

WHITE PAPER



Is My Exterior Wall Material Truly Noncombustible?

Overview

One would think that the separation between combustible material and noncombustible material would be simple, however it is far more complicated than it would appear when referencing the International Building Code (IBC). Typically, ASTM E136 is recognized as a pass/fail test for material combustibility, but the IBC has an exception where a product is recognized as noncombustible even though it doesn't pass ASTM E136.

ASTM E136 specifically states that it “does not apply to laminated or coated materials”, however there are no alternative tests to determine noncombustibility.

IBC Section 703.5.1, an alternative to ASTM E136, is used by some cladding suppliers for panels that have a noncombustible core, however this does not address the exterior cladding flame spread issues that have plagued the cladding industry in the past several years.

MCA understands the important need for Section 703.5.1; however, they remain concerned with cladding flame spread performance that has been shown by other testing throughout the world. By supporting the addition of NFPA 285 testing for these materials/assemblies, the real-world flame spread performance is addressed.

Discussion

- Will a product or material burn?
- Is a product considered flammable?
- Is a product (or assembly) truly non-combustible?

These are common questions and the typical answer should be a simple yes or no. The answer is often not quite that clear.

Virtually any material will burn under the right conditions. National standards organizations and the building codes have defined performance for a noncombustible material. What is surprising is the differences in the definition of “noncombustible” around the world.

In North America, the building codes recognize terms like “combustible” and “noncombustible”, while in Europe terms like A1, A2, B1 and B2 describe combustibility and differing levels of non-combustibility.

Historically, the Model Building Codes (pre-2000 and IBC), simply defined if a material was noncombustible based on the results of the ASTM E136 “Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C”. This test requires a 1 inch³ material sample is exposed to a furnace temperature of ~1500 °F. The sample cannot:

1. Show visible flaming beyond the first 30 seconds
2. Raise the temperature of the furnace by more than 54 °F (30 °C)
3. Lose more than 50% of the total mass

All three criteria must be met for a material to be defined as “noncombustible”.

Three issues with ASTM E136 for composite or laminate materials are:

1. The test standard states that the procedure is not applicable to composite or laminate materials
2. Materials only available in a thickness <1” must be “stacked” to provide an adequate sample thickness. This could impact the accuracy of the test method.
3. The test only applies to individual materials and does not account for any interaction between products that make up an assembly.

(During the last Code Development Cycle Hearings, an alternate test, ASTM E2652, was approved for the 2021 IBC. This addition was made because the equipment required to run ASTM E136 is no longer commonly available. The performance requirements remain the same.)

The European Union test for non-combustibility is EN 13501: Classification of Construction Materials According to their Reaction to Fire. Material classification from this standard comes in a rating such as A1, A2, B1, B2, etc. (A's being less combustible and B's being more combustible, etc.) The standard defines levels of combustibility, from less combustible (A1) to more combustible (D), however it does not define "noncombustible". These designations do not correspond directly with the existing IBC definition of noncombustibility.

Non-Combustibility in Building Construction

It is easy to confuse the use of non-combustible materials with non-combustible construction in the codes. In the United States, construction is divided into different construction types (Type I, II, III, IV, and V). Commercial construction, Type I or II, typically require noncombustible structural elements. This includes load bearing elements such as beams, columns, and floors. Nonstructural wall elements, such as cladding, are allowed to be of any construction material however, there are additional fire performance requirements to show that the wall assembly will not promote vertical flame spread. The most common test for this is NFPA 285 "Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components".

A general rule for "code complying cladding" would be that NFPA 285 compliance must be shown for cladding assemblies used when the height of the installation is greater than 40' above grade.

Since the IBC adoption of NFPA 285, there have been no major fire events identified when the wall assembly actually used has met the performance requirements of NFPA 285.

What does the IBC Actually say about non-combustible materials?

There is no definition in the IBC for the term "non-combustible". The reader is forced to go to Chapter 7 on Fire and Smoke Protection Features to learn more about non-combustibility. Section 703.5 describes the required non-combustible performance testing.

