

WHITE PAPER



Choosing Between Fire Retardant and Standard Core Metal Composite Material (MCM)

WHITE PAPER UPDATE 7/18

As a proactive response to the events involving MCM assemblies around the world, the MCM Manufacturer members of MCA submitted a code change proposal to the International Building Code 2018 Code Development – Cycle A. This code change proposal was developed to simplify the code with respect to the use of MCM assemblies making it easier for designers and code officials to understand whether Fire Retardant or Standard Core MCM was required for a specific application. This code change proposal was met with great support and was approved by the Fire Safety Committee with no opposition.

Simply put, this proposal eliminated Section 1407.11 (2012 IBC) which is 1406.11 (2018 IBC) and requires that any MCM assembly installed higher than 40 feet above grade must meet the performance requirements of NFPA 285.

While this proposal must still complete the ICC code change process, MCA wanted to make the design community aware of this potential change in the use of MCM systems which, if approved, would be incorporated into the 2021 IBC.

OVERVIEW

Metal composite material manufacturers typically provide two types of core products: standard[†] and fire retardant^{††}. While these product lines typically differ from one another in core composition, both are regulated by the Metal Composite Material (MCM) Section 1406 of the International Building Code (IBC). In the IBC, the performance requirements for specifying one MCM product type over another primarily depend on panel height above grade or grade plane and separation distance to the property line or to other structures within the property boundaries. Moreover, these provisions changed significantly in the 2012 version of the IBC. Making the correct choice of core material can be a complex process. The Metal Construction Association's MCM Fabricator Council has developed this paper to clarify the allowable uses for standard and fire retardant MCM in accordance with the 2006-2018 editions of the IBC.

[†]Standard core materials meet the performance requirements in IBC Section 1406 for ASTM D635, D1929, and E84

^{††}Fire retardant core material meets the performance requirements of all the test standards for the standard core and NFPA 285

BACKGROUND

Metal composite material (MCM) has been used for exterior cladding products in the North American building construction market for over forty years; however, MCM was not specifically recognized until the introduction of the IBC in 2000. At that time, Section 1407 was included to define the allowable use of MCM. A number of specific performance tests were referenced to define allowable use, including a reference for full-scale fire testing. The National Fire Protection Association (NFPA) 285 test (*Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components*) was not specifically referenced until the 2003 IBC.

Prior to the creation of the IBC (2000), MCM panels were allowed for use in North America based on the allowable use of combustible materials in or on exterior wall assemblies.

The building codes have long allowed the use of combustible materials in commercial construction. While structural components were required to be of non-combustible construction (Type I, II, and III), the combustible exterior cladding elements were allowed under various sections of the code. Sections in Chapter 23 (Wood) and Chapter 26 (Plastic) allowed the use of combustible cladding materials based on product performance and site considerations. From an MCM perspective, the question became: If MCM can meet the performance requirements of other combustible materials allowed by the IBC, MCM should also be allowed for use under the same conditions. As the IBC evolved, Section 1406 compiled all of these criteria in one location to aid the designer and building authority in defining the use of MCM.

DISCUSSION

The 2012 IBC established criteria that determine when a standard core or a fire retardant core must be used. The major elements that dictate the type of panel to use include: panel height above grade or grade plane, wall construction type (rated or non-rated fire assemblies), and proximity to the property line or other structures within the property boundaries. The performance criteria referenced for MCM in sections 1407.10 and 1407.11 are ASTM E84, ASTM D635, ASTM D1929, and NFPA 285. This paper assumes that a manufacturer's standard core material meets the performance requirements for the first three tests only, while the fire retardant core material meets the performance requirements of all four test standards. When the construction conditions are within the limitations outlined below, a combination of some or all of the first three fire tests are required in the IBC, a standard core material can be used. When these installation conditions are not within the defined limitations, either the fire retardant core material must be used or the authority having jurisdiction (AHJ) must provide an approval in accordance with section 104.11.

Most buildings using MCM panel cladding are non-fire-rated construction and fire separation distance is not an issue.¹ Should the building require fire rated construction, another important consideration is whether the manufacturer of the MCM has performed third party verified testing to show compliance with the requirements of the applicable fire tests. For more information about how to verify compliance, reference the MCA's white paper "[Does Your Delivered Building Material Actually Meet Code Requirements?](#)"

The 2003-2009 editions of the IBC used two critical heights (40' and 50') within Section 1407 that defined the MCM type that could be used. With the revisions included in the 2012 edition of the IBC, there are three critical heights that impact the allowable use of MCM. These heights are 40', 50', and 75' (2 Options) above grade or grade plane. Each of these height limitations will be outlined and discussed below.

