

TESTING CLADDING IN NZ

Current and Future

**CINZ – The Science of Building
Weathertightness**



Agenda

- NZBC Key Clauses for Weathertightness
 - B1 – Structure
 - B2 – Durability
 - E2 – External Moisture
- E2 – Approved Documents
- AS/NZS 4284:1995 Testing
- Actual Loads (Structural/Moisture) on Exterior Walls
- E2 Desired State?
- Real Requirements of a Cladding
- A Way forward



Key NZBC Clauses For Cladding

(not including B2)

- B1 - Structure
 - B1 has many standards for various materials referenced in the approved documents
 - e.g. Face Wind Loading, Bracing – P21/EM3, many other established calculation test methods.
 - In many cases the cladding is an integral part of the wall system (structurally)

Key NZBC Clauses For Cladding

- B2 - Durability
- All individual components must be proven by some means* to meet all other requirements of NZBC for a specified period depending on location in the system.
- In many cases with exterior cladding, this does not necessarily account for a test of system durability, which relates to the real environment in which the system is used.

* Historical, Test, Similar Materials Comparison

Key NZBC Clauses For Cladding

- E2 - *“excess moisture present at the completion of construction, shall be capable of being dissipated without permanent damage to building elements”* and, *“walls, floors and structural elements in contact with the ground shall not absorb or transmit moisture in quantities that could cause undue dampness, or damage to building elements.”*

Key NZBC Clauses For Cladding

- E2 – Approved Documents: Acceptable Solutions, or Verification Method
- No specific guidelines for the designer or engineer, only a test (unlike for Structure)
- Each building in NZ is almost a ‘one off’, with varying conditions and loads



E2/VM1 and E2/AS1

- E2/AS1 generic solutions
- E2/VM1 - AS/NZS 4284:1995
 - “Testing of Building Facades”
 - Developed for Curtain Walls (Based on Sirowet Method by CSIRO)
 - Typically repetition of parts, different construction process environment (specialists)
 - Not specifically designed for Residential Cladding but can be applied



AS/NZS 4284:1995

- Structural Test
- Air Infiltration Test
- Static and Cyclic Water Penetration
- BMU Restraint
- Seismic Serviceability
- Proof Test
- Seal Degradation
- Seismic Test and ULS displacement

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Relevant to Residential Building

