THE NFPA 285 FIRE TEST'S IMPACT ON ARCHITECTURAL DESIGN AND ENERGY PERFORMANCE

Richard Keleher[1]

ABSTRACT

The 2012 International Building Code[2] requirement that exterior wall assemblies of type I, II, III or IV construction containing certain combustible materials pass the National Fire Protection Association (NFPA) 285 fire test[3] has had and will continue to have a significant impact on the design of exterior walls. This has affected the design profession and the durability and energy performance of exterior walls. The uncertainty of designers as to how to respond to the previously unclear regulations and new enforcement situation is a concern. This paper addresses how this requirement has impacted the commercial, institutional, and multi-family residential construction industries. Aspects of the problem: (1) The response of manufacturers to the code requirement; (2) The difficulty of providing competitive specifications; (3) The uncertainty regarding how to make wall assemblies that meet NFPA 285 weathertight; (4) The resultant uncertainty regarding fire safety due to assemblies not being constructed as tested.

INTRODUCTION

This paper is one component of a four-part panel entitled, "Smoldering Issues of Fire Performance Evaluation." The papers include:

- State of the Art of the NFPA 285 Fire Test, Brian Kuhn
- The NFPA 285 Fire Test's Impact on Architectural Design & Energy Performance, Richard Keleher
- NFPA 285 in the Field: An Update on Local Adoption, Keith P. Nelson
- Exterior Combustible Wall Project of the Fire Protection Research Foundation, Amanda Kimball

This paper is about the impact of the International Building Code (IBC) requirement for buildings to comply with the NFPA 285 fire test and how it has affected the design profession and the durability and energy performance of exterior walls. This requirement applies to buildings over 40' high (except for Type V construction) and to buildings of any height for exterior walls incorporating foam plastic insulation (except certain one-story

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3 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components. This test is described in detail in another paper in this session.

buildings). The traditional (since the early 1980's at least) exterior insulation material in cavity wall construction for non-residential and multifamily residential buildings has been foam plastic insulation, usually extruded polystyrene or spray polyurethane foam. The lighter (often less fire-resistant) claddings is a concern with insulation materials that are flammable. A more recent development (in the past two decades) has been the adoption of self-adhering rubberized-asphalt-based membranes as the water-resistive barrier which also cannot pass the 285 test. The uncertainty of designers as to how to respond to the past ambiguous regulations and new enforcement situation is a serious problem for the architectural profession. The past lack of clarity stemmed from an exception to the NFPA 285 requirement contained in paragraph 2603.9 (2009 IBC):

> "Special approval. Foam plastic shall not be required to comply with the requirements of Sections 2603.4 through 2603.7 where specifically approved based on large-scale tests such as, but not limited to, NFPA 286 (with the acceptance criteria of Section 803.1.2.1), FM 4880, UL 1040 or UL 1715. Such testing shall be related to the actual end-use configuration and be performed on the finished manufactured foam plastic assembly in the maximum thickness intended for use. Foam plastics that are used as interior finish on the basis of special tests shall also conform to the flame spread requirements of Chapter 8. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use."

The problem with this exception was that it appeared to allow the use of these other tests while at the same time requiring the samples to match the actual end-use configuration. Apparently, none of these tests sufficiently address the exterior wall configurations needed, since they do not include a window opening. In response to questions on the matter, the International Code Council interpretations were exceedingly vague and contradictory.

In the 2015 IBC the exception for NFPA 285 was deleted from the Special Approval paragraph, clarifying the regulation, but now architects are struggling with complying with the newly enforced requirements while trying to meet contradictory energy and durability requirements.

The author was the chair of a Task Group (see Acknowledgements for members) of the BETEC[4] / BEC[5]-National / AIA[6] Building Enclosure Council-National which was formed to address this concern. In the author's over 50 years of practice, no other issue has so confounded architects, except, perhaps, the introduction of the accessibility requirements in the 1960s.