¹ In buildings where fire-resistance rated construction is required or the fire separation distance (generally the distance from the cladding to the property line) is less than 30', a design professional should be contacted for further analysis.

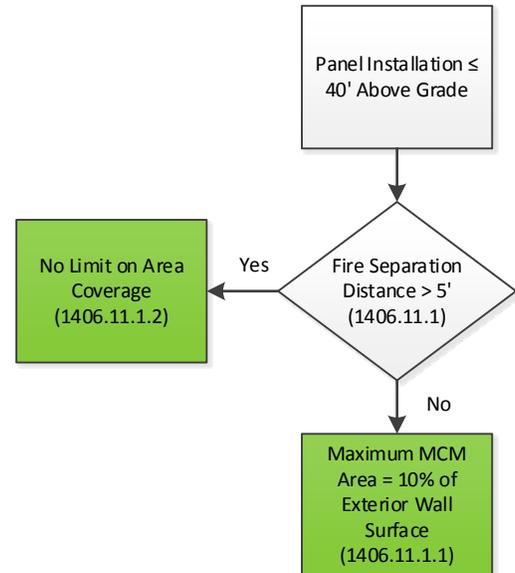
Standard MCM Core Installation Up to 40' Above Grade Plane

In the current 2018 IBC, the use of combustible materials on all construction types to a height of 40' above grade plane is allowed in several sections of Chapter 14 in the IBC. If the following limitation cannot be met, a fire retardant material or an AHJ approval must be obtained:

Limitations – Fire separation distance is > 5'-0"

The following logic tree is specific to the use of standard core MCM:

If fire separation is 5ft or less, another option could be to use fire retardant MCM below 40' in height above grade plane.



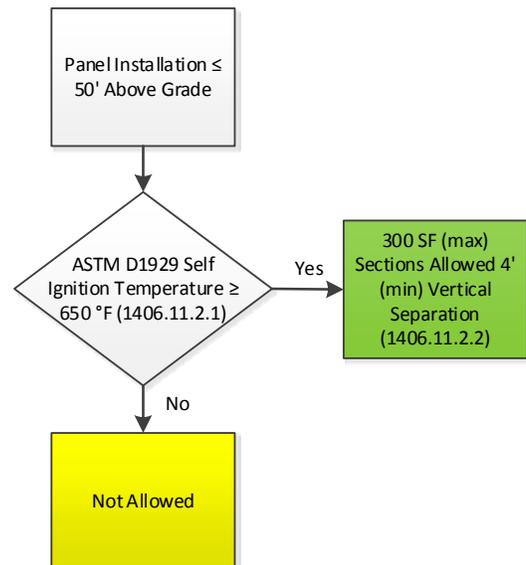
Standard MCM Core Installation Greater Than 40', Up to 50' Above Grade Plane

Installations of standard core MCM up to 50' above grade plane are defined in Section 1406.11.2 and are based on the allowable use of plastic veneer defined in Chapter 26. If the following limitations and criteria cannot be met, fire retardant material must be used.

Limitations² – Section size and vertical separation of sections

Additional Criteria – ASTM D1929 – Standard Test Method for Determining Ignition Temperature of Plastics

The following logic tree is specific to the use of standard core MCM:



² The vertical separation requirement between sections is defined in IBC Section 1406.11.2.2. The horizontal boundary of a section has been recognized by ICC ES as any break in the combustible cladding that will inhibit horizontal flame progression. (MCM fabricators have used the vertical joint between panels as the separation since MCM exhibits no horizontal flame spread characteristics.)

Standard Core MCM Installation Greater than 50', Up to 75' Above Grade Plane

This provision was adopted for MCM cladding assemblies in the 2012 IBC. There are two options defined. The first option is based on occupancy type (1406.11.3) while the second option is based on fire separation distance (1406.11.4).

