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Condensation in Exterior Building Wall Systems

JTE Guest Editors:

Bruce Kaskel
Robert J. Kudder

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Foreword

THIS COMPILATION OF THE *JOURNAL of TESTING and EVALUATION (JTE)*, STP1498, on Condensation in Exterior Building Wall Systems contains only the papers published in JTE that were presented at a symposium in San Antonio, TX, October 10–11, 2010 and sponsored by ASTM Committee E06 on Performance of Buildings.

The *Symposium Co-Chairmen and JTE Guest Editors* are Bruce S. Kaskel, Wiss, Janney, Elstner, Associates, Inc., Chicago, IL and Robert J. Kudder, Raths, Raths & Johnson, Inc., Willowbrook, IL.

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Overview

This STP represents the peer-reviewed papers first presented at the October 10–11, 2010 symposium on *Condensation in Exterior Wall Systems* in San Antonio, Texas, sponsored by ASTM E06 Building Performance, Subcommittee E06.55 Exterior Wall Systems. The symposium and this STP represent the continued efforts of this subcommittee to exchange state-of-the-art knowledge through symposia on topics related to the performance of exterior wall systems. Past symposia of this subcommittee include water leakage, repair and retrofit, façade inspection and maintenance, and performance of exterior wall systems. Condensation in walls is a timely topic for ASTM E06 to address. Advancements in building sustainability, energy efficiency, and new wall systems have progressed significantly in recent years, while the consequential changes in wall moisture behavior resulting from these advancements are less well understood.

Although the topic of condensation, per se, is not addressed in this subcommittee's prior symposia, it has been a related topic in much of the work of this subcommittee and the ASTM E06 committee at large. Numerous previous papers, available through ASTM, have addressed this topic. Seminal manuals and prior symposia presented by ASTM E06, and ASTM committee C16 on Thermal Insulation, chaired solely or in part by Heinz Treschel, serve as background to our current work. A sampling of those volumes includes:

MNL 40 Moisture Analysis & Condensation Control in Building Envelopes - Treschel, ed. 2001;

MNL 18 Moisture Control in Buildings - Treschel, ed. 1994; and

STP 1039 Water Vapor Transmission Through building Materials and Systems Treschel and Bomberg, eds. 1987.

Manual MNL 40 described some of the now-established computer simulations for condensation control such as WUFI (ORNL/IBP). Given the now nine years time since that work was published, E06 believed that the state-of-the-art had advanced and that practical experiences have been gained from the use of analytical products that were presented in the 2001 manual. This symposium provided the opportunity for leading scientists and practitioners to again advance the body of knowledge on the topic of condensation in exterior wall systems.

Beyond ASTM, organizations such as ASHRAE have offered longstanding input on the issue of condensation control. Other organizations have grown more recently, such as BETEC; and USGBC along with their LEED certification system. These organizations are interested, directly or peripherally, in the issue of condensation. They too have offered recent workshops on the topic of condensation. Code writing organizations such as IBC, in their energy code IECC, as well as their under-development green code,

IgCC, are actively codifying issues related to condensation control, which were brought to light in prior ASTM publications and in the work of these other organizations. E06 believed in presenting this symposium, that these current papers on condensation could have a similar impact in future building codes.

This STP is organized, in the same presentation as the October 2010 symposium, into two parts:

Testing/Analysis 7 papers that concentrate on testing/analysis of materials and mock-ups to predict and prevent condensation in common exterior wall systems and

Case Studies 7 papers that document condensation problems found in the real-world and their solutions.

In addition, there is one keynote paper by William Rose, which presents the history that has lead to the present state-of-the-art and some of the erroneous concepts that have advanced to today. This paper sets the tone that common-place thinking does not well serve the industry, and when it comes to the on-going discussion of condensation control, new ideas, and concepts, the consistent application of the principles of physics and the use of appropriate analytical techniques need to be embraced.

Although not included in this STP, the symposium attendees also benefited from a first-day tutorial session offered by Wagdy Anis and Robert Kudder on condensation. This primer provided the science of condensation formation and present technologies used to control its formation. For those without this background, this tutorial served as necessary background for the technical presentations.

An ASTM symposium and STP are a team-effort, which warrants the recognition of those who spend much time and energy in their success. First, recognition goes to the many unnamed reviewers who, solely to better the industry, spent many hours reviewing and re-reviewing the submitted papers. ASTM and JTE efforts were spearheaded by Dorothy Fitzpatrick and Susan Reilly, respectively, with able assistance by Hannah Sparks and Christine Urso. Upon Dorothy's retirement, Mary Mikolajewski ably stepped in. Finally, special recognition goes to WJE staffer, Amber Stokes, who assisted the Editors keep to the ambitious review and symposium schedule, and the numerous email correspondences necessary to pull this all together.

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