Specifics of the Code Requirements

The 2012 IBC includes the following provisions where NFPA 285 testing is specifically required for buildings of type I, II, III or IV construction: *Section 1403.5* for combustible

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4 Building Enclosure and Thermal Environment Council, a council of the National Institute of Building Sciences

5 Building Enclosure Council

6 American Institute of Architects

water-resistive barriers in buildings over 40 feet in height. *Section 2603.5* for exterior walls of buildings of any height incorporating foam plastic insulation. Buildings with the following cladding materials (with some exceptions): *Section 1407.10*: for metal composite materials (MCM), *Section 1409.10* for high-pressure decorative exterior-grade compact laminates (HPL), and *Section 2612.5* for fiberglass-reinforced polymer (FRP) exterior wall coverings. *Section 1509.6.2* also requires combustible mechanical equipment screens to be tested.

ASPECTS OF THE PROBLEM

Assembly Test Creates Difficulties for Designers.

It is important to stress that the NFPA 285 test is an assembly test and not a material component test. There are many other fire tests associated with façade construction, such as ASTM E84[7], E119[8], NFPA 268[9], and UL 263[10], none of which are such large-scale assembly tests and none of which have created the problems that NFPA 285 has created. To quote a passage from the Fall 2013 Life Safety Digest (page 22), in the article "NFPA 285: Flame Propagation in Exterior Walls 2012 International Building Code," [fcia.org/document/LDSSummer2013FINAL.pdf] by Ronald L. Geren, AIA, CSI, CCS, CCA, SCIP, the building exterior has become,

> "a very complex assembly with thousands of possible combinations, thereby making it cost-prohibitive for a manufacturer to test every probable wall assembly. If an assembly can be found that has passed the NFPA 285 test, then the assembly must be designed and built exactly as it was tested. Therefore, the designer must use all of the proprietary products that are indicated in the tested assembly - any change in the assembly, regardless of how minor, will require a new test. With [the] wide variety of potential exterior wall assemblies to choose from, the design professional must now consider one of the following options to remain compliant with the building code:
>
> 1. Design a building using Type V construction;
> 2. Design a sprinklered building with only one story above grade plane;
> 3. Design an exterior wall assembly that has no combustible materials;
> 4. Design a building using MCM [or] HPL that is more than 5 feet from the lot line and is less than 40 feet in height and includes no foam insulation or combustible water-resistive barrier;
> 5. Select a tested wall assembly from the few assemblies that are available; or,
> 6. Design a wall assembly and have it tested."

Addressing the Difficulties

The constraints imposed by the options above are problematic for the following reasons:

Option 1: Design a building using Type V construction: This constraint is unacceptable because most commercial, institutional, and multi-family residential construction cannot be accomplished with Type V construction, due to Code limits on that type of construction, which are due to concern about the life safety of combustible

7 Standard Test Method for Surface Burning Characteristics of Building Materials
8 Standard Test Methods for Fire Tests of Building Construction and Materials

9 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
10 Fire Tests of Building Construction and Materials

construction.

Option 2: Design a sprinklered building with only one story above grade plane: This constraint is unacceptable for the same reason.

Option 3: Design an exterior wall assembly that has no combustible materials, as defined by ASTM E 136[11]: This approach is problematic because the materials that are not combustible often do not perform adequately. For example, there are very few traditional water-resistive barriers and especially flashing membranes that are not combustible. However there are new membranes coming on the market that which the manufacturers claim, "comply with NFPA 285." But these claims are very misleading, since it is not the membranes themselves that must comply with NFPA 285, but the entire assembly, as tested. These new membranes may not provide adequate performance for their intended function; they have not been tested by time in actual installations. Also, the non-combustible insulation typically used to replace foam plastics (mineral wool) has an R-value of 75% - 84% of the R-value of either polyisocyanurate or extruded polystyrene, respectively, thereby increasing the cost to operate buildings constructed with these l0wer R-value insulations and negatively impacting the environment and our use of energy, unless thicker wall assemblies are used, adding cost for deeper, non-standard relieving angles, girt systems, etc.

Option 4: Design a building using MCM or HPL that is more than 5 feet from the lot line and is less than 40 feet in height and includes no foam insulation or combustible water-resistive barrier. Or, design a building using FRP that is Type V construction or only one story. This constraint is unacceptable because of multiple negative impacts and severe restrictions on the design of these buildings.

