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#### **ABSTRACT:**

Exterior Walls: so many components, so many materials - will the result really meet the code? NFPA 285 may govern and may limit available choices, so know what triggers the need to comply before the final wall assembly is designed.

#### **FILING:**

UniFormat™  
B2010 - Exterior Walls

MasterFormat®  
07 21 00 - Thermal Insulation  
07 25 00 - Weather Barriers  
07 27 00 - Air Barriers

#### **KEYWORDS:**

Insulation, foam plastic, polyisocyanurate, weather barrier, air barrier, permeable, vapor resistant, energy, combustible, fire resistant

#### **REFERENCES:**

International Building Code, 2009 & 2012 edition.

NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

## Insulation, MCM, and NFPA 285

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### Exterior Walls

NFPA 285 has been in the forefront of discussions about exterior walls. If you have not been to a seminar on the subject, yet, you must be playing the part of Rip Van Winkle, by sleeping through it all. Still the discussion continues. Since building envelopes are unique, each one brings a new challenge, a new discussion, and a new solution. Because of the building envelope complexity, the new solution is never as simple as it sounds.

Ignore it and there may be a lot of explaining to do when the building official determines the assembly does not meet code.

The premise is that testing exterior wall assemblies by NFPA 285 will predict the wall's ability to keep fire from spreading from one floor to the next. Certain combustible materials, installed as part of the exterior wall, can trigger the requirements to meet NFPA 285. These include foam plastic insulation, metal composite material, and combustible weather resistant barriers (WRB).

See Tech Tips Exterior Walls and NFPA 285 for additional discussion of this subject.

### Codes

Two separate sections of the IBC dictate compliance with NFPA 285. Section 1407.10.4 requires metal composite materials (MCM) to be tested. MCM panels consist of a plastic core ranging from 3 mm to 8

mm thick with thin aluminum, zinc, or other metal faces.

Section 2603.5.5 requires exterior walls for buildings of all construction types, except Type V to meet NFPA 285. (There are inevitable exceptions for single story buildings. So be sure to read the code.) This code provision applies when foam plastic insulation is included in the exterior wall assembly. Other insulation materials are permitted without the need to meet NFPA 285

Under IBC 2012, the NFPA 285 triggers were extended to include combustible WRB. This includes virtually every sheet and liquid product used for WRB, except for sheet metal. Stay tuned because the IBC 2015 will include exceptions for combustible WRB - making this issue even more complex than it already is.

### Materials

The material that is driving the need to meet NFPA 285 is plastic - the plastic core in MCM and foam plastic insulation. There is a way to avoid NFPA 285. Simply do not include plastic materials in the exterior wall assembly. It is a conscious choice and alternatives exist. So choose wisely.

MCM is available in a standard and a fire resistive core. To meet NFPA 285 the fire resistive core will be required. Check the selected basis of design product. Fire resistant cores may not be available in all panel thicknesses.

There are several insulation types available for exterior walls:

- Cellular glass R3.5 per inch
- Mineral wool semi-rigid board R4.3 per inch
- Extruded polystyrene foam R5.0 per inch
- Polyisocyanurate foam R6.0+ per inch

The insulation materials are listed in order from least to greatest thermal performance. The choice is a balance of cost, performance, and thickness for the exterior wall. Just 3 inches of polyisocyanurate provides the equivalent thermal performance of 5 inches of cellular glass. The initial material cost is one issue. Lost revenue because of reduced rentable floor area due to thicker walls is quite another.

Cellular glass and mineral wool are both noncombustible and do not trigger NFPA 285, while both foam insulations do. Polyisocyanurate insulation is treated to be fire resistant. This helps improve performance in the NFPA 285 test.

Because the test requires flame to be applied directly to the head of a wall opening, extruded polystyrene insulation requires additional protection at head conditions to pass the test. The protection may be steel, mineral wool insulation, or other materials to eliminate direct flame contact with the foam. Be sure to check with the foam manufacturers for the detailing requirements.

Tested exterior wall assemblies exist for both foam insulations. Combining multiple combustible materials in the wall assembly will severely limit available product selections. Even using sheet metal or metal plate cladding instead of MCM may limit the insulation and WRB choices. The

metal cladding acts as a reflector and radiator during the test. Other more massive cladding materials such as masonry will act as heat sink, absorbing some of the test fire energy and to help reduce the effect on the foam insulation and WRB.

## Recommendations

Answer 4 basic questions:

1. Is the building Type I, II, III, or IV construction?
2. Does the exterior wall assembly contain foam plastic insulation?
3. Does the exterior wall assembly contain MCM panels?
4. Does the exterior wall assembly contain combustible WRB? (IBC 2012 only)

If the answer to question 1 is YES and any other answer is YES then your project must meet NFPA 285. (Check the code for exceptions, of course! There are always exceptions.)

If the project construction is Type V, (wood framed construction) you successfully avoided this entire issue. But, beware Type VA has its own limitations regarding plastics on the building exterior.

Consider the options that may permit NFPA 285 avoidance - different insulation, different cladding, different WRB. Alternatives exist, and with a bit of creativity, the result may look nearly the same and potentially perform even better.

When the project must meet NFPA 285, consult the product manufacturers. Most manufacturers have charts and matrices to help with

exterior wall product selections to meet NFPA 285. The potential combinations are virtually unlimited. Since not every assembly can possibly be tested, rely on the product manufacturers for guidance to help ensure the exterior wall will meet code.

Insulation manufacturers and weather resistive barrier manufacturers have been especially helpful. They seem to have the best collections of assembly test data and provide the greatest help navigating the maze of creating a code compliant wall assembly.

Find a reliable local product representative. Make friends. You buy lunch for a change. And then seek advice when you begin designing the next exterior wall.

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