast-moving fire in 2014 caused millons of dollars in damage to an apartment building.

Recent Fires- London- June 14, 2017

- Grenfell Tower Fire
- At least 79 people died and 74 injured
- Began around 1 a.m. Wednesday morning
- Combustible exterior cladding contributed to fire spread

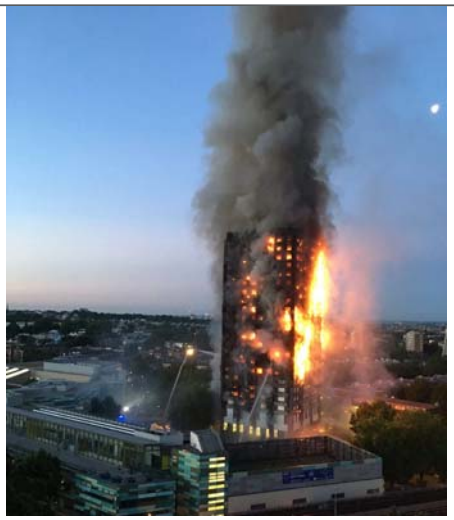

Photo credit: Getty

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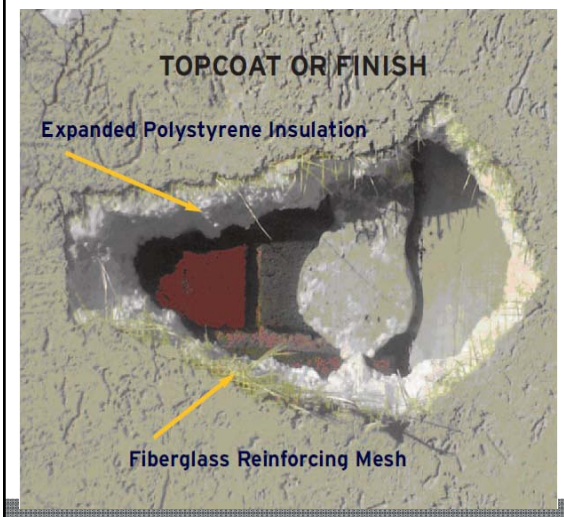


Exterior Walls

- Mid 1970's foam plastic proposed for non-combustible exterior walls
  - EIFS (Exterior Insulation Finish Systems)
- Problems:
  - Combustible
  - Many construction types require non-combustible exterior walls
  - Flame propagation
    - Vertical over surface
    - Vertical within core
    - Lateral to adjacent compartments

High Rise Buildings-What's Going On? (The Walls)

- Why?
- What?

Anatomy

- What is the “assembly”
- Constituent parts
- Testing
- Installation

Combustible Components

Exterior wall assemblies exist in a range of configurations, but many include the same elements found on London's Grenfell Tower

AIR GAP
In many assemblies using insulation board and MCM panels, an air gap exists between the two components, which in a fire can aid in funneling flames up the sides of a building.

METAL COMPOSITE MATERIAL (MCM) PANELS
Aluminum is a common metal used for MCM panels, which are often referred to as “cladding.” In combustible exterior wall assemblies, a plastic like polyethylene is sandwiched between two thin metal sheets to create the MCM panels.

FOAM INSULATION BOARD
An insulation layer is applied directly to the building's exterior wall. Commonly used plastics like polyisocyanurate, believed to have been used on Grenfell Tower, are cheaper than insulating materials such as rock wool or glass wool but are combustible.