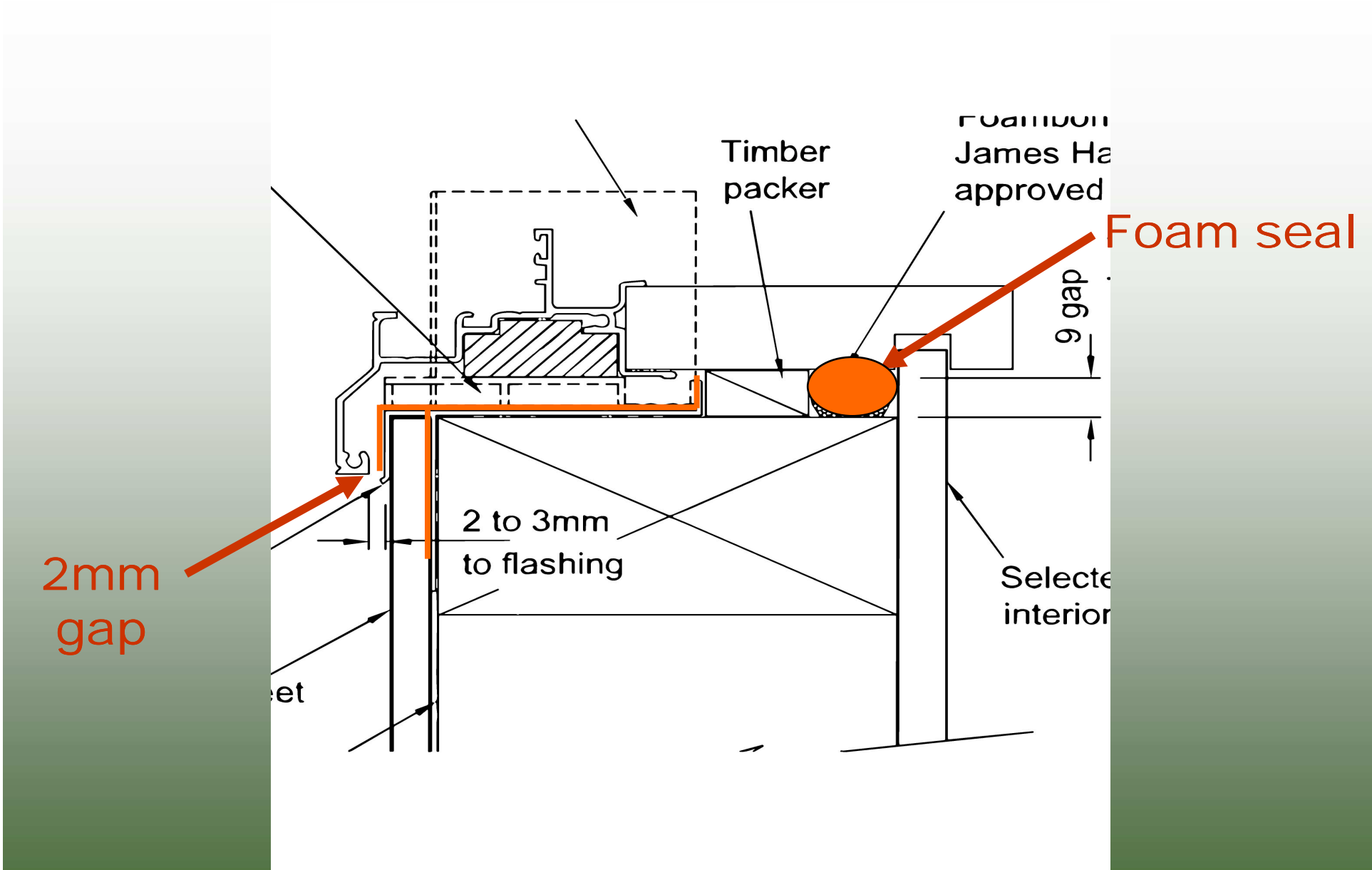
- Static and Cyclic Water Penetration
 - Typical Test Pressures 82.5-330 Pa. (L to VH)
- Seal Degradation (Damage to Gasket)
- Some applications seismic serviceability
- Test with window and other penetration in wall panel



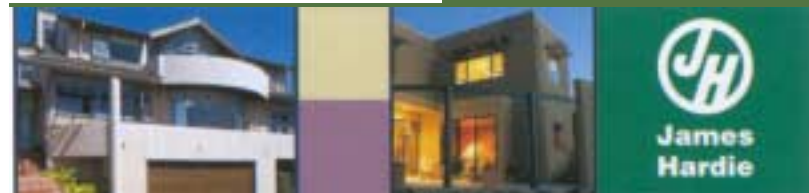
The 4284:1995 Test

- Test windows installed as specified
 - Check window/cladding junction and window performance
- Use of viewing ‘ports’ to enable observation of performance
 - E.g. observation of failure point with Linea test
- Air and Water Penetration inter-related
 - Use of air seals around window frame, use of sheathing behind Linea weatherboards
- Flashing design can be based of tests
 - e.g. Water tracking along aluminium frame determining size of flashing





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The 4284 Test

- Improvements in performance could be made at this time if all cladding systems were tested using the 4284:1995 method

System Test

- As perfectly built
- With some imperfection
 - How much imperfection?
 - i.e. How much of specification can be compromised?
 - e.g. removal of window gasket to cladding
 - e.g Testing with no lining
 - In this case are all system materials of sufficient durability? (Requires time to test this)

James Hardie Testing

- Weather Penetration Testing
 - NZS 4211:1985 / AS/NZS 4284:1995
- Durability Testing – Modified ASTM Test Heat Rain
Carbonation

