Facilities : Remediation works
Proactive Release: 19 July 2019

08 July 2019

[redacted]

E-mail: [redacted]

Dear [redacted]

Official Information Act (1982) Request

I write in response to your Official Information Act request, dated 10 June 2019. You requested the following information:

- **Copies of the test reports, and results of tests conducted in April, on the windows at Scott that have detected leakage.**
- **Any correspondence between the testing body used for the above, and CMDHB, about those tests.**
- **Any internal correspondence or discussion at CM Health at any clinical, health, management or board level, about any and all possible or actual health implications of the above leakage or possible leakage at Scott or elsewhere or in other buildings, during any current or future recladding work.**

A copy of the Test Report requested is provided (**attached**). This report was completed for CM Health by Window Engineering Consultants/ Thermosash Commercial Ltd, following testing on 18 April 2019. We are also providing (**attached**) a copy of a Report from Mott McDonald from August 2018, which describes the Testing requirements. We have chosen to withhold the individual names of those engaged in the this testing, while noting the organisation they represented. We believe that the public interest is in noting independent advice was sought, but this does not outweigh the privacy interests of those employees. We do this under section 9(2)(a) of the Act.

We note the following points as important context for this report:

- The recladding requirements identified in the past with the Scott Building facades are the result of significant weather-tightness issues, which CM Health has commenced remediation work on.
- As part of our remediation of the Scott Building, we plan to retain the existing upper windows. The windows will form part of the new façade of the Scott building.
- To ensure we do not have any ongoing weather-tightness issues, we recognised that it is critical that the upper windows are airtight, and do not allow moisture to enter the building.
- The purpose of the testing was to inform CM Health of the current condition of the windows, to enable decisions on further work. This sample testing provides 'bench-mark' results to assist with planning of further work requirements.

- All new windows are now subject to stringent air leakage testing of this type. The test is normally performed for new windows, not existing windows in place for 15 years. However, to ensure there are no ongoing weather-tightness issues, CM Health applied these same "new window" tests to our existing upper windows.
- The tests comprise a very stringent methodology that involves water being actively sucked into the space, rather than normal 'weather-like' conditions. In their normal operation, there is no evidence of leaks affecting the facade, and the cavity design also helps in that regard.
- However, the testing conducted in April 2019 did identify faults, and the seals will need to be renewed as a part of the remediation programme. Options to remedy this issue are being investigated. Based on the results, the 25-year major scheduled maintenance will be advanced, and the windows independently retested.

There has been no other correspondence between the Contractor and CM Health on this matter.

Following receipt of the Test Report, the findings were reviewed and incorporated into the regular operational reporting by the Facilities Services to the Hospital Advisory Committee (June 2019), which is publicly available.

There has been no change to the possible or actual health implications related to the remediation programme. The safety of patients, staff and visitors needing our health services remains paramount. The window testing programme and results are not related to damage to the cladding or framing timbers identified for replacement as a part of the recladding works. The health services in the building are continuing as normal from an operational viewpoint, and so far there has been minimal impact to patients.

As previously stated, our infection specialists assure us that the presence of the timber-framing deficiencies and deterioration present no safety risk. The arrangements in place for the remediation works ensure that a physical barrier exists between the remediation work and patient areas, and the work area is not open to ventilation or near an air-intake. The work and procedures continue to be checked off by the infection control team before each stage proceeds.

I trust this information satisfactorily answers your query. If you are not satisfied with this response you are entitled to seek a review of the response by the Ombudsman under section 28(3) of the Official Information Act.

Please note that this response or an edited version of this may be published on the Counties Manukau DHB website.

Yours sincerely,

Fepulea'i Margie Apa
Chief Executive Officer
Counties Manukau Health

MOTT MACDONALD

Memorandum

Project:	Middlemore Scott Building Reclad Façade		
Our reference:	401173	**Your reference:**	
Prepared by:	s9(2)(a)	**Date:**	10 August 2018
Approved by:	s9(2)(a)	**Checked by:**	s9(2)(a)
Subject:	Site water testing		

The Middlemore Hospital Scott Building is to have its façade reclad as part of maintenance works to the building. The existing building is split into two sections, ground floor to level three, originally built in 2001, and level four to level five, extension built in 2005.