"A material shall not be classified as a non-combustible building construction material if it is subject to an increase in combustibility or flame spread beyond the limitations herein established through the effects of age, moisture or other atmospheric conditions."

Section 703.5.1 goes on to state that elementary materials defined as noncombustible shall be meet the performance requirements defined in ASTM E136.

Exception to ASTM E136

There is one exception to ASTM E136 in the IBC. That exception, Section 703.5.2, allows for "products with a structural base of noncombustible material and a surface of not more than 0.125" thickness that have a flame spread index not greater than 50, when tested in accordance with ASTM E84 will be acceptable as noncombustible." This exception was developed many years ago to correctly allow products with limited combustible facers such as faced gypsum wallboard to be considered as noncombustible.

Exterior Wall Applications

While this exception is an important element in the code, it does create a "loophole" for exterior wall cladding materials.

Exterior wall cladding materials that consist of a noncombustible core material such as formed aluminum (honeycomb or corrugated) use a combustible adhesive to adhere a facing material of less than 0.125" are deemed noncombustible through this exception.

© 06/2020

METAL CONSTRUCTION ASSOCIATION

8735 W. Higgins Road, Suite 300, Chicago, IL 60631

847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org

BUILD LEGACIES
 METAL

With this exception, laminate materials are not required to meet the same vertical flame spread requirements as combustible cladding materials even though these products may contribute to vertical flame spread. Specifically, assemblies containing these laminate materials are not required to conform with the NFPA 285 test.

MCA Comment

While the IBC correctly recognizes the exception to ASTM E136 described above, it would seem reasonable to ensure that the vertical flame spread of the wall assembly be acceptable through NFPA 285 testing.

Wall cladding materials consisting of combustible elements including core materials, adhesives, or combustible facer materials such as fiberglass resin mesh used to hold thin veneers such as granite or wood products in place should be tested to identify flame spread performance to ensure safety for the building and inhabitants of high rise construction.

Summary

There is no question regarding the value of noncombustible materials in construction. The value of noncombustible materials to limit vertical flame spread is well documented. Those products that are considered noncombustible through IBC Section 703.5 that do burn or promote flame spread beyond the prescribed limits of ASTM E136 should also be tested to show compliance with NFPA 285 to prove an acceptable performance as required by the code.

Founded in 1983, the Metal Construction Association brings together the diverse metal construction industry for the purpose of expanding the use of all metals used in construction. MCA promotes the benefits of metal in construction through:

- Technical guidance
- Product certification
- Educational and awareness programs
- Advocating for the interests of our industry
- Recognition of industry-achievement awards
- Monitoring of industry issues, such as codes and standards
- Research to develop improved metal construction products
- Promotional and marketing support for the metal construction industry
- Publications to promote use of metal wall and roof products in construction

For more information, please visit the MCA Web site at www.metalconstruction.org

Copyright © 2020 Metal Construction Association. All rights reserved.

No part of this publication may be reproduced in any form or by any means, including photocopying, or utilized by any information storage or retrieval system without permission of the copyright owner.

This document is for general information only. The document is designed to delineate areas requiring consideration. Information contained in the document should not be used without first securing competent advice with respect to its suitability for any given application. MCA does not assume responsibility and disclaims any representation or warranty, express or implied, that such information is suitable for any general or particular use. Anyone making use of the document assumes all liability resulting from such use.

The existence of the document does not in any respect preclude a member or nonmember of MCA from manufacturing, selling, or specifying products not conforming to the document, nor does the existence of an MCA document preclude its voluntary use by persons other than MCA members. The document does not purport to address all safety problems associated with its use or all applicable regulatory requirements. It is the responsibility of the user of the guideline to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before use of the document.

The Metal Construction Association reserves the right to change, revise, add to, or delete any data contained in the document without prior notice.

It is the responsibility of the end user to verify the applicability of this information with the local building and fire officials.

© 06/2020

METAL CONSTRUCTION ASSOCIATION

8735 W. Higgins Road, Suite 300, Chicago, IL 60631

847.375.4718 | mca@metalconstruction.org | www.metalconstruction.org

BUILD LEGACIES
 METAL