

BUILDING ENCLOSURE TESTING
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A CARING SAFETY CULTURE ... 24/7/365

Safety is our first & most important core value

- *Zero accidents & zero injuries is our goal*

Safety importance continually reinforced

- *Daily, weekly & monthly safety reminders*
- *Job & task specific safety training*
- *360° Walk-Around Program*

Safety record is improving - but more work needs to be done

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AGENDA

- 01 Why do we test?
- 02 Benefits of Pre-Construction Lab Mock-Up Testing (Lab PMU)
- 03 Keys to Success in the Lab
- 04 Field Testing



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WHY DO WE TEST?



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NATURAL EVENTS



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NATURAL EVENTS



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NATURAL EVENTS

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NATURAL EVENTS

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MAN MADE EVENTS



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BENEFITS OF PRE-CONSTRUCTION LAB MOCK-UP TESTING



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BENEFITS OF LAB MOCK-UP TESTING

- Validate the structural integrity
- Measure the air tightness
- Verify the water drainage characteristics
- Observe condensation behavior
- Identify critical construction details
- Review sequencing/logistics
- Establish standard of care
- Verify code compliance
- Confirm compliance with contract requirements and project specifications



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BENEFITS OF LAB MOCK-UP TESTING



Exterior Wall Performance Characteristics:

- Resistance to air leakage
- Resistance to water penetration
- Structural performance
- Thermal cycling performance
- Condensation evaluations
- Building movement and seismic evaluations
- Durability
- Special Tests
 - Acoustic
 - Hurricane
 - Bomb Blast

Elements that should be included in the mock-up:

- Accurate representation of the wall design inclusive of typical details
- Specialty details and transitions
- Anchorage conditions
- Longest spans
- Corner conditions
- System transitions

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KEYS TO SUCCESS IN THE LAB



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KEYS TO SUCCESS IN LAB PMU TESTING



Selecting
best testing
venue

Safety and
Light
Conditions

Easy Access

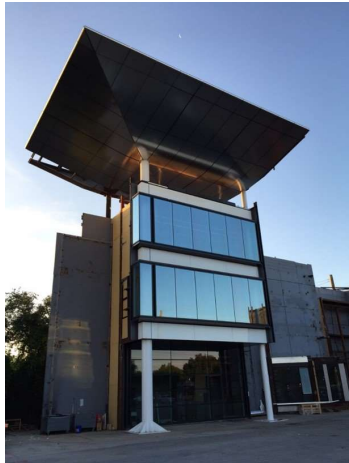
Equipment

Ability to
deal with
delays

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KEYS TO SUCCESS



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KEYS TO SUCCESS

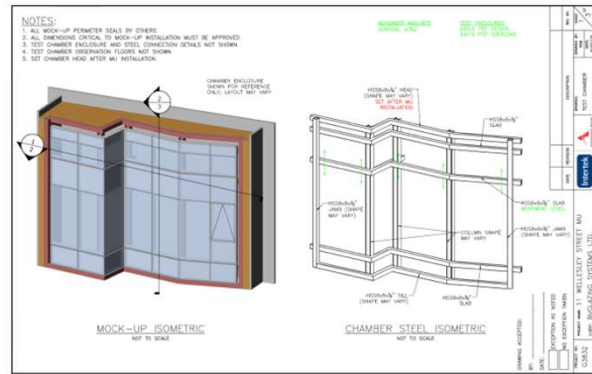
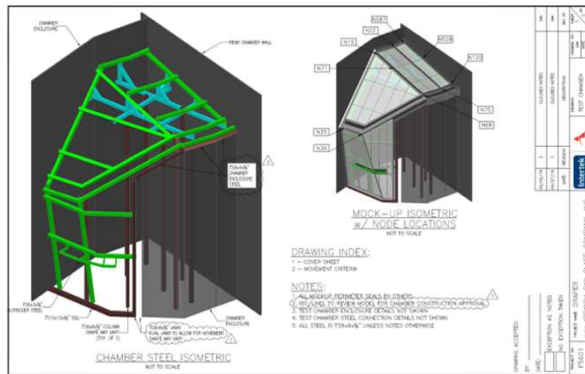


- Understand the project performance requirements relating to the exterior wall.
- Review the test methods required by the project specifications.
- Look for special testing requirements:
 - Seismic
 - Thermal
 - CRT
 - Bomb Blast
 - Missile Impact
- Elements that should be included in the PMU
 - Accurate representation of the wall design inclusive of typical details.
 - Specialty details and transitions
 - Anchorage conditions
 - Support Conditions
 - Longest Spans
 - Corner Conditions
 - System Transitions

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KEYS TO SUCCESS



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KEYS TO SUCCESS



The formal test procedure is a critical document and should be prepared by the testing laboratory:

- Pre-testing
- Deflection criteria
- Design pressures
- Simulated building movement issues
- Pass/fail criteria
- Substrate testing

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MOCK-UP CONSTRUCTION AND PMU INSTALLATION

- The placement of the test chamber steel representing the building structural frame is a critical first step.
- Every chamber is customized to accommodate project conditions.
- Verify the availability of special erection equipment at the test site.
- Maintain accurate as built drawings.
- Promptly notify test lab and owner of any changes to the schedule.