Option 5: Select a tested wall assembly from the few assemblies that are available: This constraint is unacceptable because there is no central resource where these assemblies can be found (see below). There are very few tested assemblies of which this author is aware. This is not a sufficient number of choices to meet the needs of the construction industry for the many types of buildings being built, each with multiple types of wall assemblies. Furthermore, there are concerns with obtaining competition (see below) thereby likely increasing cost and not meeting owners' requirements (especially public agencies) for competition.

Option 6: Design a wall assembly and have it tested: This constraint is unacceptable because of the fact that the NFPA 285 test is an assembly test means that every element of the final construction has to match what was in the tested assembly. If an architect's design calls for a different material for the cladding, the insulation, or the water resistive barrier, or if the architect's details of the window opening vary from the tested assembly, the proposed assembly must be tested, at a cost of $15,000- $25,000 plus costs to retain consultants, construct test specimens, and conduct multiple tests if necessary, increasing the cost to $30,000 - 40,000 or even higher, and potentially delaying the project. The only alternative to this is have the design reviewed by an engineer with expertise in this area who can provide a letter stating that the changed products will perform as well as the products actually tested. The amount of variation from the tested assemblies is very limited and the products that can be approved must be very similar to the ones in the tested assembly.

11 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

Response from Manufacturers

Manufacturers of products used in cladding assemblies have taken the approach to see this as an opportunity to market their products as meeting NFPA 285. This is often misleading to the unknowing designer, because no single product meets NFPA 285, only assemblies do. The author fears that many designers may think that they have 285-compliant assemblies on their projects when they do not, due to this misleading advertising. The degree to which NFPA 285 is an assembly test goes against the whole way the US construction industry is set up for the design of exterior walls, which is to focus on individual products. The only way that an assembly test can work for the industry is if the manufacturers get together to test their products and publish the assemblies that meet the test in a directory, similar to the Underwriters' Laboratories' (UL) directories of fire-rated assemblies for interior construction. But this has not yet happened except for a few directories with only a small number of assemblies. UL briefly had such a directory online (with only five tested assemblies, all similar and by one manufacturer), but as of this writing it has been taken down. The industry is reluctant to reduce competitive advantage and is often therefore reluctant to publish data about assemblies that have passed the test. The author has even had a manufacturer provide information on an assembly that had been tested and passed, only to be asked not to pass it on to others; for fear that what they did would be copied. How are architects supposed to find out what assemblies are available in this environment? As it stands now, the architect must seek out tested assemblies through various manufacturers without the convenience of a directory of approved assemblies. Projects are always on very tight schedules, and at least the initial choice of which assemblies to use (and there are many assemblies on every job) must be made in a time frame that does not allow for research. Triggers for NFPA 285 testing should be clearer, available assemblies should be in a common database, and there should be prescriptive alternatives.

Lack of Competition

Providing competitive specifications is difficult, if not impossible, due to the above noted lack of information and the fact that a whole assembly must be specified that meets the test. The likelihood of finding more than one assembly let alone three or more, which is the typical requirement for competition for many owners and for governmental jurisdictions, is next to none, except for assemblies with heavy masonry claddings.

Uncertainty Regarding Weathertightness

Architects and contractors have had a difficult time already in designing and building weathertight assemblies, even before the advent of the enforcement of the NFPA 285 requirements. The author's thriving practice and that of other building scientists and building enclosure consultants will attest to this. Uncontrolled rainwater penetration and moisture ingress are two of the most common threats to the performance of a building's envelope. Together they represent up to 80 percent of all construction-related liability claims in the United States.[12] As an example of the problems encountered, the typical detailing for the

12 Richard Weber and George Crow. Preventing Moisture Problems in a Building Envelope, AIA Best Practices, November 2006, BP 18.03.12, pp. 1

self-adhering rubberized-asphalt-based water-resistive barrier is to wrap it into the rough opening, allowing for an internal seal to windows. None of the details for the successfully NFPA 285 tested assemblies that the author has seen to date incorporate this detail.

