STP 1517

Advances in the State of the Art of Fire Testing

JAI Guest Editor:

Arthur J. Parker
Journal of ASTM International
Selected Technical Papers STP1517
Advances in the State of the Art of Fire Testing

JAI Guest Editor:
Arthur J. Parker, P.E.
Foreword

THIS COMPILATION OF THE JOURNAL OF ASTM INTERNATIONAL (JAI), STP1517, on Advances in the State of the Art of Fire Testing, contains only the papers published in JAI that were presented at a symposium in Miami Beach, FL, on December 11, 2008 and sponsored by ASTM Committee E05 on Fire Standards.

The JAI Guest Editor is Arthur J. Parker, P.E., Hughes Associates, Inc., Baltimore, MD, USA.
Contents

Overview ................................................................................................................... vii
A History of Fire Testing: Past, Present, and Future
   J. R. Lawson ........................................................................................................ 1
Using Directional Flame Thermometers for Measuring Thermal Exposure
   N. R. Keltner, J. V. Beck, and J. T. Nakos ....................................................... 27
Comparisons of Temperature and Heat Flux in Furnaces Controlled by Different Types
   of Temperature Sensors
   M. A. Sultan ...................................................................................................... 44
Guide on Measuring Uniformity of Furnace Exposure on Specimens Representing Test
   Samples Used to Determine Fire Resistance Ratings
   R. Berhinig ........................................................................................................ 63
Predicting Fire Behavior of Composite CFT Columns Using Fundamental Section
   Behavior
   S. Hong and A. H. Varma ............................................................................... 78
Guidelines for Improving the Standard Fire Resistance Test Specifications
   V. K. R. Kodur and R. Fike ............................................................................ 111
Fire Performance Testing of Building Element Interfaces and Connections
   A. J. Parker and N. R. Iwankiw ........................................................................ 135
Cone Calorimeter—A Cautionary Tale
   M. Hermesky and J. Murrell .......................................................................... 149
Heat Release Testing of Consumer Products
   M. M. Hirschler .............................................................................................. 162
A Materials Science-Based Approach to Characterizing Fire Resistant Materials
Measuring Properties for Material Decomposition Modeling
   C. Cain and B. Y. Lattimer ............................................................................ 211
Overview

This book represents the efforts of presenters at the Symposium on the Advances in the State of the Art of Fire Testing held on December 11, 2008 in Miami, FL. The goal of the symposium was to highlight advances we have made, or areas where further research and modifications have been identified, when conducting standardized fire testing. This collection of publications provides an understanding and appreciation for what types of results standard fire tests have been and will be asked to provide to properly address the hazards associated with future technological advances.

Very large and costly fires which occurred in the late 19th century and early part of the 20th century highlighted the need for uniform building codes and fire-resistive assemblies capable of providing minimum levels of protection for life and property. Fire test standards developed in response to this need specified the minimum test specimen requirements, fire exposure conditions, and level of protection. By standardizing the testing, the performance of different materials, systems, and assemblies, using the latest available technologies, could be compared directly. These test standards are continuously being updated to reflect improvements in materials technologies and testing capabilities.

The recommendations presented in the NIST report for the 9/11 attacks resulted in many E05 Subcommittees reviewing existing standards under their jurisdiction to determine if the assemblies these standards are intended to evaluate are being correctly tested; in terms of test set-up, procedure, and conditions of acceptance. This collection of papers provide an overview of what types of testing have we conducted, what advances in testing capabilities we have encountered, and how we have reacted to new material technologies to ensure that the test specimen performance is being evaluated properly.

This collection of publications and the symposium where they were presented is dedicated to the memory of Richard Licht, our dear friend who passed away in July of 2007. Richard spent a great deal of time and effort in ASTM E05 advancing the state of the art of many fire standards. I hope that this collection of papers will continue to generate the interest level in all of us that Richard demonstrated in working to promulgate technically sound fire test standards to improve life safety.

Arthur J. Parker, P.E.
Hughes Associates, Inc.