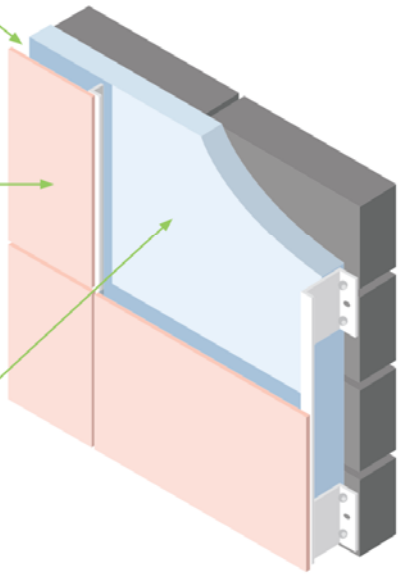
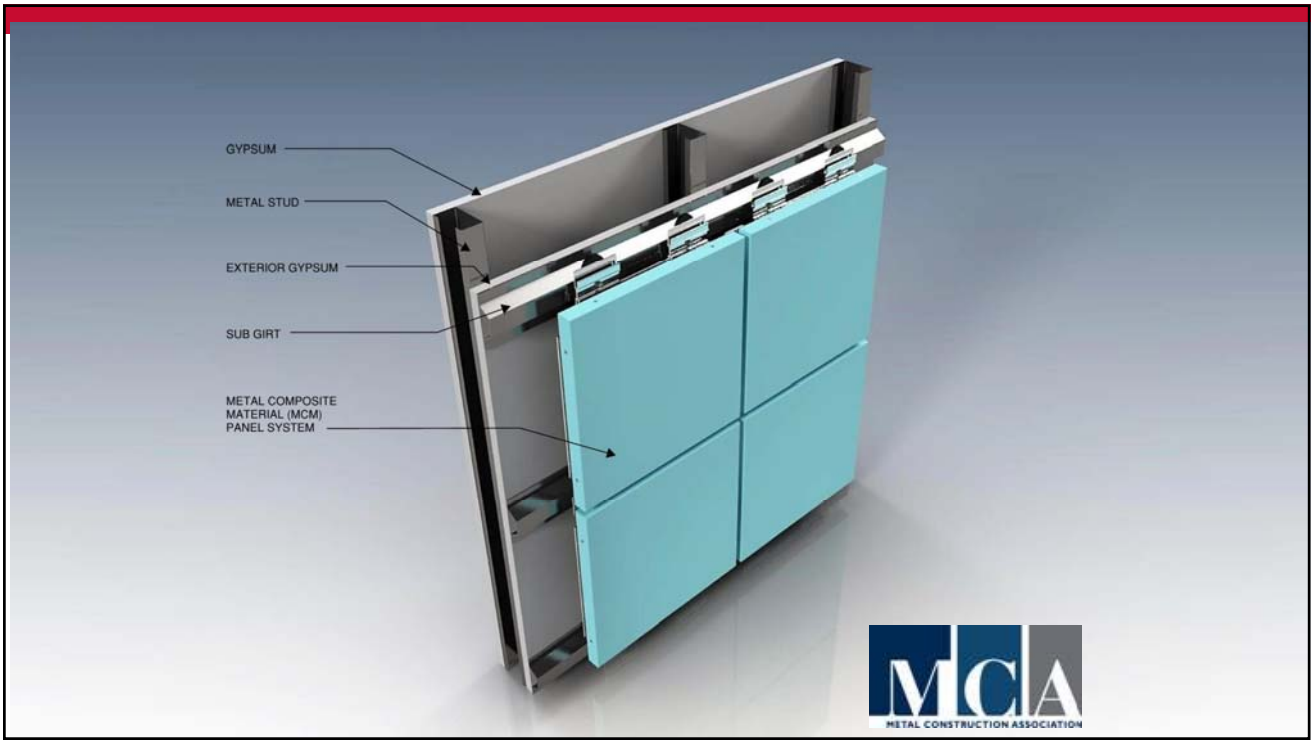


