



## TECHNICAL BULLETIN: 05/09/2019

### Fire Code Compliance - NFPA 285

#### Overview

This technical bulletin addresses AFCC's fiber cement panel exterior rainscreen applications and how they coincide with the NFPA 285 fire test. The International Building Code (IBC) requires exterior walls to comply with NFPA 285. Compliance can be achieved through wall assembly testing, fire code consultant approval letters, fire code compliance reports, or falling under an IBC exception.

NFPA 285 is a wall assembly test, so all of the wall components must work with one another to achieve compliance. It is the responsibility of all supplier of components in the wall assembly to understand NFPA 285 compliance.

#### International Building Code and Exceptions

Before analyzing approval letters and reports, the building code must be understood. The referenced building code sections can be found in the appendix. All of the building code sections are pulled directly from the 2018 International Building Code. Only sections relevant to NFPA 285 are referenced.

NFPA 285 testing comes into play when a non-combustible construction (Building Type I, II, III, or IV) contains a combustible component. Combustible components are typically insulation, the weather barrier, or the cladding.

##### Foam insulation:

Applicable Sections:

- 1403.13 Foam plastic insulation.
- 2603.5 Exterior wall of buildings of any height.
- 2603.5.5 Vertical and lateral fire propagation.

Foam insulation used on an exterior wall of *any building height* must comply with NFPA 285. Exception one of 2603.5.5 only references one-story buildings utilizing foam with specific flame spread and smoke developed index as well as covering the foam with aluminum or steel. Exception two of 2603.5.5 only references wall assemblies that cover the foam with concrete or masonry. Both exceptions do not apply to a rainscreen application, so physical testing, an approval letter, or a compliance report are the only paths to NFPA 285 compliance.

##### Water-resistive barrier:

Applicable Sections:

- 1402.5 Vertical and lateral flame propagation.

Combustible water-resistive barriers used on an exterior wall of a building with a height *greater than 40 feet* must comply with NFPA 285. Exception one does not reference fiber cement cladding,



so it is not applicable. Exception two allows for the wall assembly to avoid the need for NFPA 285 compliance if the following conditions are met.

1. The water-resistive barrier is the only combustible component in the wall assembly.
2. The water-resistive barrier has a flame spread index of 25 or less and a smoke-developed index of 450. In other terms, the water-resistive barrier is ASTM E84 Class A.
3. The water-resistive barrier has a peak heat release rate of less than 150 kW/m<sup>2</sup>, a total heat release of less than 20 MJ/m<sup>2</sup> and an effective heat of combustion of less than 18 MJ/kg. The test that must be conducted is ASTM E1354.

If noncombustible exterior insulation is used, or no exterior insulation is used, the water-resistive barrier is often the only combustible component in the wall assembly. All AFCC fiber cement products comply with ASTM E136 indicating they are noncombustible products. Most weather barriers meet the ASTM E84 Class A requirement. Very few weather barriers appear to have conducted ASTM E1354 testing, so even though the first two criteria are met, the third criteria often cannot be met. Therefore, the exception cannot be used more often than not. When this exception cannot be used, physical testing, an approval letter, or a compliance report are the only paths to NFPA 285 compliance.

### Wall Assembly Testing

The NFPA 285 test is a two-story test of a specific wall assembly testing flame propagation in many different areas of the wall assembly. Wall assembly testing can be very expensive and time consuming. It also only allows creates compliance for the specific wall assembly that was tested. Because of this, a worst-case wall assembly scenario is often tested, and then compliance reports or approval letters can be created including product options with equal or lower flammability characteristics.

### Compliance Reports

Compliance reports contain a table containing a variety of exterior wall components that can be used together and will comply with NFPA 285. These compliance reports are typically created by the producers of a combustible component. Water-resistive barrier producers and foam insulation producers are the most common ones to create these reports. The tables typically consist of the following categories with specific components that can be chosen from each wall component category.

*Table 1: Typical Compliance Report Layout*

Wall Component Type	Product Options		
1. Base Wall System (select one)	1)...	2)...	3)...
2. Stud Cavity Insulation (select one)	1)...	2)...	3)...
3. Exterior Sheathing (select one)	1)...	2)...	3)...
4. Weather-resistive barrier applied to base wall (select one)	1)...	2)...	3)...
5. Exterior Insulation (select one)	1)...	2)...	3)...
6. Weather-resistive barrier applied to exterior insulation (select one)	1)...	2)...	3)...
7. Exterior Cladding (select one)	1)...	2)...	3)...



These compliance reports are relatively straight forward except for the cladding section. Claddings are often listed with a specific installation technique. Fiber cement appears in many of these reports, but the installation techniques listed are very vague. Here are some of the comments listed under the fiber cement cladding option:

- Any standard installation technique.
- Fastened to the structural backup wall or to Z-furring, girts, or other secondary framing as recommended by the cladding manufacturer.
- Minimum ¼-inch thick. Any standard installation technique can be used. A maximum 1½-inch air gap allowed behind the fiber-cement siding.

