Wood and Fiber, 9(1), 1977, pp. 40–43

STANDARDS IMPACT[1]

James P. Thompson
Consultant, 1510 Kabel Drive, New Orleans, LA 70114

(Received 26 May 1977)

ABSTRACT

Fire standards are required for regulating the use of materials and protecting life and property. Consumer impact on standards and test methods is presented with the ASTM E 5—E 39 case offered as an illustration. A study of how a new standard, limited combustible, was introduced into the building industry is discussed. Standards can frequently impact other standards, such as the utilization of insulation materials for energy conservation increasing fire intensity or causing more smoke during fires. Recent changes in ASTM E 119 have broadened use of the test method to include testing of specific assemblies of materials intended for particular designs and functions.

Keywords: Standards, combustibility, fuel potential, heat release, test methods, building codes, ASTM.

INTRODUCTION

The word "impact" should not be confined just to the material properties of wood. Any standard or code that affects wood also has an impact on consumers, engineers, architects, and lumber manufacturers. Is does not matter whether the standard deals with physical properties, quality, or fire. If reference is made to either a new or revised standard, some type of change occurs. The immediate reaction is to question how the change will affect the standard. Therefore, it is important that individuals involved in standards development activities are given the opportunity to ask and answer these questions and provide input before the new or revised standard becomes a reality.

CONSUMER ENTRY INTO THE WORLD OF STANDARDS

Because of today's improved inspection system, more refined processes of promulgating standards, more complete test methods, wider communication systems, and transportation systems bringing all building products into close proximity, both producers and consumers of materials are much more closely regulated than ever before. The consumer has entered the overall picture on a broader scale and can be far more effective with the development and use of standards and test methods than previously.

Perhaps the best example of consumer entry into the standards picture is the ASTM Committee E 5—E 39 episode, which was consumer-instigated, via the Federal Trade Commission. The example involves an *impact on standards* rather than a *standards impact*. It is notable that the formation of Committee E 39 on Fire Hazard Standards to evaluate whether Committee E 5 on Fire Tests of Materials and Construction was actually developing reliable test methods evoked considerable response. The fact that the ASTM process and some of its standards were being challenged due to misuse and misleading terms brought about a reaction from ASTM to protect itself. Finally, it was concluded that the scope of E 39's activities, as far as determining what is a fire hazard standard, could not be defined after the expenditure of hundreds of thousands of dollars over several years. [The Task Group on Fire Research Needs of Committee E 39 has published an interim report listing overall goals and early findings (ASTM 1977) —Ed.]

[1] Presented at the Society of Wood Science and Technology Symposium, Trends in Fire Protection, Session I—Trends in Regulation of Wood Construction and Products, Madison,WI, 19 April 1977.

It would be rare for a new or revised standard not to adversely affect an individual or industry. After all, the standard most likely evolved because of the need to structure matters or clarify a situation, which if allowed to continue, would become chaotic. Obviously, differing views exist. Resolution means compromise, and the degree of compromise determines the amount of impact. Each interest group has various concerns about separate portions of standards. Like other industries, there can be differing viewpoints within various segments of the wood industry. Problems can develop related to fire performance and regulation of wood.

INTRODUCTION OF A NEW CONCEPT: LIMITED COMBUSTIBLE

Perhaps the most indicative and current example of a struggle caused by a new standard and the differing views within the building industry was the introduction of the standard for defining "limited combustible" and use of related terminology concerning the regulation of materials. A few years ago, the ASTM Committee E 5 attempted to provide better definitions of combustible and noncombustible. In doing so, the terms "fuel potential" and "low combustible" were introduced into the jargon. People in the wood industry argued that the rate at which a material releases heat is just as or more important than fuel potential itself. Whether or not that fuel potential is released in 5 minutes or over a 2-hour period presents two different performance levels. There was growing concern among building official groups that proper regulation and use of materials from a fire standpoint did not necessarily mean that material had to be noncombustible. They began to realize that when noncombustible was called for in code language, it was not always meant literally. In other words, materials with some fuel potential could be justified.

Proposed code changes were introduced to one of the model code groups, stating that materials having a certain level of BTU fuel potential per pound or per square foot exposed surface could be considered as noncombustible. Again, the lack of a relationship to rate of heat release was instrumental in the proposal not being accepted. Many people involved in the deliberations believed that the general idea of these proposals was a step in the right direction, because they had the potential of providing a means of regulating materials possessing properties between very combustible and noncombustible. Ironically, we were plagued with absence of a test method to determine the rate of heat release due to the lack of a standard.

