NAMBA NOTES

This is the final installment of a four-part series of articles on the topic of testing and design for exterior wall assemblies that the building codes require to comply with NFPA 285. These articles are intended to promote effective communication between stakeholders regarding this important fire safety topic for the design and construction of code-compliant exterior wall assemblies. Readers are advised to consult with their own experts and review NPFA 285 for further details.

NFPA 285 TESTING & DESIGN INFORMATION PART 4 – DATA ANALYSIS AND EXTENSION

ENGINEERING ANALYSES, EXTENSION, AND JUDGMENTS

Although engineering analysis, extensions of test results, and compliance judgments for exterior wall assemblies have been made since the 1980s, the recent focus on NFPA 285 engineering analyses and judgments arose from changes in the 2012 International Building Code® (IBC®). A new Section 1403.5 required NFPA 285 testing and compliance for exterior wall assemblies on buildings of Type I, II, III, and IV construction, greater than 40 feet in height above grade plane, and containing a combustible water-resistive barrier. At the time, the IBC already required, with limited exceptions, weather protection of exterior wall assemblies in the form of a water-resistive barrier (2012 IBC Section 1403.2) and a means of drainage. The net effect of the existing requirement for a water-resistive barrier, combined with new requirement for NFPA 285 testing and compliance, was a significant expansion of the scope of exterior wall assemblies and assembly design combinations and permutations that were required to comply with NFPA 285. Given the impracticality of testing every possible assembly design and permutation of potential components, engineering analyses and judgments performed by knowledgeable and qualified persons became a practical way to reliably extend successful test results to assemblies similar to tested assemblies.

An engineering *analysis* evaluates the temperature data and visual observations of the NFPA 285 test(s) along with other applicable material properties using fire science and engineering principles to first understand how the tested assembly performed, then determine how certain changes might alter the observed performance. An engineering *judgment* is a determination of whether an alternate assembly, based on an assembly meeting NFPA 285 will continue to meet NFPA 285.

Due to the complexity of today's modern exterior wall assemblies and availability of NFPA 285 test data, these analyses have become an essential method to demonstrate compliance of assemblies required by the building code to be tested to and meet NFPA 285. Section 1402.8 was added to the 2024 Edition of the International Building Code® (IBC®) to recognize and clarify the use of these analyses as a prescribed compliance method in addition to a tested assemblies and third-party listed assemblies:

1402.8 Vertical and lateral flame propagation compliance methods.

When exterior wall assemblies are required in this chapter to be tested for vertical and lateral flame propagation in accordance with and comply with the acceptance criteria of NFPA 285, compliance with the requirements shall be established by any of the following:

1. An *exterior wall assembly* tested in accordance with and meeting the acceptance criteria of NFPA 285.
2. An *exterior wall assembly* design *listed* by an *approved agency* for compliance with NFPA 285.
3. An *approved* analysis based on an assembly or condition tested in accordance with and meeting the acceptance criteria of NFPA 285.

RECENT UPDATES TO NFPA 285

To help improve transparency and consistency of NFPA 285 analyses and judgments, the 2023 Edition of NFPA 285 was revised to add a new Annex on the subject - *Annex B Guide for Extensions of Results from Assemblies that Meet NFPA 285*.

[1] NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.

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Developed by a work group of experts under the NFPA Committee on Fire Tests, following the NFPA standards development process, the Annex communicates the collected experience and consensus recommendations regarding the scope, purpose, and limitations of these analyses along with eleven (11) common subjects of analysis that are discussed in eighteen (18) sections.

Important scoping and application considerations for NFPA 285 analyses stipulated in Annex B include the following:

- Users of the Annex should have a knowledge and understanding of the NFPA 285 test as well as the acceptance criteria and applicable *tested assembly* and materials of construction.
- The same pass/fail acceptance criteria used by NFPA 285 should be the basis for extending test results when considering modifications to a tested and compliant assembly.
- Evaluations are for the extension of compliant results of tested assemblies.
- Extensions are to assemblies that differ from the compliant, tested assembly in terms of materials, components, or configuration.
- The wall assembly is treated as a system and it is the performance of this system that achieves the NFPA 285 test result, not any single component or detail.
- The Annex is not comprehensive and some of the principles described within it may require additional fire test information or data.

Annex B also identifies several important limitations for the analysis and extension of NFPA 285 test data. These limitations include:

- Extension of results is only valid for changes that are within reasonable limits for standard construction practices.
- The validity of an analysis or judgment is limited to only those specific changes that are identified in the analysis.
- Multiple changes may produce a different cumulative effect than each change individually.
- Analysis is not possible for every configuration or potential change to a tested assembly.
- When a change is not supported by an analysis or judgment, then an NFPA 285 test should be conducted.

The analysis and extension of results for assemblies that meet NFPA 285 is an important and code-recognized tool for establishing code compliance of exterior wall assemblies required to be tested to and meet NFPA 285.