Exterior Wall Cladding Survey Results Review

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GENERAL COMMENTS

The reason for this survey is related in part to the International Code Council's response to the deadly Grenfell Fire that occurred in London. When that fire occurred, many questions were asked of the Code Council and many other organizations as to whether this could happen in the United States and how the International Codes address exterior wall finishes.

In reviewing these questions, the fire in the United Kingdom (UK) needed to be better understood. Initial reports primarily focused upon the aluminum composite material (ACM) on the exterior of the existing high-rise building. Note that ACM is termed metal composite material (MCM) in the International Building Code (IBC). However, there were many factors that led to this tragedy. In terms of the overall wall system, there was an exterior wall system that included MCM, an air gap and foam plastic insulation. In addition, the way the wall system was constructed allowed many paths for fire movement. The building contained a single exit stairway and lacked an automatic sprinkler system and building fire alarm system. Additionally, the compartmentation was compromised. The UK depends more heavily on passive fire protection than active protection. In addition, there was also a culture of "stay put" within such compartments during fires based upon the reliance on compartmentation. To make matters worse, the exterior wall system that had been placed on the building was not tested as a system and had been approved through what is termed a "desk top study." This type of study in the U.S. may be called an engineering judgement or perhaps an alternative material or method approval. The MCM used was not what was originally specified, resulting in the use of a cladding that would not have passed NFPA 285 or BS8414 with or without the gap and foam insulation.

Therefore, in many ways this tragic loss was more about the failure of the regulatory process than the technical documents as published. In reviewing the IBC, some adjustments have been made technically to the 2021 edition, but as a whole the code has the technical pieces necessary that would have prohibited this installation. See this article published by the Code Council: Combustible Exterior Wall "Cladding" Systems: An ICC Perspective.

Since the Code Council article focusing on the process was published, it became clear that a literal test of all exterior wall systems for every building does not always occur in the U.S. and dependence on technical expertise to review the performance of wall systems is used in its place. NFPA 285 currently has a task group reviewing qualifications necessary for such reviews.

Keep in mind a new high-rise in the U.S. would be required by the IBC to install an automatic sprinkler system throughout, a minimum of two exit stairways, an emergency voice/communication system and many other safety-related provisions that were not present in the existing Grenfell tower. The requirements for new high-rise buildings of course does not

lessen the need to ensure the exterior wall materials meet the code requirements; however, it does reduce the risk to the occupants overall. This also does not reflect the varying condition of existing high rises in the U.S. as the code requirements have continually evolved.

This survey was created to get a better sense as to how common this practice of engineering judgement (approval without specific testing of the wall system for a specific building) may be in the U.S. Since it is a survey, the results are not tied back to a particular jurisdiction. Overall it provides a sense of what level of consistency there is on the topic and whether allowing alternatives to testing to NFPA 285 is a common occurrence and allowance.

It should be noted that the IBC does provide some specific tools that assist in the approvals process for the exterior wall envelopes in addition to containing technical requirements within Chapters 14 and 26. IBC Section 107.2.4 contains specific requirements for the construction documents regarding the detail of the exterior wall envelopes. These documents, as approved, can be used for the inspection of such wall systems. Note that the requirement for a registered design professional will vary based upon the statutes and policies of the jurisdiction.

> **[A] 107.2.4 Exterior wall envelope.** *Construction documents* for all buildings shall describe the *exterior wall envelope* in sufficient detail to determine compliance with this code. The *construction documents* shall provide details of the *exterior wall envelope* as required, including flashing, intersections with dissimilar materials, corners, end details, control joints, intersections at roof, eaves or parapets, means of drainage, water-resistive membrane and details around openings. The *construction documents* shall include manufacturer's installation instructions that provide supporting documentation that the proposed penetration and opening details described in the *construction documents* maintain the weather resistance of the *exterior wall envelope*. The supporting documentation shall fully describe the *exterior wall* system that was tested, where applicable, as well as the test procedure used.

SURVEY SUMMARY

Question 1.

Does your jurisdiction allow an alternative method of approval in place of testing exterior wall coverings/cladding systems to NFPA 285 where testing to NFPA 285 is required by Chapter 14 or Chapter 26 of the IBC?

Response

The focus of this question was whether an engineering analysis in place of testing the wall system to NFPA 285 would be permitted. The response was mixed. Essentially there appear to be three categories:

- Six respondents state that it is allowed and it appears they have been presented with this approach.

- Three jurisdictions have not addressed yet but do not prohibit allowing such an approach.
- Four would not allow this approach at all.

In some of the responses where such an analysis is permitted, a fire protection engineer or qualified engineer would need to be part of the approvals process. In addition, this may also drive the need for a special inspection where it was permitted. In one case, it was noted that the materials were tested to a European standard.

Question 2.

Are there building features such as the height, area or location that may affect the use of an alternative approval method? If yes, please describe what this includes. Are there limitations on the use of such alternative approvals?

Response

Generally, alternative approvals are allowed and potentially a higher level of scrutiny is required for those buildings that by nature have a higher risk such as high-rise buildings or very large buildings. As noted in Question 1, some jurisdictions do not allow alternatives to testing to NFPA 285. In other jurisdictions they have not yet been presented with this request.

Question 3.

Do you have minimum qualifications for those designing exterior wall envelope systems/cladding? If yes, please describe.

Response

A question of particular importance on this issue as to who is required/allowed to design exterior wall systems. In six of the responses it did not appear that there were baseline requirements for qualifications. Essentially, the code provides requirements that simply need to be documented as met, but in some cases the construction documents need to be signed or sealed by a licensed architect or engineer. The trigger for a licensed engineer or architect may be related to the size of the building and state or local qualification requirements.

The code has requirements in Chapters 1, 14 and 26 related to approvals of such wall systems. In some cases, simply showing compliance with these requirements is sufficient. In other cases, a registered design professional is required to sign/seal the construction documents. The type and size of buildings may have more restrictive

requirements for approval. This may also depend on whether an alternative approach was taken (engineering judgment) or simple code compliance (fully tested assembly) is submitted. One jurisdiction stated that a fire protection engineer would need to stamp or sign off on the alternative approach.

Question 4.

Does your jurisdiction require a special review or third-party review for such systems? If so, what does that process include?

Response

Approvals ranged from simply confirming that the fire tests were undertaken by an accredited laboratory and meet Evaluation Reports, to requiring third-party special inspections of the wall on-site. The need for special inspection or third-party review may also relate to larger installations where the risk becomes greater. It is assumed that since it is part of building construction, some level of inspection occurs in either case on the jobsite.

CONCLUSIONS

Results appear to vary significantly potentially based upon the types of buildings being constructed and what is being presented to the jurisdiction. In some jurisdictions with respect to fire test compliance, a fire protection engineer may be required, and in others, it rises only to the level of basic code compliance. Potentially, a seal or stamp from a registered design professional may be required.

FURTHER THOUGHTS

The main market driving force for exterior wall systems have been their benefit for energy savings and management of moisture. The code does provide the basic tools for protection from fire. Ultimately, whether or not approval is through simple code compliance or is achieved through an alternative approval, such wall systems need to be installed as approved. Potentially, the installation process, which is a critical link to full compliance, should be studied further. In addition, due to the complexity of these systems some jurisdictions are better positioned to deal with the review and approvals process. It is hoped that this knowledge may be shared with those jurisdictions without the same level of resources.

For inquiries regarding the exterior wall cladding survey results and information presented in this article, please contact the Major Jurisdiction Committee at mjc@iccsafe.org.