Code Compliance Issues

There is resulting uncertainty within the code enforcement profession regarding fire safety due to assemblies not being constructed as tested. Apparently this is happening because of lack of knowledge and because designers are perhaps unknowingly modifying the assemblies they use to meet other requirements of facades (for competitiveness/cost and constructability and weathertightness (see above) and aesthetics.

Loss of Energy Efficiency and Consequent Impact on the Climate

The change from extruded polystyrene foam to mineral wool insulation (see below) has resulted has resulted in a loss of 16% to 25% of the insulating value of the continuous insulation layer of the walls behind claddings that could otherwise be provided with no increase in wall thickness. This comes right at the time when there is increased emphasis in the codes on this layer as a way of avoiding the thermal bridging that occurs in the stud cavity behind the continuous insulation layer.

THE RESPONSE OF ARCHITECTS

The response of architects in the northeast and elsewhere in the US to these immensely complex problems has generally been to switch from extruded polystyrene to mineral wool insulation (see Figures 1 and 2), reducing the R-value of wall assemblies due to the inherent lower insulating value of mineral wool (R3.5 – 4.0) compared to plastic foams (R5.0 – 5.6). Even where not required by the local code, architects on some projects are switching to mineral wool, just to avoid potential liability. Architects on commercial projects are also just beginning to switch to membranes that are not self-adhering rubberized-asphalt, responding largely to manufacturers' claims that their membranes, "meet NFPA 285." In addition, many of these membranes have the field-proven performance of the more traditional membranes. Some of the newer fluid-applied membranes show promise for weather-tightness, but the transition membranes for these fluid-applied membranes are often the same self-adhering rubberized-asphalt, now prohibited by the code. The 2015 Code, as noted below, exempts window and door flashings from this restriction, but they neglected to exempt through-wall flashings and flashings at louvers and other penetrations.

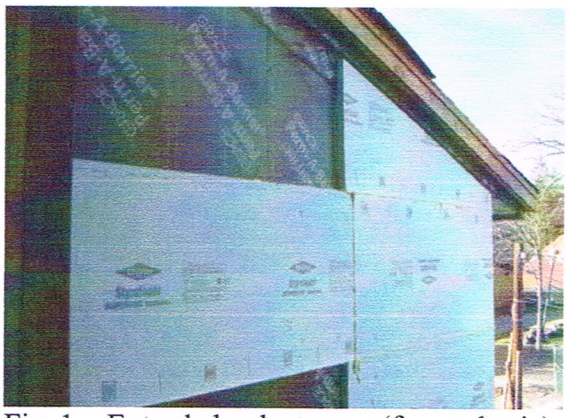

Fig. 1 – Extruded polystyrene (foam plastic) insulation with black water barrier behind.

Fig. 2 – Mineral wool insulation behind brick veneer and over blue water barrier

Risks of Methods Being Employed to Mitigate Reduced R-Value

One method commonly employed to recapture some of the R-value lost to the reduced R-value of mineral wool compared to the plastic foams is to put insulation into the stud cavity, commonly referred to as a "hybrid wall."

A little history is in order here. When wood stud framing was first used to frame commercial, institutional, and multi-family residential buildings, it was a simple thing to put the insulation in the stud cavity, as it had been in single-family residences for centuries. In the 1970's metal studs were proposed as a more economical method of framing these walls. There was no thought given to the increased thermal bridging due to the change from wood to metal studs. Because of condensation problems due to poor vapor barriers and air leakage into the stud cavities, the idea of the "perfect wall"[13] developed (by the Norwegians centuries ago and by the Canadians in the mid-20th century) where the insulation was located outboard of the stud cavity and sheathing and the air and water barrier was located directly behind it. These modern or "perfect" walls typically utilized closed-cell foam plastic (previously used for below grade insulation and in masonry walls) as the insulating material, since it is relatively impermeable to water.

These walls were "perfect" because they could be used in any climate. They kept all possibility of unexpected condensation is in a portion of the wall that is designed to be wet anyway, and the structure is kept on the temperature-controlled side of the insulation, avoiding the condensation, movement, and durability problems associated with having the structure penetrating the control layers and going from inside to outside. Also, the air barrier, vapor barrier, and drainage plane are in one inspect-able plane.