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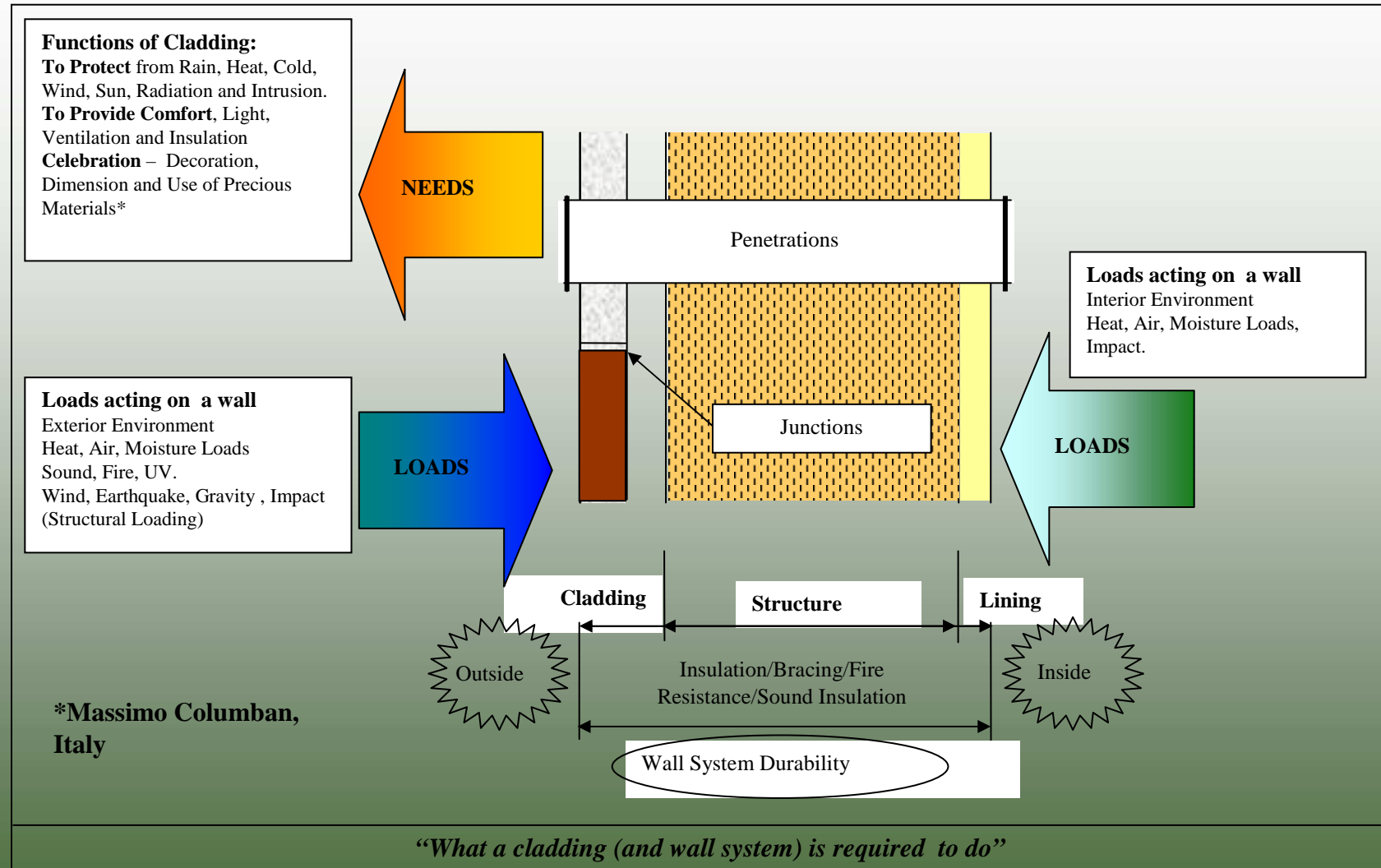
James Hardie Testing

- Building Wrap testing in and out of system
 - Weather testing
 - AS/NZS 4200.1:1995
 - BS3137
 - Air Permeability
 - Heat Ageing and Real time exposure

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Actual Loads on Exterior Walls



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E2 – A desired state would be;

- “*to have the ability to **predict** moisture transport through walls (E2/E3)*
- *To **prevent** moisture accumulation in wall systems and components*
- also would be beneficial to understand the **effect of moisture transport on energy efficiency?**”

Moisture Control in Buildings - Trechsel

Requirements of Cladding

- To deal with all loads as they occur in their sequence and frequency in service
- To maintain adequate performance and **aesthetic appeal** for the duration
- It should be noted the loads all act together and many are inter-dependant on one another, thus there is an interaction between E2, E3 and H1, and possibly long term aesthetic appeal.

So how do we move forward?

- Coordinated Industry Approach
- Funding for incremental knowledge gain and dissemination of information
- What is required is an improved framework for testing claddings in NZ