The cladding descriptions above do not clearly highlight the type of fiber cement cladding or the specific installation methods. Medium density fiber cement is a very different product from high density fiber cement as far as installation technique goes. High density fiber cement is typically installed with open joints and a larger air space behind the panels. Only one of the fiber cement descriptions above mentions any air space requirements. Three things are required to sustain a fire; heat, fuel, and oxygen. The air space is directly linked to the amount of oxygen in the air cavity. The amount of oxygen in the air cavity helps sustain the flame coming from a combustible insulation and/or weather resistive barrier. Therefore, specifics about the air cavity depth should be mentioned in these reports. If these compliance reports do not clearly display the compliance of fiber cement cladding with specifics on air space or open joints, the creator of the compliance report should be contacted to ensure the report is applicable. Appendix B highlights some notable compliance reports and some of the products listed within them

## **Approval Letters**

Independent fire consultant agencies can write approval letters wall assemblies that slightly differ from previously tested wall assemblies. Alternative materials “shall be approved” if they are found to comply with Section 104.11, meet the intent of the code and are proven to be at least equivalent to material tested in the original NFPA 285 wall assembly. The letter should provide an engineering analysis concluding that the product replacement is equivalent to the material tested.

There are various former wall assemblies that were tested with ACM and HPL cladding that allows for fiber cement to be labeled as equivalent. ACM can be considered a worst-case scenario because of its melting and ignition characteristics that were observed in former NFPA 285 tests, whereas Fiber Cement is classified as a non-combustible component via ASTM E136.

Below is a list of some notable consulting agencies that specify in fire code.

