

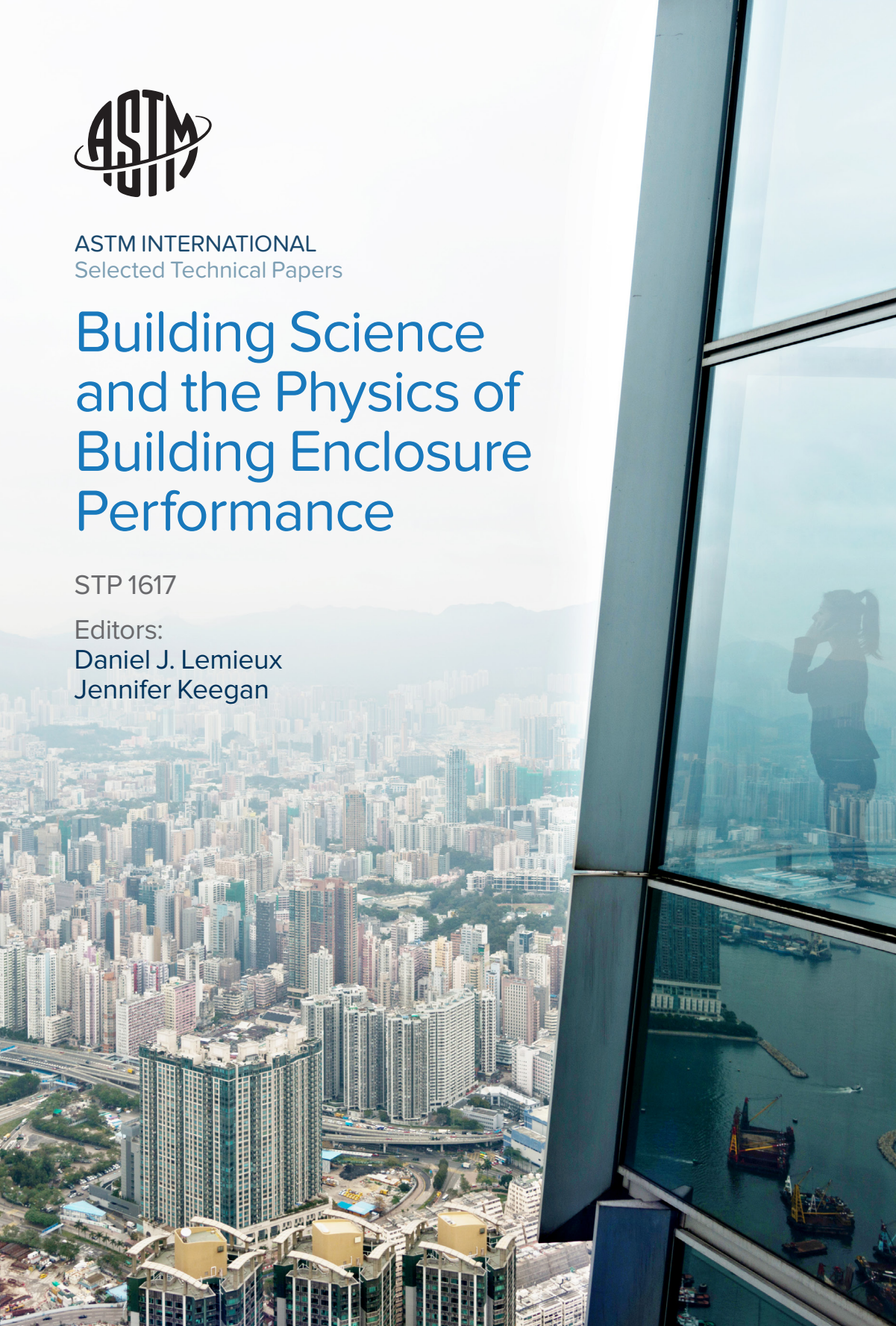


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Building Science and the Physics of Building Enclosure Performance

STP 1617

Editors:
Daniel J. Lemieux
Jennifer Keegan





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Foreword

THIS COMPILATION OF Selected Technical Papers, STP1617, *Building Science and the Physics of Building Enclosure Performance*, contains peer-reviewed papers that were presented at symposiums held October 21–22, 2018, and December 2, 2018, in Washington, DC, USA. The symposiums were sponsored by ASTM International Committee E06 on Performance of Buildings and Committee D08 on Roofing and Waterproofing.

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Overview

The Joint Symposium on Building Science and the Physics of Building Enclosure Performance was held in Washington, DC, beginning with Part 1 on October 21 and 22, 2018, and concluding with Part 2 on December 2, 2018.

Sponsored by ASTM Committee E06 on Performance of Buildings and Committee D08 on Roofing and Waterproofing, this first joint symposium brought together subject-matter experts from both committees in addition to students, teachers, research scientists, conservators, and practicing professionals from both the public and private sectors in North America, the United Kingdom, Europe, and Asia.