The intention is to retain the existing windows on levels four and five and the curtain wall located above the main entry on all levels. The remaining windows on level one to level three are to be replaced. The cladding (excluding existing timber framing) on level one to level three is to be replaced with the introduction of a cavity system to meet NZBC compliance. Cladding on levels four and five was built with a cavity and the intention is to only replace the exterior cladding layer to match the lower levels.

1 Testing to be implemented

There are two types of testing that have been identified;

1. Initial testing to establish the benchmark performance of the retained windows and curtain wall,
2. QA testing to the new works to verify the installation.

1.1 Benchmark testing

The purpose of the benchmark testing is to try and identify existing or potential future leak areas that would not be resolved with the current scope, so that the client is informed about consequences of decision to retain these systems.

Initial benchmark testing should occur at locations where the intention is to retain the existing windows and curtain wall. The investigation will be beneficial in addressing the current state of the façade and identifying any leaks and their cause that may currently be occurring. Identified leaks can be classified as two types;

1. Leaks occurring at the interface between the glazing and the solid clad façade,
2. Leaks occurring within the joinery of the glazing system.

1.1.1 Leaks at glazing interfaces

Any leaks identified to occur at glazing interfaces should be able to be remediated as part of the recladding scope of works. Early detection of these leaks can influence the cladding installation procedure to include adequate sealing of the glazing interfaces for NZBC E2 requirements.

1.1.2 Leaks within glazing system

If leaks are identified to occur within the joinery of the glazing system, further discussion with the client may be required. If the leaks identified are classified to be minor and can easily be repaired, remediation works can be included as part of the recladding scope of works. However, if the leaks are identified to be major, client input could be required to decide whether to remediate the windows or to also replace windows which are currently, scoped as being retained.

1.2 QA Testing

At the completion of the recladding works, a second round of site water tests will be required to verify the installation as part of the required QA. If leaks were to occur at this stage it would be beneficial to have the results of the initial investigation as a comparative tool. It would also be required to re-test any areas which may have leaked during the initial investigation to confirm appropriate remediation has been conducted.

2 Types of testing

Initial benchmark testing should occur on levels 4-5 where existing windows are to be retained and the main entry area on levels 1-5 where existing curtain wall is to be retained. The QA site water testing will occur on all levels, incorporating all different glazing types and interfaces.

Site water testing to include;

1. Site water hose test, AAMA 501.2, Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems, on the existing curtain wall and after construction QA testing,
2. Pressure box test, AAMA 502 Voluntary Specification for Field Testing on Newly Installed Fenestration Products, on the existing windows on levels four and five.

Due to the location of the curtain wall to be retained, it will be difficult to conduct pressure box testing on this system. Therefore, for these areas where there is curtain wall it would be reasonable to conduct a site water hose test to access the initial benchmark conditions of the façade.