Finally, the health risks of having insulation in the stud cavity can be avoided because the insulation (where condensation is most likely to occur) is outboard of the air barrier. Most foam plastics off-gas blowing agents and most mineral wool, fiberglass, and cellulose off-gas small amounts of phenol formaldehyde (there is no knowing the safety of the newer, supposedly more benign materials). With the "perfect wall" this is not a concern because the

13 See BSI-001: The Perfect Wall, by Dr. Joe Lstiburek, http://www.buildingscience.com/documents/insights/bsi-001-the-perfect-wall

insulation is outboard of the air barrier.

The conversion of the industry to these perfect walls was nearly complete in much of the country by the close of the first decade of this century when the 2009 International Enegry Conservation Code required continuous insulation. This is also when the enforcement of NFPA 285 requirements in the IBC to the design of exterior walls began to gain steam. It is the confluence of increased concern for energy performance and increased enforcement of the NFPA 285 requirements that has increased discussion of this topic.

Hybrid walls put insulation back into the stud cavity, which raises several needs:

1. To provide a vapor control layer on the inner or outer side of the insulation in some climates, the side depending on the climate.
2. To use vapor-permeable membranes when a vapor retarder is necessary to avoid having two vapor retarders, which should be avoided because two vapor retarders can trap moisture between them, moisture that can then never dry.
3. To allow for the very significant (sometimes over 50%) loss of insulation value due to the thermal bridging caused by the studs.

THE RESPONSE OF THE ARCHITECTURAL PROFESSION

The response of the architectural profession has been to monitor the problem, but to the author's knowledge, neither the American Institute of Architects nor any other national group representing architects has taken action, other than to participate in the NIBS code change proposals as described below. Architects are the ones most severely impacted by the complexity of this situation.

ATTEMPTS TO MODIFY THE CODE TO ADDRESS THESE PROBLEMS

BECs / NIBS

The Building Enclosure Councils (BECs) (www.bec-national.org) and the National Institute of Building Sciences (NIBS) (www.nibs.org) submitted code change proposals to try to affect positive change during the development of the 2015 IBC. The history of this process is outlined below:

1. Task Group Formed: The building enclosure council chairs, meeting with the Building Enclosure Technology and Environment Council (BETEC), decided in the fall of 2010 to form a Task Group to look into the impact of NFPA 285 and to consider ways to ameliorate the impact. That group was formed under the leadership of the author, and produced a Request for Proposals for a consultant to produce a report and recommendations on the issue. The Group also provided a preliminary list of possible donors to provide the funding for the consultant to NIBS.
2. Code Change Proposals Submitted: Henry Green, President of NIBS and David Collins FAIA, NCARB of the The Preview Group, Inc. and manager of the American Institute of Architects Codes and Standards Program submitted code change proposals on behalf of the Task Group and the BEC Chairs and BETEC. Changes were proposed for Sections 1403.5 and 2603.5. See attachments at the end of this

paper for these proposals.

3. Action by the International Code Council:
    a. The changes proposed in one 1403.5 proposal were accepted (FS147-12), as modified by public comment. The second 1403.5 proposal was not accepted (FS148-12).
    b. The changes proposed in the 2603.5 proposal (FS187-12) were not accepted. Verbal comments were received from the Council indicating that they want more clarity as to why the proposal was to delete (exempt) rather than modify. They thought that the testing protocol (NFPA 285) was well understood (not by practitioners) and used. They asked for a compromise.
4. Current Actions by the BETEC Code Committee: The committee is gathering information from the nationwide network of Building Enclosure Councils on local code change efforts and may propose some small scope code changes for the coming cycle, such as extending the flashing exception.

TO BE UPDATED WITH THE CURRENT STATUS. THE NEW ROUND OF CODE CHANGE PROPOSALS WILL HAVE BEEN SUBMITTED BY JANUARY 1, 2015 AND WE SHOULD BE AWARE OF WHAT HAS BEEN SUBMITTED BY OTHERS SHORTLY BEFORE THE BEST4 CONFERENCE.

Local Alternatives

There are a number of local efforts to modify the language of the code to address these issues. These efforts are the subject of a paper that follows in this session.