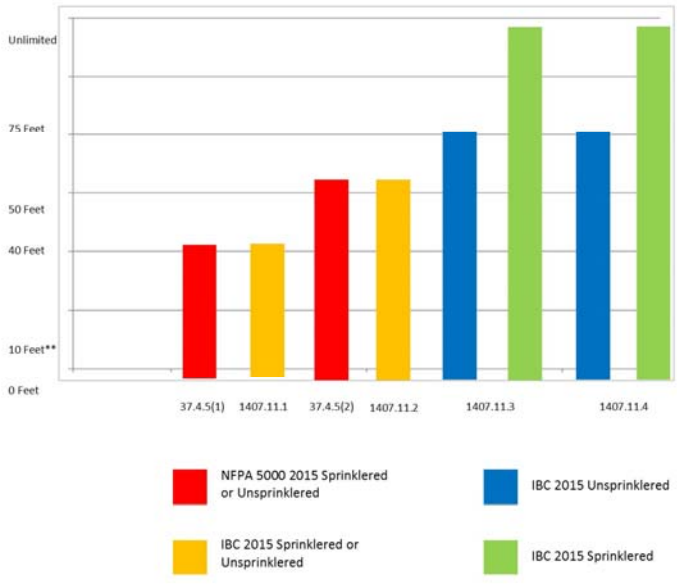
Illustration: Reuters



Grenfell Tower-Can It Happen in the US

- Grenfell Design
  - No sprinklers
  - Fire alarm system
  - Single exit
  - EAP lacking
  - BS 8414
- Unlikely, but
  - 5 states
  - Liberalized use
  - Equivalency
  - Identification
  - NFPA 285

Allowable Heights of Buildings Using MCM Panels or Panels with Foam Plastic Not Tested to NFPA 285



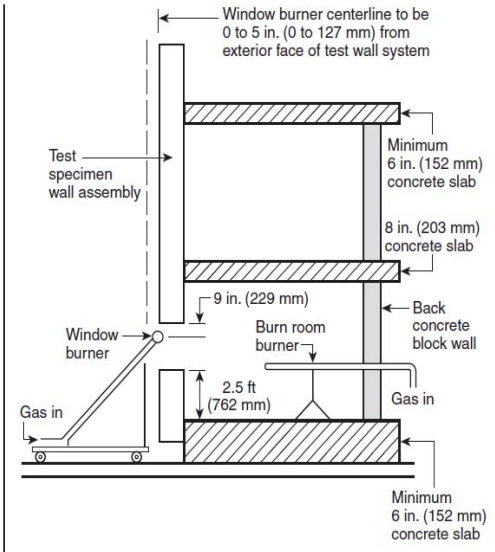


FIGURE A.4.4.3.6 Section View of Burner Placements for First-Story Test Room (not to scale).

NFPA 285

Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

11

Instrumentation

Thermocouples

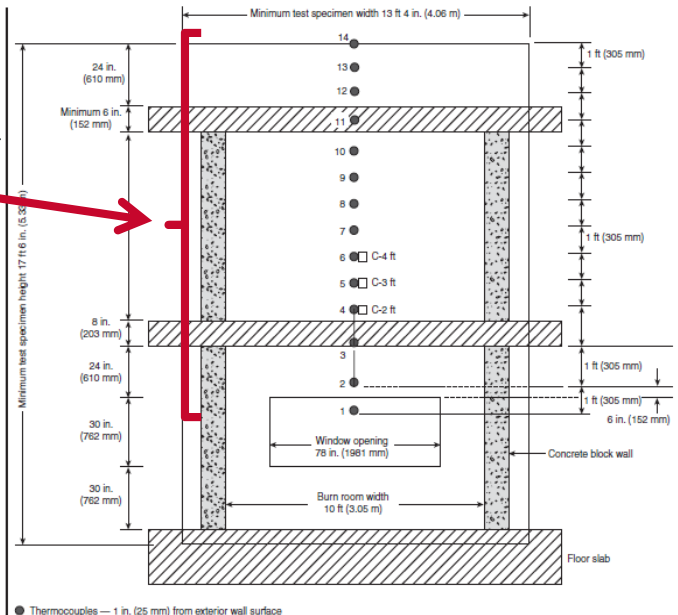


FIGURE 7.1.6(a) Front View of Calibration Wall Assembly Superimposed over Test Apparatus. Calibration instrumentation locations (not to scale).