The objective of the symposium was to provide a forum for the exchange of ideas on current research regarding building science and the physics of building enclosure and whole-building performance, including testing and assessment of building envelope heat, air, and moisture transfer, energy use, and our environment. Areas of inquiry included:

- Building Science Fundamentals
- Physics of Heat/Air/Moisture Transfer
- Energy Modeling: Facts, Myths and Legends
- Human Comfort and Productivity in Our Built Environment
- Critical Review of Building Enclosure Standards and the Codes
- Material Selection for Climate-Specific Durability and Performance
- Adaptive Re-Use and Conservation in Truly Sustainable Design
- Building Enclosure Commissioning: Promises Kept
- Lessons Learned and the Road Ahead

Dr. John Straube (RDH Building Science, Inc.) served as keynote speaker for Part 1 of our joint Symposium. John is a professor of building science in the Civil Engineering Department and School of Architecture at the University of Waterloo, and his research focuses on energy-efficient, healthy, durable, and sustainable building design supported by advanced computer simulation, laboratory testing, and full-scale natural exposure performance monitoring.

John built upon his message as keynote speaker for our previous ASTM/National Institute of Building Sciences (NIBS) Workshops on Building Science Education in North America (ASTM/NIBS Workshops on Building Science Education in North America, Toronto, Ontario, Canada in October, 2016, and Washington, DC in April, 2017) to challenge all of us to reconsider the role of building science

education in delivering—rather than simply promising—quantifiable performance in our built environment. For John, standards development for standards-development sake is not the answer. Improved and more readily accessible opportunities to pursue graduate, post-graduate, and continuing education in building science fundamentals and a deeper appreciation for practical solutions to the challenges that we face in our built environment were the core of his message and helped fuel the discussion and debate that followed during our closing plenary session for Part 1 of the symposium.

Kevin Kampschroer (Office of High Performance Buildings and US General Services Administration) was our second keynote speaker. As the largest property owner in the United States, Kevin brought the owners' perspective to the discussion and attributed the apparent success of building enclosure performance to Building Enclosure Commissioning (BECx). He spoke of the cascading effect of design and encouraged the community to embrace high performance buildings and leverage the power of BECx, stating, "If you set a standard that is achievable, people will get excited about it."

Roy Wright (Insurance Institute for Business & Home Safety) encouraged listeners to focus on the people that rely on the practices and standards development, so that they can withstand these stronger weather-related events that have come and those we know will come. He challenged us to ask, how can we improve our standards to reduce the risk for future disaster? How can we improve the process to inspire pace, not haste, to get these standards approved more expeditiously? And how do we activate community leaders to create opportunities to build better? Resilience requires leadership.

Rene Dupuis (Structural Research Inc.) encouraged us to continue to foster a more cross-disciplined approach at ASTM that reaches across silos. In his experience with failure analysis, this collaborative focus may reduce the amount of system-related failures in the future.

Paul Johnson (SmithGroup) is an ASTM Fellow and active member of ASTM Committees E06 and D08. He brought the architects' perspective to the discussion, encouraging the holistic view of the building in which the enclosure is a critical part. Buildings need to serve people, and it is incumbent upon our committees to collaborate in order to strengthen our standards from a building performance perspective.

We would also like to take this opportunity to offer our sincere thanks to Steve Mawn and Joe Hugo, our respective ASTM Staff Managers for Committees E06 and D08, for their tireless patience and support. We share a common goal to encourage a more cooperative, cross-disciplined, and fully transparent approach to standards development at ASTM. Steve, Joe, and the ASTM Board of Directors are firm believers in that effort. This symposium and the symposia that will follow are in no small part a direct result of their insight, wisdom, and learned guidance.

A special thanks to Dr. Robyn Pender (Historic England) for joining us from London to offer her insight and expertise on this topic. Robyn is a renowned author, building physicist, and conservator whose work includes landmark buildings and structures throughout greater London and across the United Kingdom. She served as a panelist alongside Kampschroer and Straube during Part 1 of our symposium and previously as a keynote speaker for the 2017 Symposium on Building Physics and Conservation at Southbank Centre, London.

Many thanks also to Kelly Dennison, Alyssa Conaway, Sara Welliver, and all of the truly dedicated professional staff at ASTM for making this first joint symposium an overwhelming success for both committees. Teamwork and a considerable amount of patience—often beyond our view and behind the curtain—came together to make it all look so easy. Thank you.

This symposium would not have been possible without our sponsors, who supported us in bringing these critical discussions to the industry. A very special thank you to our platinum sponsors: Building Envelope Technologies, RCI/IIBEC, Simpson Gumpertz & Heger, Wiss, Janney, Elstner Associates, Inc., and WSP. Thank you to our silver and bronze sponsors: CDC, Cetco, GAF, NRCA, Rimkus, Soprema, and Tremco. We are grateful for your support.

And finally, a very special thanks to our keynote speakers, authors, presenters, technical reviewers, and invited and registered guests for donating your time, interest, passion and expertise. For three days in 2018 we were your students—humbled by your knowledge and grateful for your continued contributions to our industry and to the advancement of our profession. It has been a privilege to serve each of you and to serve ASTM as Co-Chair of this symposium.

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