THE 2015 IBC

The 2015 IBC contains two changes that will help relax the requirement for NFPA 285 testing for combustible barriers, which was introduced in the 2012 edition. Section 1403.5 adds the following to the charging paragraph:

> "For the purposes of this section, fenestration products and flashing of fenestration products shall not be considered part of the water-resistive barrier."

And adds the following two 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 thicknesses in accordance with Table 1405.2."
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^2, a total heat release of less than 20 MJ/m^2 and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E 1354 and has a flame spread of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723. The ASTM E 1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m2."

THE FUTURE

The Fire Protection Research Foundation has initiated a project to develop the technical basis for fire mitigation strategies for exterior fires exposing exterior wall systems with combustible components. This is a multi-national research project and a report on the status is another paper in this session.

DISCUSSION

Issues to be discussed and resolved as we go forward:

1. Extending the exemption of fenestration flashing to other types of flashings, such as through-wall flashings and flashings at doors, louvers, etc.
2. Presence of Sprinklers as a Reason to Exempt from NFPA 285: It has been said that NFPA 285 replicates a flashover fire plume coming out of a window, which is an unlikely scenario where the building is protected throughout with a sprinkler system. However, many fire protection experts have noted that sprinklers fail to operate in a significant percentage of fires. If this is a valid concern, the question should be asked; why does the Code allow larger structures if there is a fire suppression system? On the other hand, sprinklers will not protect from fires originating outside of the building (e.g. trash barrel fires, etc.).
3. Height of Ladder Trucks (75' – 100'): The height to which ladder trucks can reach is of concern, since a fire progressing up the outside of a building above that height cannot be fought by the fire service.
4. Public Perception: Façade fires are, by their very nature, very visible to the public and threatening to surroundings. Fire departments are naturally wary of any prominent fire that they cannot fight successfully. Fire services' concern about misguided public perception is a concern.
5. Frequency of Façade Fires: Since façade fires do not occur frequently with no reported deaths, other than in (low-rise?) residential occupancies[14], are the restrictions on construction necessary for other use groups?
6. Adequacy of Construction: Many of the buildings where these fires have occurred often in foreign countries with inadequate codes and/or inadequate enforcement may not meet US code requirements for safe construction. Some of them have had bamboo scaffolding or have been caused by illegal fireworks, etc.
7. We will never have perfectly fire-safe buildings unless we build only concrete bunkers and prevent use of combustibles, such as paper and furniture inside.
8. Architects are expending their efforts trying to meet mandates of increased energy efficiency with the conflicting code requirements reviewed in this paper, while not paying sufficient attention to weatherproofing and durability.

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14 See Figure 1

Table 2. Exterior wall fires - Building fires in selected properties in which the area of origin, item first ignited or item contributing most to flame spread was an exterior wall.

Property use	Fires	Civilian deaths	Civilian injuries	Property damage (US$Millions)	Portion of total structure fires
Public assembly	706	0	6	$30.8	(5%)
Educational	127	0	0	$2.8	(2%)
Institutional,	94	0	0	$4.6	(1%)
Residential	2,889	18	133	$197.2	(2%)
Mercantile	891	0	5	$31.1	(6%)
Office building	210	0	3	$7.6	(6%)
Laboratory & Data centre	5	0	0	$1.5	(2%)
Manufacturing or processing	120	0	1	$6.3	(2%)
Selected storage occupancies,	303	0	0	$13.1	(10%)
Total	5,346	18	148	$295.0	(3%)

Figure 1: Table 2 from "Fire Hazards of Exterior Wall Assemblies Containing Combustible Components - Final Report" prepared by: CSIRO and FireSERT in June 2014 for the Fire Protection Research Foundation

CONCLUSIONS

The uncertainty and disagreements regarding the subject of façade fires will continue for at least three years (until the 2018 International Building Code is adopted by a significant number of states). And that assumes that there are code changes that satisfactorily address the questions raised in this paper. More likely, the report from the Fire Protection Research Foundation described above will engender much discussion and attempts to make fire testing more rigorous.