However, one of the model code groups in whose operation the building materials industry has little input announced their concern about not having a clear demarcation line between truly noncombustible materials, as covered in the first part of a three-part definition including gypsum board and Tectum, and materials having some combustibility under the other two parts. Thus, they created a new term, "limited combustible," and have used it in the 1976 Edition of the National Building Code, promulgated by the American Insurance Industry. In effect, the old three-part definition was divided: Part (A) which references ASTM Standard E 136, Noncombustibility of Elementary Materials, was set aside to define those materials which are truly noncombustible; and Parts (B) and (C) were maintained as before but with the further provision that materials having a total potential heat value not greater than 3500 BTU per pound were termed "limited combustible." While not completely performance in nature, it is a positive move toward recognizing materials that can perform but would not have been previously accepted.

The fallacy of this code change lies in the further provision that a limited combustible assembly is one composed of limited combustible materials. Separate test methods for rate of heat release are needed: one test method for materials and another for assemblies of materials.

The American Insurance Association (AIA) mentioned rate of heat release as

one of the important criteria in their special report introducing the change, but ultimately it was not included because no test exists to measure rate of heat release. Other model codes will most likely follow a similar pattern, and it is debatable as to whether this action will speed up or slow down the development of a rate-of-heat-release test method. It is unusual for the wood industry to have to harp on the necessity for a new fire test method, but this time it is.

The introduction of "limited combustible" in building codes has initiated activity to develop a rate-of-heat-release test method for materials which in turn has brought about work to prepare a test method for measuring rate of heat release for assemblies of materials. It is reasonable to believe that there can be assemblies of materials that do not meet the limited combustible criteria individually, but when protected and assembled collectively they can provide a rate of heat release within the limited combustible range and can therefore be utilized for the same purposes with equal assurance of performance.

IMPACT FROM CHANGES IN OTHER STANDARDS

Changes in one standard often impact other standards. Building code agencies are considering provisions covering acoustics, insulation, energy-saving devices, and security devices and systems. As some of these provisions are adopted, the impact on fire standards must be carefully assessed.

To illustrate, let us consider increasing ceiling insulation to 12 inches from 3½ inches. Will this result in confining a fire longer or compartmentalizing it so the fire burns more intensely? If it does, the fire-endurance performance of an assembly changes markedly. Pole frame builders are very concerned with this possibility, mainly due to problems in obtaining fire insurance.

As another example, insulation is being applied on the inside of walls as well as between studs. However, there is a great difference in burning characteristics and in the generation of smoke between the two insulation methods, with the extra insulation creating significant problems. Thus, a standard designed to help conserve energy may result in different performance during a fire.

Moreover, concern with security has caused many problems. During a fire, firefighters have not been able to enter buildings, and occupants have been trapped inside because of locked exits. Unfortunately, standards relating to security could result in loss of life during a fire situation.

CHANGE IN FIRE TEST METHODS

A recent change in ASTM Standard E 119 on Fire Tests of Building Construction and Materials has expanded the possible utilization of the test method, and consequently the range of potential use of materials in fire assemblies. In effect, the change permits the testing of specific assemblies of materials intended for a particular design and use. Prior to the change, it was required that during a furnace fire test the structural elements of a floor system be subjected to an imposed live load that would stress the material to its maximum design value, even though in actual use, this may not be the case. In other words, because of this test method and the manner in which an assembly had to be tested, we were not allowed to substitute a slightly larger or somewhat over-designed structural member to overcome structural weakness exhibited in a fire test by the structural member customarily used. For example, an architect may wish to utilize a 2 × 8-inch floor joist system in a 1-hour rated assembly whose span is such that the joists are actually stressed far below their allowable limit. However, the architect could not do this because previously the fire tests indicated structural failure because under that test, members were loaded to their maximum. However, this is not the case with the design the architect proposes. Under the change, such a system can now be tested in accordance with the test method, loaded as the members will be used. A similar proposed change affecting the testing of walls and partitions is

currently being developed by Committee E 5. This is just another instance of standards impact expanding and becoming more adaptive to performance type building codes and regulations.

CONCLUSION

Fire standards are needed for guiding the use of materials and protecting life and property. An important consideration is to ensure that the privilege or responsibility for proper use of building materials is not abused. Standards on fire will continually be improved. With proper care and guidance, their impact will enhance the use of building materials and provide better protection from fire. Care must also be taken to assess changes in other standards that might have an impact on fire performance or fire standards.

REFERENCE

AMERICAN SOCIETY FOR TESTING AND MATERIALS. 1977. Assessing fire hazard—some research needs. ASTM Stand. News 5(9):11–13.