Option 1

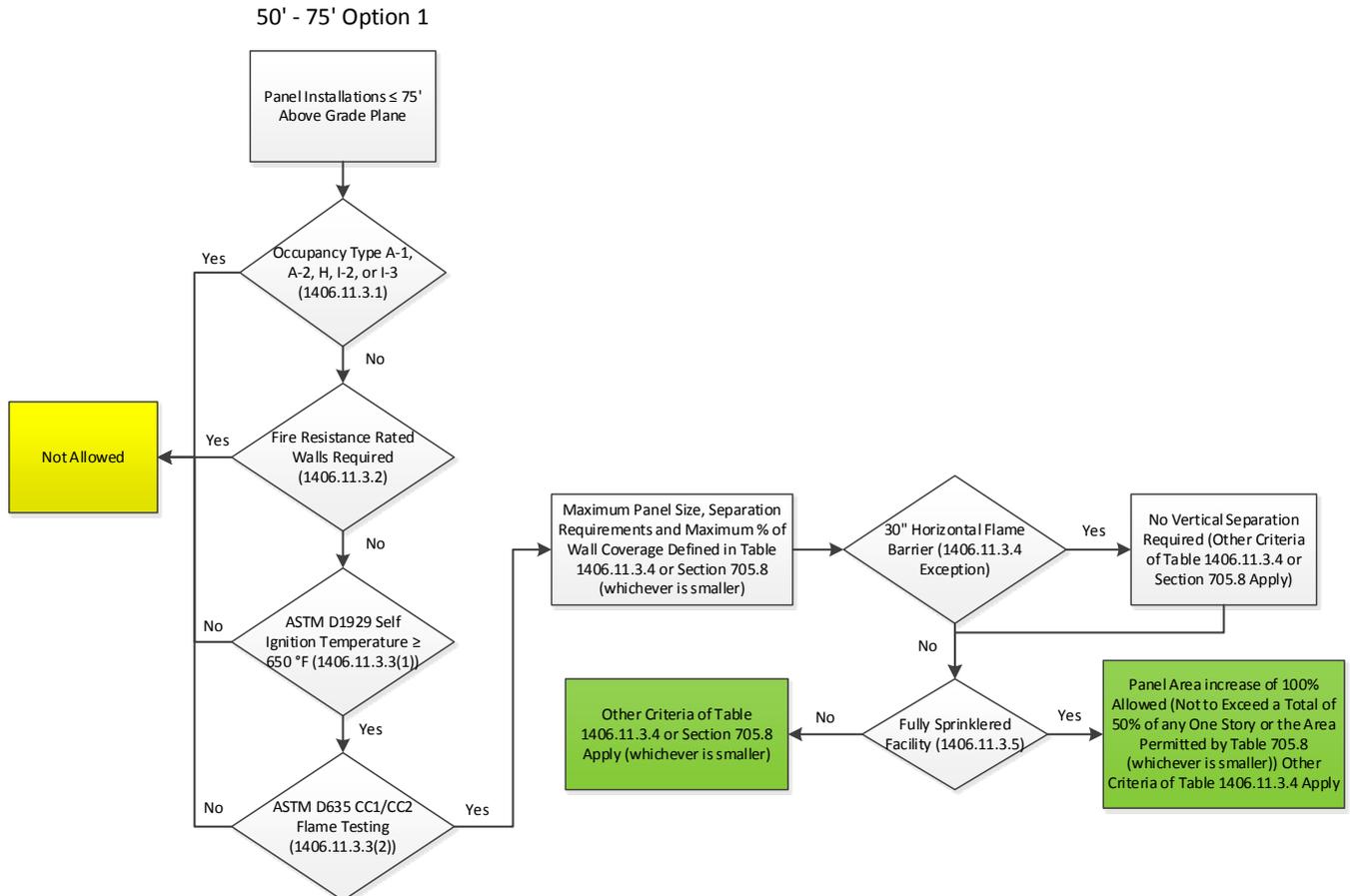
If the following limitations and criteria cannot be met, a fire retardant material must be used:

- Limitations** -
1. Not allowed for A-1, A-2, H, I-2, or I-3 Occupancies
 2. Not permitted for use on exterior walls required to have a fire-resistance rating
 3. Area and separation limitations are shown in Table 1406.11.3.4

Additional Criteria – ASTM D1929 – Standard Test Method for Determining Ignition Temperature of Plastics

ASTM D635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position

The following logic tree is specific to the use of standard core MCM for Option 1:



Installations up to 75' above grade plane defined in Section 1406.11.3 (Option 1). Based on the allowable use of light transmitting plastic wall panels (Section 2607)

Option 2

If the following limitations and criteria cannot be met, a fire retardant material must be used:

Limitations – For non-sprinklered construction

1. Minimum fire separation distance is 30'
2. Aggregate area of panels shall not exceed 25% of the area of any exterior wall face of the story on which it is installed.
3. Minimum vertical separation distance is 4' or a 30" flame barrier