The international fire protection and insurance communities will continue to press for safer exterior wall assemblies. Without a balanced and reasonable discussion within the construction community about the impacts on costs and constraints on creativity and from the environmental community about the loss of insulating value, the fire protection and insurance communities will continue to control the discussion.

ACKNOWLEDGEMENTS

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2. The work of Henry Green, President of the National Institute of Building Sciences and David Collins FAIA, NCARB of The Preview Group, Inc. and manager of the American Institute of Architects Codes and Standards Program

PUBLIC CODE CHANGE PROPOSAL FORM
FOR PUBLIC PROPOSALS TO THE INTERNATIONAL CODES
2012/2013 CODE DEVELOPMENT CYCLE

INTERNATIONAL CODE COUNCIL®

CLOSING DATES: Group A Codes: January 3, 2012
Group B Codes: January 3, 2013

See Item 3 of these instructions for additional information concerning Group A and Group B Code Development Committees Responsibilities

1)

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CODE CHANGE PROPOSAL FORM
(See instructions on page 2)

Code: _1403.5 –12/13

Code Sections/Tables/Figures Proposed for Revision (3.3.2); Note: *If the proposal is for a new section, indicate (new).*

Proponent: ***Name/Company/Representing (3.3.1):*** *(NOTE: DO NOT USE ACRONYMS FOR YOUR COMPANY OR ORGANIZATIONAL NAME)*

David S. Collins, FAIA/The Preview Group, Inc./The American Institute of Architects
Henry Green, President, National Institute of Building Sciences/NIBS BETEC Committee

Revise as follows:

~~**1403.5 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 the acceptance criteria of NFPA 285.~~

Reason: There are materials that are available, tried and tested by long-term proven history of performance as weather barriers that are not able to meet the standards in this test. Section 1403.2 of the IBC requires weather-resistive barriers while Section 1403.5 requires them to be tested to a standard if they contain a combustible water resistive barrier that many materials that are traditionally used and have proven their value can't meet.

Section 2603.5 establishes requirements for protection and testing of combustible water resistive barriers that include foam plastic insulation, so Section 1403.5 is not necessary for those products. Given that 75% of construction litigation relates to water leakage suggests that this paragraph should be deleted or we are likely to face significant problems in the future with the failure of exterior water barriers.

Cost Impact: The change will reduce the cost of construction.

PUBLIC CODE CHANGE PROPOSAL FORM
FOR PUBLIC PROPOSALS TO THE INTERNATIONAL CODES
2012/2013 CODE DEVELOPMENT CYCLE

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CODE CHANGE PROPOSAL FORM
(See instructions on page 2)

Code: _2603.5 –12/13

Code Sections/Tables/Figures Proposed for Revision (3.3.2); Note: *If the proposal is for a new section, indicate (new).*

Proponent: ***Name/Company/Representing (3.3.1):*** *(NOTE: DO NOT USE ACRONYMS FOR YOUR COMPANY OR ORGANIZATIONAL NAME)*

David S. Collins, FAIA/The Preview Group, Inc./The American Institute of Architects
Henry Green, President, National Institute of Building Sciences/NIBS BETEC Committee

Revise as follows:

2603.5 Foam plastic insulation in exterior walls of buildings ~~of any height~~. Exterior walls of buildings ~~of Type I, II, III or IV construction of any height~~ including foam plastic insulation shall comply with Sections 2603.5.1 through 2603.5.~~7~~8.

2603.5.1 Exterior walls of Cold Storage Buildings. Exterior walls of cold storage buildings required by Section 503.1 to be constructed of noncombustible materials, where the building is more than one story in height, shall ~~also~~ comply with the provisions of Sections 2603.5.1 through 2603.5.~~7~~8.

2603.5.2 Exterior walls of Type V Construction. Exterior walls of buildings of Type V construction shall comply with Sections 2603.2, 2603.3 and 2603.4.

2603.5.3 Buildings of Type I, II, III or IV Construction. Foam plastic insulation in exterior walls of buildings of Type I, II, III or IV construction shall comply with Section 2603.5.3.1, 2603.5.3.2, 2603.5.3 or 2603.5.4.

