

*ASTM's
Role in*

*Performance-
Based Fire Codes
and Standards*

*John R. Hall, Jr.
editor*



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Foreword

This publication, *ASTM's Role in Performance-Based Fire Codes and Standards*, contains papers presented at the symposium of the same name held in Nashville, Tennessee, on 8 December 1998. The symposium was sponsored by ASTM Committee E5 on Fire Standards. The symposium chairman was John R. Hall, Jr., National Fire Protection Association.

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Overview

The objective of this symposium was to discuss possible roles that ASTM might play in the move toward greater use of performance-based fire codes and standards in the United States and Canada.

This move is a global phenomenon that has been gathering speed and strength for at least a decade. Performance-based fire codes are now established in use from the United Kingdom to Australia and New Zealand, and from Japan to the Nordic countries of Europe. ASTM is a supplier of standards to the world so even if this movement had not reached North America, and it most certainly has, ASTM would have a strong interest in identifying and responding to the challenge and the opportunity presented by performance-based codes and standards.

Performance-Based Codes and Standards

Performance-based codes and standards are documents that state goals and objectives, together with rules and procedures, usually involving testing and modeling, for determining when performance is achieved. Such documents allow designers greater flexibility, which can be used to achieve cost savings, greater safety, or greater quality. Performance-based codes and standards can be written on anything from products, materials and assemblies, to equipment, to whole buildings and complexes, to procedures and programs.

When poorly executed, performance-based codes and standards permit designers too much flexibility, leading to reduced safety, or require bewildering and unmanageable standards of proof, or inadvertently compromise the delicate balance between science and values or between the legitimate interests of different parts of the community. It is not enough to be interested in performance-based codes and standards and intrigued by their potential. They must be approached with care and knowledge.

Do we have enough knowledge? What is a prudent path forward that still offers us the prospect of success in a timely fashion? These were among the sweeping questions addressed in the symposium, but always with a focus on the role ASTM E5 has played and the roles it could (and should) play in the future.

The intent was to give a diverse audience an awareness of relevant concepts and activities, inside and outside ASTM, in order to provide a sound and comprehensive basis for planning by ASTM E5, possibly by Subcommittee E5.91, which has responsibility for planning; possibly by Subcommittee E5.33, whose scope is most nearly aligned with that of performance-based codes and standards; possibly by Subcommittee E5.90, the executive subcommittee; and possibly by all these and others as well.

The symposium featured 12 papers, organized in three groups of four papers each.

Session I—General Concepts and Principles

The first four papers addressed general concepts and principles.

As the symposium chairman and organizer, I spoke first, offering a set of options for ASTM's role and ideas for planning, with associated pros and cons. ASTM E5 was one of the first organizations to offer standards relevant to performance-based activity, but in many ways, the initiative has moved past ASTM E5 in the last few years. This may have occurred because the stage of development of performance-based fire codes and standards now emphasizes elements for which other organizations

are more appropriate, or it may have occurred because ASTM E5 is not sure where to go next, having completed the tasks its members defined for themselves when they first entered this arena. The first possibility is acceptable and appropriate, while the second possibility is worrisome and could be threatening to the long-term health of ASTM E5. Determining which is true and what course to follow is the essence of planning.

The second paper was by Vincent Brannigan and Steven Spivak of the University of Maryland, who discussed quality standards for the participants in performance-based regulation. Professors Brannigan and Spivak have degrees in both fire protection engineering and law, which give them a unique perspective on the interaction of these two decision-making systems, both of which have relevance to performance-based codes and standards. One of the recurring concerns in developing performance-based codes and standards is how to assure that the individuals designing to these documents are up to the job. This paper proposed concepts and approaches to this issue, while underscoring that this is not an internal matter for the engineering field.

Ronald Alpert of Factory Mutual Research Corporation, the current chair of Subcommittee E5.33 on Fire Safety Engineering, provided the third paper, which reviewed the history, activities, and plans of this subcommittee. Subcommittee E5.33 and its two predecessors, Subcommittee E5.35 on Fire Risk and Hazard Assessment and Subcommittee E5.39 on Fire Modeling, have been the home for most of ASTM E5's work related to performance-based codes and standards to this point. Subcommittee E5.33 now faces a number of choices. They can maintain their guides. They can take an active role in educating constituents in the use of those guides. They can play a part in applying the guides to the development of fire risk and hazard assessments for particular products or to the review of particular fire models. Or they can defer to relative newcomers like the Society of Fire Protection Engineers, or seek to partner with them.

Completing the session on general concepts and principles was Marcelo Hirschler of GBH International, who provided a highly personal (at the organizer's request) review—but with very general implications—of his efforts to write ASTM E5 fire hazard assessment standards and guides. Probably no one has spent more time and effort attempting to define, in detail, what a performance-based, fire-hazard-analysis-based product standard would look like in the ASTM E5 system. Dr. Hirschler's review of these efforts and of the thinking behind them is an invaluable starting point for anyone else seeking the same objective, no matter how much they may differ on the particulars.

