



# Modified Testing for Products: All Smoke and Mirrors?

How manufacturers are modifying the ASTM E84 standard to skew test results and provide favorable FSI and SDI numbers.

By Jay Peters and Bill Bliss

When reviewing a product to determine if it is acceptable to the building codes and the project specifications, it is noted as “modified.” Does that mean it meets the strict letter of the building code requirements? If you are responsible for approving project materials, you need to understand the standards and the liability of allowing unacceptable materials using modified testing on your project.

Building codes, including plumbing and mechanical codes, limit certain materials from being used in locations susceptible to fire. The standard used for testing these materials is ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials, developed by the ASTM E05 Committee on Fire Standards.

The standard ensures that the products used in a structure will not put people in danger during a fire event. For example, plenums used for air conveyance limit the flame and smoke ratings of materials within them, ensuring occupants are not exposed to excessive smoke or allow fire to travel from room to room or floor to floor through the plenum.

For building and fire officials, as well as designers and architects, it is critical to test these materials consistently to better understand how these materials react in a fire situation. Most often, the building inspector looks for the product’s mark of conformity that proves the material has met the ASTM E84 standard test requirements, as well as the flame and smoke index number derived from

the test. The data is then printed on the product itself for easy recognition of compliance.

The ASTM E84 standard is a 10-minute test to measure the flame spread index (FSI) and smoke developed index (SDI) to assess building materials’ surface-burning characteristics. FSI measures the speed of the flames’ progress across the sample’s surface; SDI provides the amount of smoke the sample emits as it burns. The results help fire protection engineers, architects, and builders better understand how various materials will react during a fire.

To compare apples to apples, the test parameters should be consistent for all materials. All the samples must be tested at the full width and length of the test tunnel, using a uniform flame location, temperature curve, measurement (FSI and SDI) and draft or pressure. All materials are not created equally and may require minor adjustments, mostly for the geometry of the product being tested.

## False Sense of Reality

Of course, there are ways to manipulate the test parameters in an attempt to meet the minimum flame and smoke characteristics (lower the number) of a specific product during these tests by using creative mounting techniques. Some manufacturers use more materials to support their product sample in the tunnel. After this modification takes place, it generates a “modified” ASTM E84 test.

# ASTM

Although the standard contains strict provisions, there is a trend to adjust the minimum safety test provisions to get a specific product to meet the lowered standard parameters. However, in reality, the product itself should be “enhanced” to meet the minimum safety standard tests — not the other way around.

For example, plastic water supply and drainage piping testing was significantly modified by filling the pipe with water before performing the fire and smoke test. Of course, it will have a major impact on the testing results. Some modification methods are much more intricate than others.

Since there are many different materials of various shapes and thicknesses being tested, they must be supported differently in the Steiner test tunnel. While this is to address a narrow situation in many cases, even the differing support methods can affect the outcome of the flame and smoke rating test. In fact, some have found ways to lower their ratings by manipulating the variables in the test tunnel.

The ASTM E84’s scope of the standard states: “1.4 The use of supporting materials on the underside of the test specimen has the ability to lower the flame spread index from those which might be obtained if the specimen could be tested without such support. These test results do not necessarily relate to indices obtained by testing materials without such support.”

This could create a situation where a product exhibits an FSI or SDI low enough for use but would not necessarily meet the code values without modifying the testing.

Some manufacturers made a concerted effort to weaken the E84 test parameters by expanding the standard’s scope to include other less-stringent measures. These “product”-based analyses move away from a direct material comparison to include assumptions on what configuration, form and quantity a product of a certain material might be installed within any given building.

While this may seem to make sense — why not test the product in the form in which it is installed? — boiling down the installed use assumptions for many different building scenarios (high-rise hotel vs. office building vs. hospital, etc.) to the least common denominator can provide test results completely disconnected from real product performance. The E84 test procedure, using tightly controlled test specimens and criteria, is intended to prevent just that situation.

Still, these manufacturers attempted to modify E84 to “recognize” these product-based alternative tests in the ASTM process to make them appear equivalent. They’ve also made similar proposals to do the same in the national model plumbing and mechanical codes.

Thus far, these actions have not made a lot of headway; however, one must always be on the lookout for concerted efforts to weaken the flame and smoke ratings and, in turn, the safety of a building.

## Identifying a Modified Test

How does one identify if a test has been modified, especially if it is not obvious? The answer is research. The manufacturers’ information is a good place to begin. Some manufacturers will indicate in their product literature that

the test performed was modified; others may not. But if they reveal it was modified, they still do not typically indicate exactly how the test was modified.

The next piece of research will be the listing or listings for the product by the listing agency. This is where you must become an investigator since most listings indicate the modification information buried deep within the listing.

To ensure you are fully aware of the testing methodology and results, it is advised to request the actual test report for the modified test from the manufacturer directly. Since the testing laboratory that produced the report worked for the manufacturer, only the manufacturer can release it.

It will contain a great deal of technical information, including the modifications that took place to test the specific product or material. The report will state whether the lab performed a full tunnel test, used proper support for materials that melt, bend or flex, or if these items were modified in a way to allow a lower FSI or SDI than if it were done properly.

There are modifications to do proper mounting and testing, as well as modifications that change the outcome of the indices to promote usage where a product may not be allowed.

The best way to avoid a catastrophe or ensure you are installing the materials with the correct assets to protect the building and the public is to avoid using any material that has used a modified ASTM E84 test or any material that has used a revised testing standard. Building codes do not have exceptions for modified testing for the building products, so specifiers should not allow them to be considered either.

In the end, it is not just your reputation on the line, it is a matter of public safety — and that is much more important! Do your homework and don’t fall for it.

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*Jay Peters is the president at Codes and Standards International, which helps manufacturers test, certify and list products for codes and standards acceptance and industry recognition. He has served in the industry for almost 40 years as a licensed journeyman plumber, refrigeration journeyman, sheet metal installer and multistate contractor. For more than a decade, he worked for the two largest code organizations: executive director of plumbing, mechanical and fuel gas at the ICC; and senior director of codes and education at IAPMO.*

*Bill Bliss is a technical consultant for McWane Plumbing Group. A U.S. Army veteran, he worked at Oklahoma State University for 17 years, where he taught plumbing, pipe fitting, and welding at its School of Technology. Following his teaching career, Bliss worked at Tyler Pipe, where he served in various capacities, most recently as vice president of the McWane Plumbing Group. Bliss has applied his 40 years’ experience by serving on various codes and standards committees and task groups: CISPI, IPC, UMC, IMC, UPC, and ASTM, ASME, CSA, and AWWA.*