

and Drying

Drainage Capacity Evaluation of EIFS / Wood Substrate

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Industry Collaborative Effort

Client: CCMC
Consortium Members

- Adex
- BASF
- Dryvit
- Durabond
- Durock
- Sto

Consultants

- Elie Alkhoury, CAN-BEST
- Don Onysko, DMO Associates



CAN-BEST wishes to thank all consortium members, CCMC and DMO for their support and constructive comments.

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This research program was carried out at CAN-BEST's laboratory in Brampton, Ontario (SCC accredited).



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2004 State-of-the-Art

ASTM E 2273-03 "Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies".

- **Generic Test**
Wood substrates require special attention
- **Not Appropriate**
Does not address Drying Capability

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ASTM Method

- **Spray Water into Fault Slot**
at rate of 106 to 116 g/min for 75 minutes
- **Collect and Weigh drained water**
for 60 minutes
- **Calculate % Drainage Efficiency**
$$= (W_{\text{Drained}} / W_{\text{Total}}) \times 100$$



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ASTM Method



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<h3>ASTM Method</h3> <ul style="list-style-type: none"> • Wetting 75 min • Drainage 60 min 	<h3>CCMC Method</h3> <ul style="list-style-type: none"> • Wetting 60 min • Drainage 60 min • Drying 48 hrs
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CCMC Method

- Continuous Mass Monitoring
- Trickle Wetting of Drainage Cavity

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CCMC Method – Drainage Phase

- Trickle Water onto WPB
at rate of 133 ml/min (8.0 l/hr) for 60 minutes
- Allow panel to drain for 60 min
- Drainage Unit-Retained < 30 g/m²
*(based on the projected drainage area)
= width of slot fault x its height*

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CCMC Method – Drying Phase

- Allow panel to dry for 48 hours
- Drying Unit-Retained < 15 g/m²
*(based on the projected drainage area)
= width of slot fault x its height*

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Project Description



- 6 Companies
(7 Systems, minimum 3 panels per system)
- OSB Preparation
(Special frames mounted on skids for ease of handling)




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OSB Substrate


- Horizontal Joint
3.2 mm wide horizontal joint located at panel's mid-height.
- Joint Preparation
Joint treated prior to WPB application.

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WPB (Water Penetration Barrier)

- **Two-Coats**
(CCMC requirement)
- **Application**
WPB applied by trowel or roller.
- **Ready for next step**



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Drainage Cavity

- **Adhesive Ribbon**
Drainage cavity controlled by the final thickness of adhesive ribbon (2-3 mm).
- **Geometrically-Defined**
(Not covered in this presentation)
Channels or other shapes carved in backside of insulation board.





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Insulation

- **Adhered System**
Adhesive is used to adhere insulation board to WPB.
- **Application**
2'x4' boards applied 7' high in running bond pattern.



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Lamina (Base Coat/Finish Coat)

- **Base Coat**
Trowel-applied, fibreglass reinforcing mesh embedded in base coat.
- **Finish Coat**
(Not Required)



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Curing & Conditioning



- **Curing**
Test panels allowed to cure at lab conditions for a minimum period of 7 days.
- **Conditioning**
Optional water pre-conditioning of drainage cavity.
- **Ready for testing**

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Test Set-Up

- **Master Test Frames**
A pair of master frames, suspended from specially designed weighing system were used.
- **Test panels**
Test panels mounted on Master frames, instrumented, and ready for water introduction.




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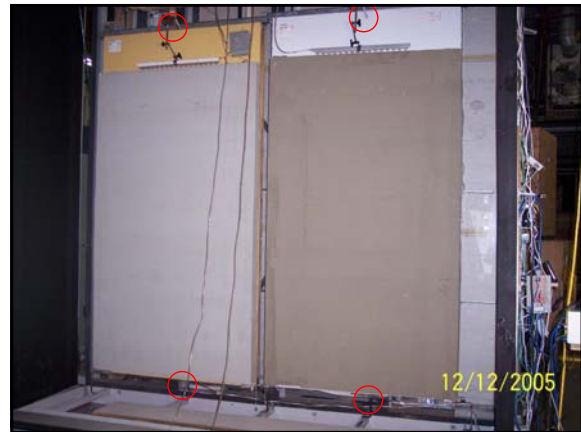
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Instrumentation - Measurement

- Mass Change Detection**
A pair of specialized weighing systems were used to detect minute changes in panel's mass with 0.01 g resolution.
- Temperature & RH**
 - Ambient
 - Top of drainage cavity
 - Bottom of drainage cavity




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Instrumentation - Data Acquisition

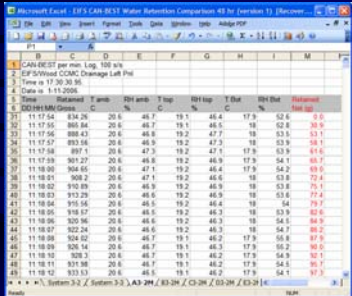
Monitor all instruments continuously

- Scan data 100 times per second
- Log data:
 - once per second in first two hours, and
 - once per minute for entire duration of test

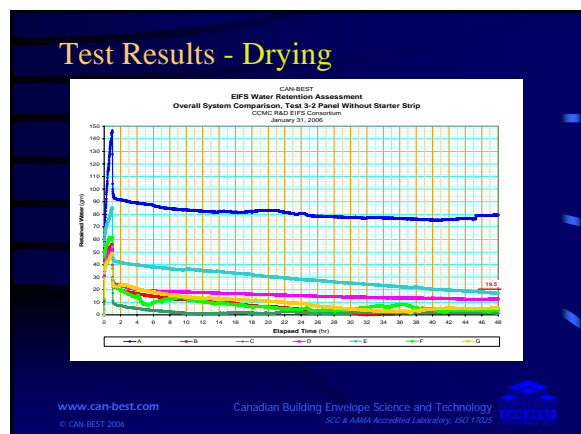
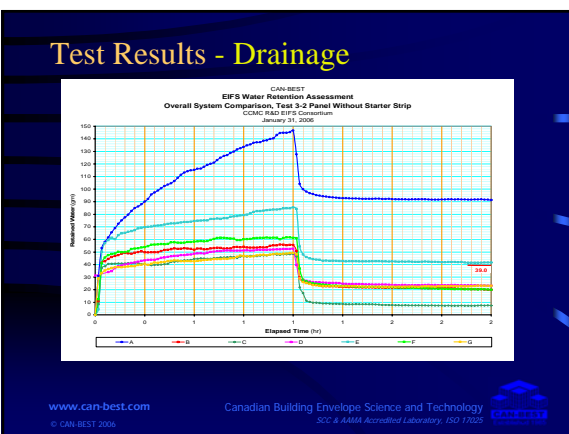


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Example Log



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WPB Performance

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Test Results - WPB

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Building Paper Performance

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Adhesive Performance (Thin vs. thick layer application)

High Absorbing

Low Absorbing

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EIFS Water Retention Assessment Sample A

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EIFS Water Retention Assessment Sample C

Effect of water trapped in taped joint

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