For sprinklered construction

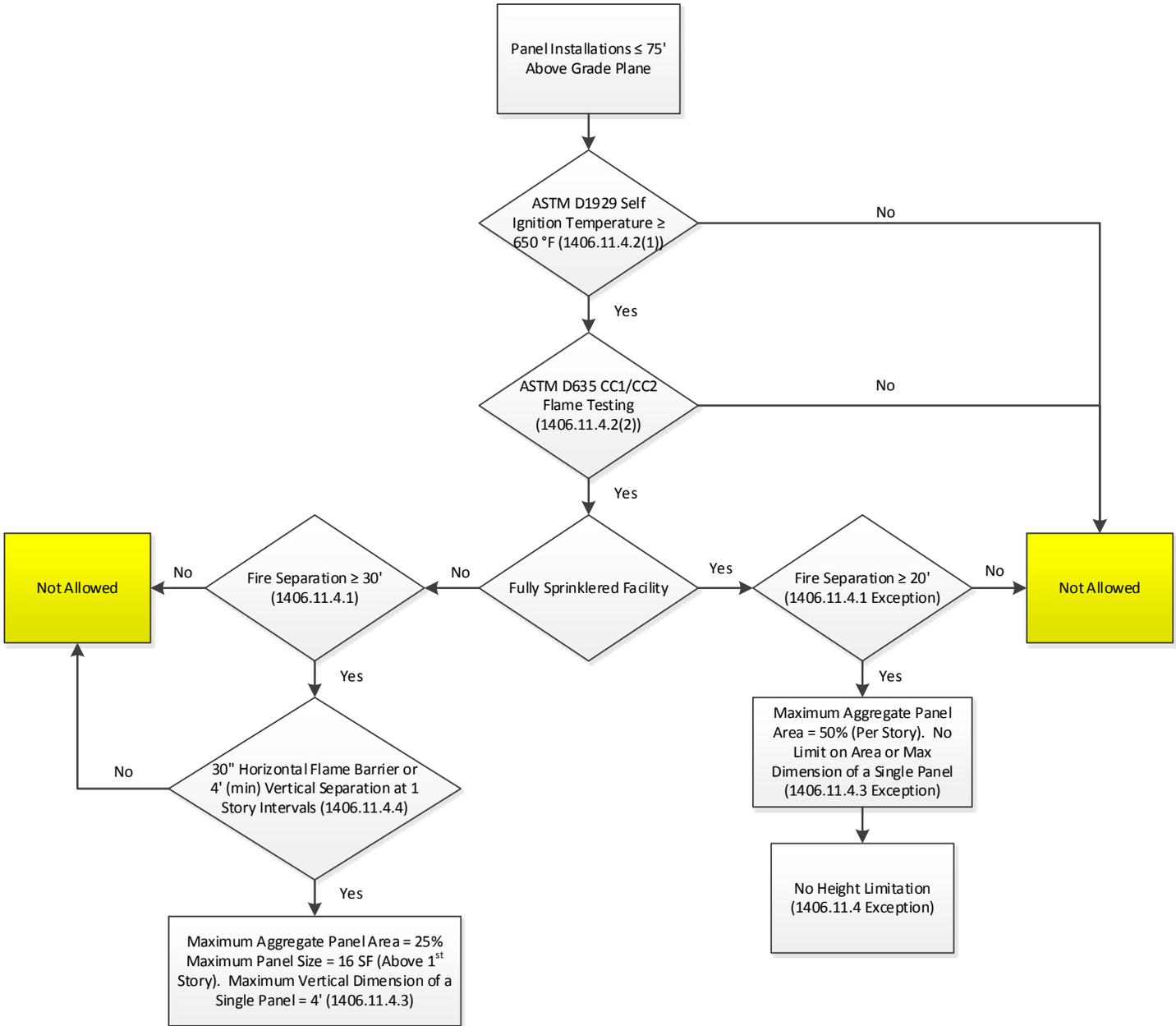
1. Minimum fire separation distances 20'
2. Aggregate area of panel shall not exceed 50% of the area of any exterior wall face of the story on which it is installed.
3. No vertical separation requirements.

Additional Criteria - ASTM D1929 – Standard Test Method for Determining Ignition Temperature of Plastics

ASTM D635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position

The following logic tree is specific to the use of standard core MCM for Option 2:

50' - 75' Option 2



Installations up to 75' above grade plane defined in Section 1406.11.4 (Option 2). Based on the allowable use of light transmitting plastic glazing (Section 2608)

CONCLUDING REMARKS

Generally, MCM is required to meet the performance criteria of NFPA 285 when installed higher than 40' above the grade plane. However, there are certain installation conditions that may allow use up to a height of 75' above the grade plane without this requirement. The applications are defined in Section 1406 and are based on the allowable use of other combustible materials throughout the code.

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