Session II—Specific Methods and Tools

From general concepts and principles, the symposium next moved to four papers on specific methods and tools.

The first of these papers was given by Daniel Gemeny of Rolf Jensen & Associates, who spoke on the preparation of fire test data for use in specifying design fires. This essential step links traditional fire testing and the many associated standards with which ASTM has made its reputation and its contribution over the years with the often-different needs of models and calculation methods for input data on product performance in a wide variety of fire environments. Having conducted a number of performance-based design projects for a company that is among the world's leaders in this area, Mr. Gemeny was able to provide substantial insight into the steps required for this interface and the issues that arise along the way.

The second of these papers is also the only paper not included in this proceedings. Gordon Hartzell of Hartzell Consulting spoke on recent proposals for new approaches to smoke toxicity assessment, currently under consideration in both ASTM E5 and the International Standardization Organization

(ISO), as an example of a new type of ASTM E5 standard, illustrating the incorporation of fire hazard analysis concepts. Because Dr. Hartzell's work in this area is of far-ranging interest, he presented the same paper to the First International Symposium on Human Behavior in Fire, held in Ulster, Northern Ireland, earlier in 1998. ASTM's policies rightly preclude publication of a paper already published, and Dr. Hartzell's paper is available in the proceedings of that conference. Readers of this volume are encouraged to seek this paper out, because it is a rare and important example of the evolution of fire test methods to support more comprehensive fire hazard assessments rather than to produce evaluative data by themselves.

The third of the specific method and tool papers was by Brian Lattimer of Hughes Associates. A project of his required the adaptation of fire test data from the cone calorimeter (ASTM E 1354) for use in a performance-based fire protection analysis. As with the other two papers, the conversion process tends to be anything but straightforward or simple, but it is essential if the calculations supporting performance-based design are to be based on valid data appropriate to the structures and assumptions of the models.

Completing the session on specific methods and tools was Marc Janssens of Southwest Research Institute, who spoke on computer fire model selection and data sources. Dr. Janssens' paper drew on both his own work and the work of ASTM E5.39, for which Dr. Janssens was the last chairman. The four modeling-related guides produced by ASTM E5.39 include some of the first guidance in print on the selection of data for computer fire models.

Session III—Alliances and Activities of Other Groups

The last session of the symposium broadened out from methods and tools to kindred organizations and their activities, with emphasis on opportunities for alliances and partnerships that would advance the cause of performance-based codes and standards and the interests of ASTM.

The first two of these papers addressed initiatives of the Society of Fire Protection Engineers. Morgan J. Hurley of the Society of Fire Protection Engineers spoke on SFPE's task groups to evaluate specific types of fire models, and Eric Rosenbaum of Hughes Associates spoke on SFPE's project to develop a design guide for performance-based design, the latter due to be published late in 1999. Both authors noted the value of ASTM's guides related to fire modeling as starting points for the SFPE exercises.

The last two papers addressed performance-based code initiatives of the National Fire Protection Association and the International Code Council. John Watts of the Fire Safety Institute described NFPA's proposal for a performance-based option within the Life Safety Code, and Beth Tubbs of the International Conference of Building Officials described ICC's proposal for a performance-based version of their building and fire codes. By focusing on codes, as distinct from the standards ASTM publishes, the two authors offered two initiatives that could create demand for supporting standards from ASTM.

Closing Thoughts Amidst the Opening Remarks

After you have read these papers, you may be frustrated that you cannot immediately do a specific job better or identify a new skill you have acquired. The benefit and relevance of these papers is in another form.

If you are an active volunteer within ASTM E5, you should learn a great deal about new ways in which the standards you write will be used. You may even have some new thoughts on whether you are working on the most important issues in the most appropriate way.

If your interest is more in performance-based design, codes, or standards, and only secondarily in ASTM's role, you may discover a resource in ASTM that you had not previously recognized.

You may wish to explore the ability of ASTM E5 standards, existing and prospective, to support your interests.

No matter how you came to this volume, these papers should give you a better sense of context and of possibility, and a lot to think about. But a passive reaction to this material is not what we are looking for.

This volume is meant to motivate even more than educate. It is meant to galvanize even more than inform. We are in the midst of a defining moment for the ways in which we make decisions about the fire safety of everything. If you have any thoughts or any preferences for how this ought to proceed, you owe it to yourself and to your colleagues and progeny to become a part of the debate and contribute a part of the solution.

Whenever you find this volume, it is likely that every author represented here is still working on the subject and would like to hear from you. It is certain that ASTM, especially Committee E5, is still working on this subject and would like to hear from you. So get involved and get in touch.

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Symposium Chairman and Editor

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