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2nd Volume

# Heat-Air-Moisture Transport

Measurements and Implications in Buildings

*JAI Guest Editors*

Phalguni Mukhopadhyaya  
Mavinkal K. Kumaran

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# Foreword

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THIS COMPILATION OF THE *JOURNAL OF ASTM INTERNATIONAL (JAI)*, STP1519, on *Heat-Air-Moisture Transport: Measurements and Implications in Buildings, 2nd Volume*, contains papers published in JAI that were presented at a symposium in Vancouver, BC, Canada, on April 19–20, 2009 plus two additional papers on the topic by *Shi and Burnett & Maref and Lacasse*. The symposium was sponsored by ASTM Committee C16 on Thermal Insulation.

The JAI Guest Editors are Phalguni Mukhopadhyaya and Mavinkal K. Kumaran of the National Research Council, Ottawa, ON, Canada.

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## Overview

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ASTM Committee C16 was established in 1938. Since its inception, committee members have been working tirelessly toward the development of standards, promotion of knowledge, and stimulation of research in the area of heat-air-moisture transport through thermal insulation and other related building materials.

In the rapidly changing world of free trade and market economy the movement of building materials and construction technologies across the continents has become an undeniable reality. Innovative and/or imported building technologies and new building materials are challenging everyday conventional building construction practices and use of traditional building materials. As a result, in order to deal with this unprecedented phenomenon, the building construction industry is making increased use of sophisticated computer aided numerical tools for the design of building envelopes. These tools require not only well-defined heat, air, and moisture transport properties for building materials but also a broader understanding of the implications of the measured heat-air-moisture transport properties on the performance and durability of the whole building envelope systems. Unfortunately, there exists a wide communication gap between the laboratory professionals and design office executives and that leads to many undesirable and completely avoidable poor design decisions and consequences. The feedback received in 2006 from the participants of the 1st Symposium on Heat-Air-Moisture Transport: Measurement on Building Materials had strongly advocated the urgency to address this issue. Hence, the idea of organizing the second symposium of this series was conceived with the mandate to bring together measurement issues of heat-air-moisture transport through building materials and its implications on the short- and long-term performance of the building envelope systems.

The principal aim of the 2nd Symposium on Heat-Air-Moisture Transport: Measurements and Implications in Buildings, held in Vancouver, British Columbia, Canada on April 19–20, 2009 was to create a forum to discuss the recent developments in the measurement of heat-air-moisture transport properties of building materials and their applications in the construction industry. This special technical publication (STP) presents 19 selected peer reviewed papers from the symposium authored by renowned international experts from Asia, Europe, and North America. The first two sections, “Material and Measurement” and “Test Method and Experiment,” of the STP present the challenges and observations associated with the measurement and performance assessment. The remaining section of the STP deals with various application and modeling related issues that are linked to heat-air-moisture transport properties of building materials and building envelope systems. Altogether the contents of the papers present the latest laboratory



and applied research activities on the heat-air-moisture transport through building materials and envelope systems.

Finally, the editors would like to acknowledge that this STP is a product of the tremendous diligent efforts of many people. In particular, the editors would like to thank the ASTM C16 symposium organizing committee, all of the authors, paper reviewers, and session chairs who devoted their valuable time for this endeavor. Special thanks are due to Dorothy Fitzpatrick, Timothy Brooke, Andre Desjarlais, Thomas Whitaker, and Robert Rushforth for their enduring support, constructive feedback, timely assistance, and efficient handling of all minute details.

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