Window Burner

Failure

Flame propagation shall be determined to occur if:

- Temperature of 1000°F reached by TC 11 &14-17
- Flames from exterior face reach 10ft above window
- Flames from exterior face reach 5ft horizontally from window opening

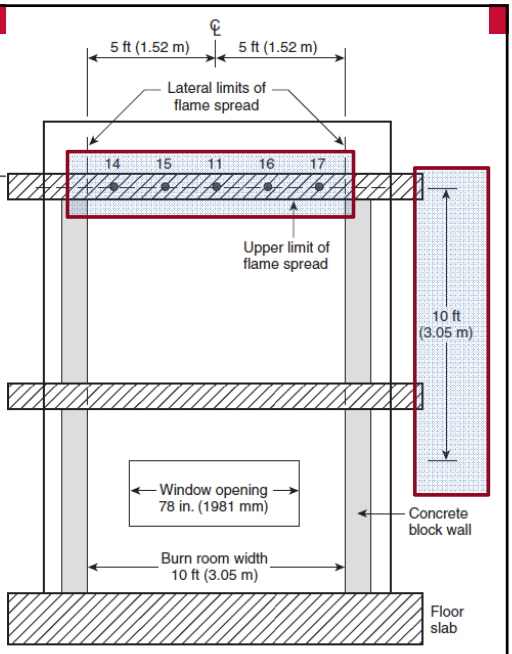
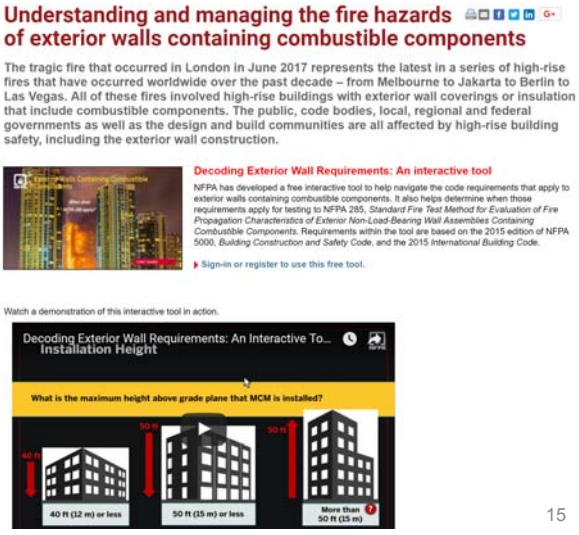


FIGURE 10.2.1.2 Limits of Flame Propagation — Exterior Surface of Test Specimen (not to scale).

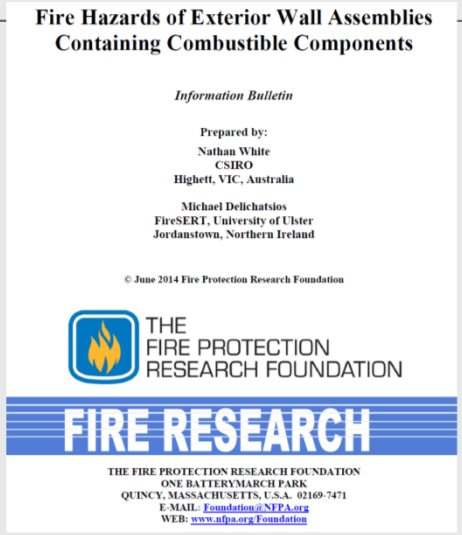
Combustible Components in Exterior Walls

www.nfpa.org/exteriorwalls

- Online interactive tool to help determine Building Code requirements
- Additional resources
  - Journal Articles
  - FPRF Report
  - Videos



Combustible Components in Exterior Walls



RESEARCH FOUNDATION
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High rise buildings with combustible exterior façade systems:
Fire risk assessment tool

Task 2 – Risk variables | 17 August 2017

ARUP

17