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TESTING PLAN



Determine the required observers

Inform observers of the schedule for each test sequence

Advise all interested parties that schedules will be dynamic

- 90% of all mock-ups require some form of remediation during the test phase

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PRIOR TO TESTING

Publicize the proposed mock-up test schedule for all interested parties:

- Installation of the mock-up
- Visual inspection
- Sealant cure time
- Testing duration
- Remediation and retesting
- Report
- Dismantle



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CAREFULLY ANALYZE THE TEST RESULTS



Cause of premature failures must be determined: Excessive Deflection, Glass flaws, anchor failures are often contributing factors

Analysis and understanding of test results, will require an investment of time

- Workmanship
- Design

Avoiding the temptation of “Band-Aid” remediation

Involve the design team:
Owner/Architect/General Contractor

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FIELD TESTING



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FIELD TESTING VS. LABORATORY TESTING



1. Lab Testing

- Performed on prototype specimen to certify or validate product performance ratings

2. Quality Assurance Field Testing

- Performed on “newly” installed products to verify installed performance of the product and the installation

3. Forensic Testing

- Performed on wall assemblies with known water control problems as a means to accurately identify suspect wall construction components and details

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REASONS TO PERFORM FIELD TESTS




- 1. Quality Control**
 - New construction
 - Building façade renovations and improvements
 - Replacement
 - Remedial and maintenance verification
- 2. Investigative**
 - Water leakage analysis
 - Seasoned buildings
- 3. Litigation**

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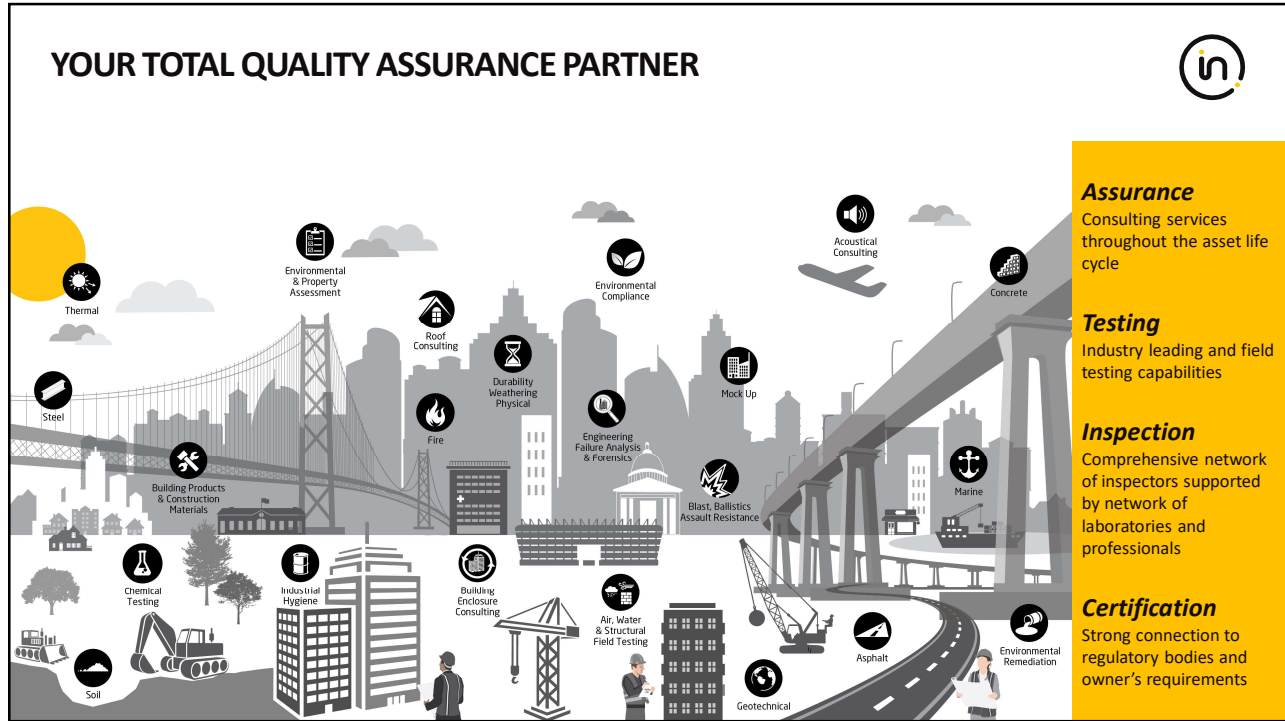
COMMON FIELD TESTS

- 1. Air infiltration or exfiltration testing**
- 2. Water penetration testing**
- 3. Structural performance testing**
- 4. Specialty field tests:**
 - Acoustical
 - Thermal evaluations
 - Glass evaluations (bow/warp, frost point)
 - Masonry anchors (shear and tension tests)
 - Masonry wall absorption
 - Tracer smoke
 - Vacuum dome
 - Roof testing
 - Dynamic water testing
 - Blower door and thermal imaging



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YOUR TOTAL QUALITY ASSURANCE PARTNER



Assurance
Consulting services throughout the asset life cycle


Testing
Industry leading and field testing capabilities


Inspection
Comprehensive network of inspectors supported by network of laboratories and professionals


Certification
Strong connection to regulatory bodies and owner's requirements


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