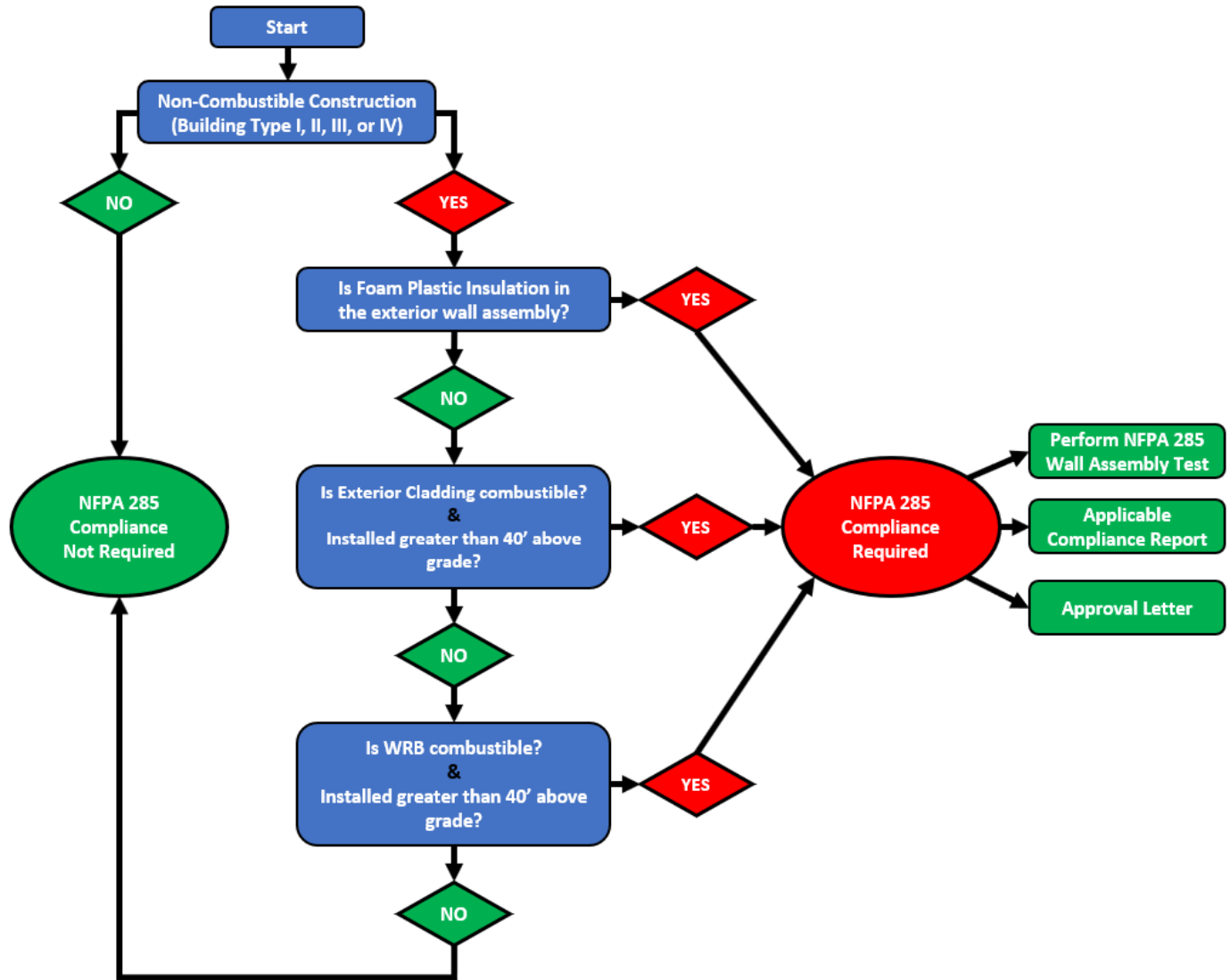
### *Fire Consultant References*

- Priest & Associates Consulting
- Jensen Hughes
- Zari Consulting Group
- And many more...



### NFPA 285 Compliance Flow Chart

The following flow chart shows the pathways to NFPA avoidance and NFPA 285 compliance.





## Appendix A

### 2018 International Building Code

All sections of the 2018 International Building Code can be found using the following link.

(<https://codes.iccsafe.org/content/IBC2018>)

#### Chapter 14 Exterior Walls

##### 1402.5 Vertical and lateral flame propagation.

*Exterior walls* on buildings of Type I, II, III, or IV construction that are greater than 40 feet (12,192 mm) in height above grade plane and contain a combustible *water-resistive barrier* shall be tested in accordance with and comply with acceptance criteria of NFPA 285. For the purposes of this section, *fenestration* products, flashing of *fenestration* products and *water-resistive barrier* flashing and accessories at other locations, including through wall flashing, shall not be considered part of the *water-resistive barrier*.

##### Exceptions:

1. Walls in which the *water-resistive barrier* is the only combustible component and the *exterior wall* has a wall covering of brick, concrete, stone, terra cotta, stucco, or steel with minimum thicknesses in accordance with Table 1404.2.
2. Walls in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* has a peak heat release rate of less than 150 kW/m<sup>2</sup>, a total heat release of less than 20 MJ/m<sup>2</sup> and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and has a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50kW/m<sup>2</sup>.

##### 1403.13 Foam plastic insulation.

Foam plastic insulation used in exterior wall covering assemblies shall comply with Chapter 26.

#### Chapter 26 Plastic

##### 2603.5 Exterior wall of buildings of any height.

*Exterior walls* of buildings of Type I, II, III, or IV construction of any height shall comply with Sections 2603.5.1 through 2603.5.7. *Exterior walls* of cold storage buildings required to be constructed of noncombustible materials, where the building is more than one story in height, shall comply with the provisions of Sections 2603.5.1 through 2603.5.7. *Exterior walls* of buildings of Type V construction shall comply with Sections 2603.2, 2603.3 and 2.603.4. Fireblocking shall be in accordance with Section 718.2.

##### 2603.5.5 Vertical and lateral fire propagation.



The exterior wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285.

Exceptions:

1. One-story buildings complying with Section 2603.4.1.4.
2. Wall assemblies where foam plastic is covered on each face by not less than 1-inch (25 mm) thickness of masonry concrete and meeting one of the following:
  - 2.1. There is no airspace between the insulation and the concrete masonry.
  - 2.2. The insulation has a flame spread index of not more than 25 as determined in accordance with ASTM E84 or UL 723 and the maximum airspace between the insulation and the concrete masonry is not more than 1-inch (25mm).

## Chapter 1 Scope and Administration

### [A] 104.11 Alternative materials, design and methods of construction and equipment.

The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, *fire resistance*, durability and safety. Where the alternative material, design or method of construction is not *approved*, the building official shall respond in writing, stating the reasons why the alternative was not *approved*.

#### [A] 104.11.1 Research reports.

Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved* sources.

#### [A] 104.11.2 Tests.

Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of the code, or in order to substantiate claims for alternative material or methods, the *building official* shall have the authority require tests as evidence of compliance to be made without expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *building official* shall approve the testing procedures. Tests shall be performed by an *approved agency*. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.



## **Appendix B**

### **Product References**

The following products all have NFPA 285 compliance reports. The “fiber cement” description in the cladding section differs from report to report. Products not listed below may or may not have compliance reports. Just because a product has a compliance report does not mean that fiber cement cladding is listed in the report, and even if it is listed, it most likely does not clarify the air space requirements.

#### Insulation:

- Owens Corning – Thermafiber – Rainbarrier 45
- Hunter Insulation – various products
- Dow – Xarmor

#### Weather Resistive Barriers:

- Dorken – DELTA – various products
- Vaproshield – RevealShield