2603.5.3.1 One-story buildings complying with Section 2603.4.1.4.

2603.5.3.2 Building shall be sprinklered throughout in accordance with Section 903.3.1.1 or 903.3.1.2.

2603.5.3.3 The exterior walls shall be fireblocked per Section 718.2.6.

2603.5.3.4 The exterior wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285.

~~**2603.5.1 Fire-resistance-rated walls.**~~
~~Where the wall is required to have a fire-resistance rating, data based on tests conducted in accordance with ASTM E 119 or UL 263 shall be provided to substantiate that the fire-resistance rating is maintained.~~

2603.5.24 Thermal barrier.
Any foam plastic insulation shall be separated from the building interior by a thermal barrier meeting the provisions of Section 2603.4, unless special approval is obtained on the basis of Section 2603.10.

Exception: One-story buildings complying with Section 2603.4.1.4.

2603.5.35 Potential heat.
The potential heat of foam plastic insulation in any portion of the wall or panel shall not exceed the potential heat expressed in Btu per square feet (mJ/m2) of the foam plastic insulation contained in the wall assembly tested in accordance with Section 2603.5.5. The potential heat of the foam plastic insulation shall be determined by tests conducted in accordance with NFPA 259 and the results shall be expressed in Btu per square feet (mJ/m2).

Exception: One-story buildings complying with Section 2603.4.1.4.

2603.5.4 Flame spread and smoke-developed indexes.
Foam plastic insulation, exterior coatings and facings shall be tested separately in the thickness intended for use, but not to exceed 4 inches (102 mm), and shall each have a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E 84 or UL 723.

Exception: Prefabricated or factory-manufactured panels having minimum 0.020-inch (0.51 mm) aluminum facings and a total thickness of 1/4 inch (6.4 mm) or less are permitted to be tested as an assembly where the foam plastic core is not exposed in the course of construction.

~~**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.~~

~~**Exception:** One-story buildings complying with Section 2603.4.1.4.~~

Renumber remaining sections.

Reason: In 1978, the U.S. Department of Energy (DOE) initiated a national program plan to address building enclosure systems. This program evolved into one of the National Institute of Building Science's first councils, the Building Enclosure Technology and Environment Council (BETEC). Today, DOE and more than 125 corporate and individual members support BETEC. An elected Board of Direction guides the Council. Government agency and association personnel, design and construction professionals, researchers and academics serve on BETEC committees and working groups, propose and review research, and organize symposia and publications.

Currently, Section 2603.5 requires all foam plastic exterior insulation materials to conform to the limits of NFPA 285. This test replicates the response of materials to a fire extending through an exterior window of a building. The code does not differentiate as to whether there is a potential for such a fire to occur in a building. Flashover fires which would cause the flame to break out of the building will not occur in a building that has a fully operational sprinkler system. Similar provisions in the code for other materials that are combustible and may lead to vertical and lateral spread of fire are required to provide fireblocking. In recreating Section 2603.5 we have incorporated various options to the use of this testing to address the risk of fire spreading on the exterior wall of a building where foam plastic insulation is found.

2603.5 The existing section includes three separate criteria, none of which has anything to do with height except for the provisions for cold storage buildings that only applies when they are over one story in height, so the title of the section is incorrect. In addition, to avoid additional confusion this code change breaks the section down into its various parts.

New 2603.5.1 The requirement for combustible or noncombustible walls is based on the construction type allowed in Section 503.1. The use of the term "also" implies there are other requirements that are not clearly spelled out.

New 2603.5.3 This is a new section that reflects the requirements for the use of combustible materials on the exterior of a building. The maximum height of an unsprinklered building is 55 feet to the occupied floor per Section 903.2.11.3. Current requirements for protection of combustible wood veneer materials on the exterior of a building are limited in Section 1405.5 to 40 feet in height. Fireblocking is required in Section 718.2.6 for concealed spaces on the exterior of a building.

2603.5.1 This existing section in the code is redundant with Section 703 of the IBC which requires all fire resistance rated walls to conform with ASTM E119 or UL 263. It isn't necessary to state everywhere in the code that if a wall is required to be fire resistance rated that it must pass these tests.

Cost Impact: The change will reduce the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF