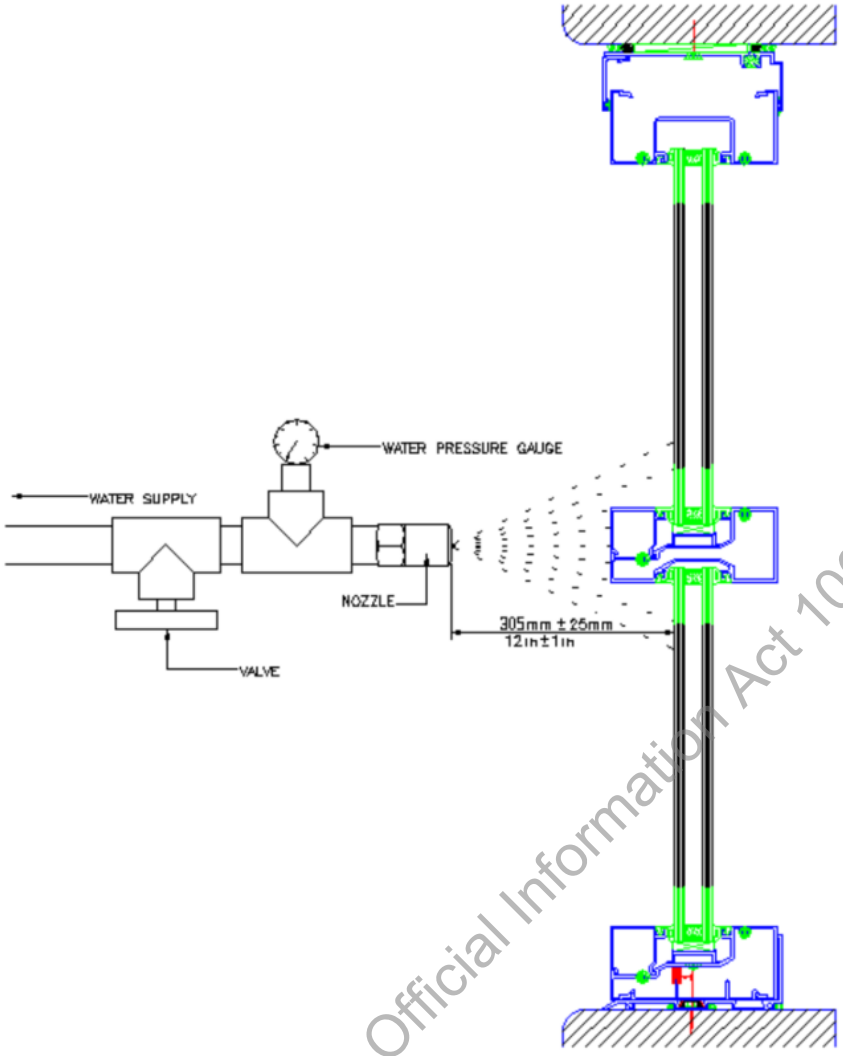
2.1 Site water hose test (AAMA501.2)

Site water hose testing should follow the method set out in AAMA501.2. In summary this procedure involves:

1. The test occurring to an approximately 1-2m section of glazing interface (head, sill and jamb).
2. The test will be conducted using a pressure-controlled hose held approximately 300mm from the window surface (Figure 1).
3. The test water pressure is to be adjusted to be between 205-240 kPa (30-35 psi).
4. Each test section is to be tested by slowly moving the hose back and forth for a period of 5 minutes.
5. Testing should begin at the lowest horizontal glazing interface (sill) followed by the adjacent glazing interfaces (jamb and head).

AAMA501.2 testing is to provide a quality assurance check for curtain walls. This test is not appropriate for operable windows and doors. For operable windows and doors AAMA502 (pressure box test) should be used.

Figure 1: AAMA501.2 site water hose test set up



Source: AAMA501.2, Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefront, Curtain Walls and Sloped Glazing Systems

2.2 Pressure box test (AAMA502)

Compared to site water hose testing the pressure box test is a more robust test to assist in the identification of leaks. Pressure box testing should follow the method set out in AAMA502. In summary this procedure involves:

1. Sealing a test chamber (typically made of plywood and plastic) to the interior fully encasing the window to be tested.
2. The test chamber should have a controllable exhaust to achieve the required pressure difference between the interior and exterior.
3. Water is to be uniformly sprayed (uniform grid system) to the window from the exterior (Figure 2 and 3).
4. The test is conducted by simultaneously supplying or exhausting air to the sealed chamber maintaining a pressure difference and applying water to the exterior face of the window.
5. Pressure differentials shall be derived as per Table 1.
6. All operable components of windows and doors should be closed and locked for the duration of the test.
7. The conducted test will be for a static air pressure difference for a continuous duration of 15 minutes.
8. Observation is to be made from the interior for any potential leaks.

Table 1: Pressure box test, test pressures

Scenario	Test Pressure	Failure Criteria	Notes
NZS4211 Performance (Best outcome)	0.3xW_s	NZS4211 'Uncontrolled water'	NZS4211 laboratory test pressure is 30% of the AS1170.2 positive SLS pressure (W_s). See section 2.3 for NZS4211 definition of 'uncontrolled water'.
AAMA502 Performance	0.2xW_s	AAMA502 'Uncontrolled water'	AAMA502 allows for 1/3 reduction of laboratory test pressure, to account for difference between laboratory and field installation/ environments. AAMA502 'uncontrolled water' is a slightly less onerous definition since it allows collection of water on the window sill/ reveal.
Installed windows do not meet above performance criteria	If water penetration occurs at a pressure lower than 20% W_s, further discussion will be required in regards to the condition of the existing windows		

2.3 NZS4211 Definition of water penetration

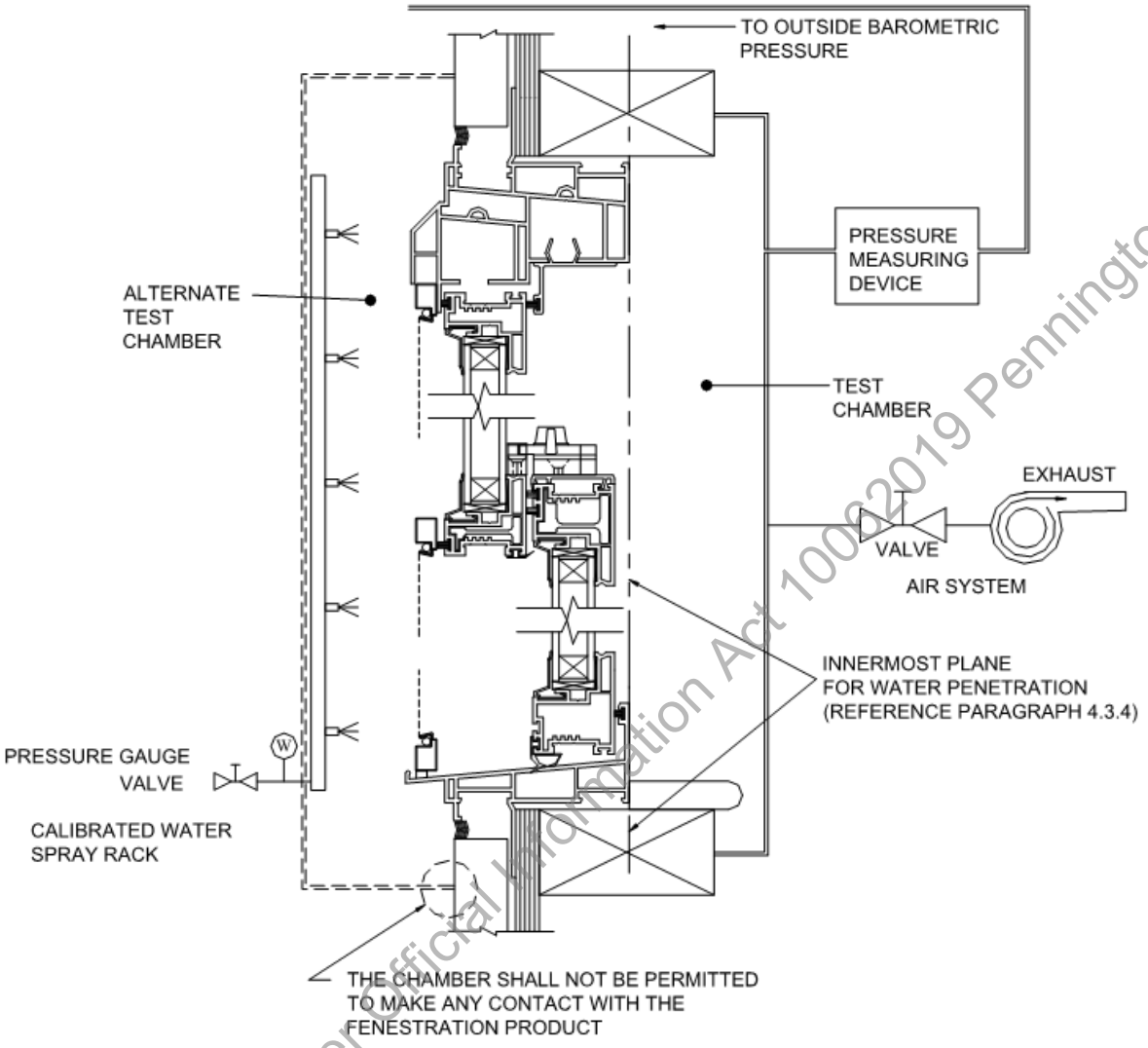
According to NZS4211, **uncontrolled water penetration** is defined as:

1. Water that is not contained within acceptable drainage areas (ie, sill, flashing etc).
2. Water that has the potential to damage interior finishes.
3. Water that enters the interior in a continuous flow.

Acceptable water penetration is defined as:

If minor water is observed on the interior at operable doors/windows or within a minute of a pressure change it is considered as acceptable water penetration.

Figure 2: AAMA502 pressure box test set up



Source: AAMA502, Voluntary Specification for Field Testing of Newly Installed Fenestration Products

Figure 3: Example pressure box test set up, A interior, B exterior

3 Cause of leaks and interiors linings

If a leak occurs and the cause cannot be easily identified, internal linings may need to be removed. A detailed report should be provided for any leaks that may occur in including the location and cause. These locations should be remediated and re-tested after the façade recladding works is completed.

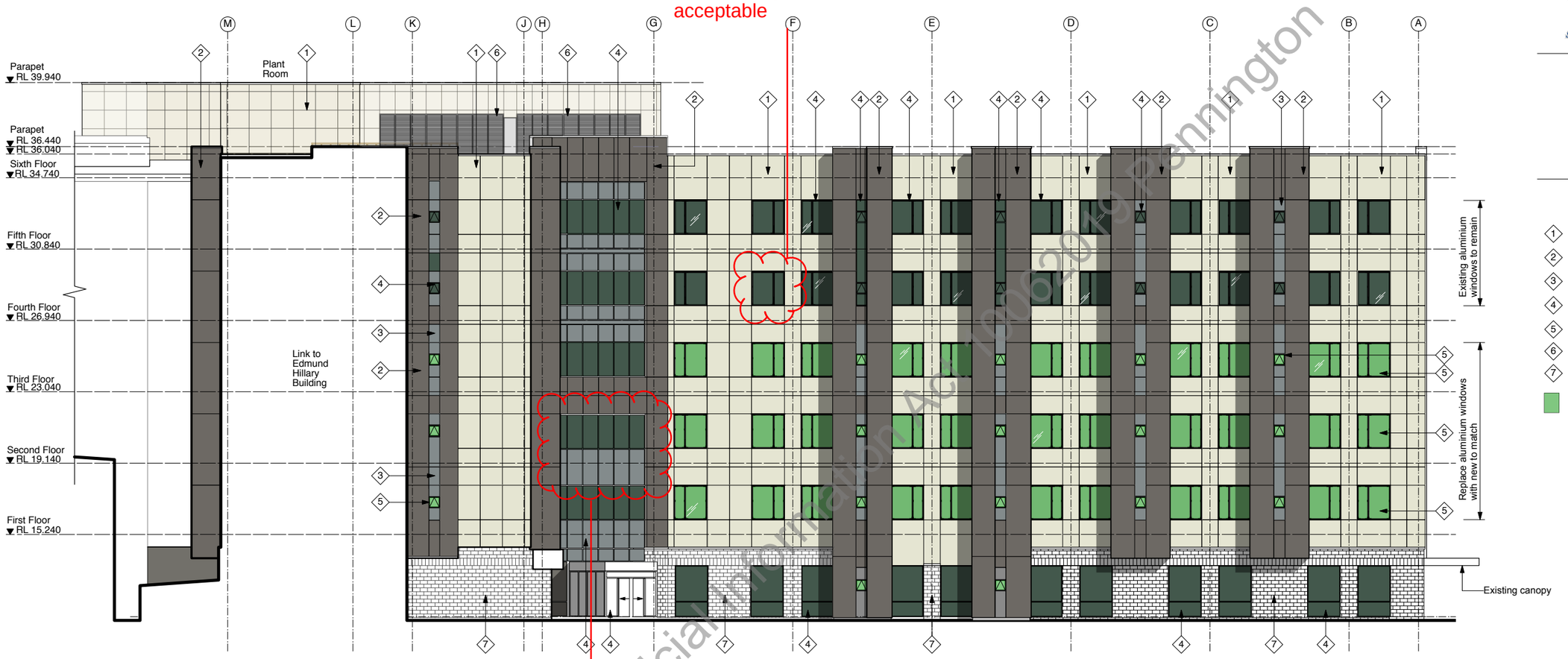
4 Test regime

Initial benchmark testing should occur at no less than 4 locations where windows and curtain wall are to be retained. Refer to attached elevations with suggested test locations. Locations may change depending on availability of safe site access.

It is anticipated the QA site water hose testing should allow for testing at no less than 12 locations across all elevations reclad façade.

Note: Test locations suggestions only, will depend on availability of safe access.

#2 Window unit, pressure box test, any similar unit is acceptable



#1 Main entrance curtain wall, site water hose test, any similar curtain wall location is acceptable

1 PROPOSED EAST ELEVATION
1:250 @ A3

EXTERIOR CLADDING SCHEDULE

ALL NEW WALL CLADDING TO BE HPL WITH SELECTED COLOURS

ALL WINDOWS TO LEVEL 4 AND 5 ARE TO REMAIN IN PLACE (INDICATED DARK GREY)

ALL WINDOWS TO LEVELS 1, 2 AND 3 ARE TO BE REPLACED WITH NEW WINDOWS AND GLAZING TO MATCH EXISTING L4 to L5 (INDICATED GREEN)

ALL SEISMIC FRAMED WINDOWS TO MAIN ENTRY (ANGLED FACE) ARE TO REMAIN (INDICATED TWO TONE GREY)

ALL SEISMIC FRAMED WINDOWS TO LEVELS 4 AND 5 TO NORTH, WEST & SOUTH FACES TO REMAIN (INDICATED DARK GREY)

ALL SEISMIC FRAMED WINDOWS TO LEVELS 1, 2 AND 3 TO NORTH FACE ARE TO BE REPLACED WITH NEW TO MATCH (INDICATED GREEN)

ALL ENSUITE WINDOWS TO LEVEL 1, 2 AND 3 (SEISMIC AND PORTHOLE TYPE) ARE TO BE REPLACED WITH NEW SQUARE PORT HOLE TYPE OPENING
WINDOWS TO MATCH L4 & L5 (INDICATED GREEN) COMPLETE WITH HPL PANELS ABOVE AND BELOW IN FEATURE COLOUR (INDICATED LIGHT GREY)
TO REINFORCE DARK VERTICAL BANDS

2 OFF SOUTH LOUVRES AT L3 + L4 ARE TO BE REPLACED AS REQUIRED DUE TO CAVITY DEPTH OF HPL CLADDING SYSTEM (LONGER SLEEVE & SMALLER LOUVRE BY APPROX 60mm)

ALL SOUTH FACE LOUVRES AT L1 (ABOVE SERVICE TUNNEL ROOF) ARE TO REMAIN IN PLACE WITH ALUMINIUM JAMB AND HEAD CLOSERS TO HPL CLADDING

2 LARGE BANK OF LOUVRES AND ACCESS DOOR TO L6 PLANT ROOM ARE TO REMAIN IN PLACE

SINGLE BANK OF LOUVRE AND DOUBLE ACCESS DOOR TO L2 PLANT ROOM ARE TO REMAIN IN PLACE

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COUNTIES MANUKAU HEALTH

Cladding Materials Key

1. New HPL Panel Cladding - Light colour
2. New HPL Panel Cladding - Dark Warm Grey colour
3. New HPL Panel Cladding - Cool Grey colour
4. Existing Aluminium framed Joinery to Remain
5. New Aluminium framed Joinery to Match Existing
6. Existing Aluminium Louvres
7. Existing Concrete Block

New aluminium framed joinery. Frame & glass colours to match existing.

REVISIONS	DATE	BY	REASON
A	22.12.16	JG	RESOURCE CONSENT

Klein Limited
27 College Hill Freemans Bay
PO Box 47 538 Auckland
Phone: 09 377 7005
Fax: 09 377 7006
Web: www.klein.co.nz
Email: klein@klein.co.nz

Consultants

Services:
Fire:
Structural:
Project Manager:
Quantity Surveyor:
Communication:

Project:
SCOTT BUILDING EXTERNAL REFURBISHMENT MIDDLEMORE HOSPITAL
For: COUNTIES MANUKAU HEALTH

Drawing Title:
PROPOSED EAST ELEVATION

Drawn	JG	Checked	–
Date	04.04.2016		
Cadfile	31033-PD-210-East Elevations		
Scale	1:250 @ A3		

Job No:	Drawing No:	Revision:
3.1033	RC-210	A

Note: Test locations suggestions only, will depend on availability of safe access.

#2 Operable window, pressure box test, any similar window is acceptable

#3 Louvre/glazing interface, site water hose test, any similar location is acceptable

2 PROPOSED NORTH ELEVATION
1:250 @ A3

EXTERIOR CLADDING SCHEDULE

ALL NEW WALL CLADDING TO BE HPL WITH SELECTED COLOURS

ALL WINDOWS TO LEVEL 4 AND 5 ARE TO REMAIN IN PLACE (INDICATED DARK GREY)

ALL WINDOWS TO LEVELS 1, 2 AND 3 ARE TO BE REPLACED WITH NEW WINDOWS AND GLAZING TO MATCH EXISTING L4 to L5 (INDICATED GREEN)

ALL SEISMIC FRAMED WINDOWS TO MAIN ENTRY (ANGLED FACE) ARE TO REMAIN (INDICATED TWO TONE GREY)

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ALL ENSUITE WINDOWS TO LEVEL 1, 2 AND 3 (SEISMIC AND PORTHOLE TYPE) ARE TO BE REPLACED WITH NEW SQUARE PORT HOLE TYPE OPENING WINDOWS TO MATCH L4 & L5 (INDICATED GREEN) COMPLETE WITH HPL PANELS ABOVE AND BELOW IN FEATURE COLOUR (INDICATED LIGHT GREY) TO REINFORCE DARK VERTICAL BANDS

2 OFF SOUTH LOUVRES AT L3 + L4 ARE TO BE REPLACED AS REQUIRED DUE TO CAVITY DEPTH OF HPL CLADDING SYSTEM (LONGER SLEEVE & SMALLER LOUVRE BY APPROX 60mm)

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SINGLE BANK OF LOUVRE AND DOUBLE ACCESS DOOR TO L2 PLANT ROOM ARE TO REMAIN IN PLACE

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TOWARDS 20/20 Supporting our community into the future

COUNTIES MANUKAU HEALTH

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1. New HPL Panel Cladding - Light colour
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5. New Aluminium framed Joinery to Match Existing
6. Existing Aluminium Louvres
7. Existing Concrete Block

New aluminium framed joinery. Frame & glass colours to match existing.

REVISIONS	DATE	BY	REASON
A	22.12.16	JG	RESOURCE CONSENT

Klein *Limited*
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Consultants

Services:
Fire:
Structural:
Project Manager:
Quantity Surveyor:
Communication:

Project:
SCOTT BUILDING EXTERNAL REFURBISHMENT MIDDLEMORE HOSPITAL
For: COUNTIES MANUKAU HEALTH

Drawing Title:
PROPOSED NORTH ELEVATION

Drawn	**JG**	**Checked**	**--**
Date	**04.04.2016**		
Cadfile	**31033-PD-211-North Elevation**		
Scale	**1:250 @ A3**		

Job No:	Drawing No:	Revision:
3.1033	**RC-211**	**A**

WEC Thermosash

P.O. Box 100-340 NorthShore Mail Centre, Auckland 10, New Zealand
Phone (09) 444-4944 Fax: (09) 444-4886
Window and Fai;ade Testing Laboratory; 11 Olive Road, Penrose

Test report: 1463-51

AAMA 501.2 and AAMA 502 Field Testing of three existing windows at Middlemore Hospital's Scott Building Level 4

Reference:	Middlemore Hospital - S1
Client:	Insite Facades
Specifier:	Mott MacDonald
Sample Designer:	Unknown
Installer:	Unknown
Test dates:	18th April 2019
Test facility:	Window Engineering Consultants Onsite Test Rig
Persons Present:	s9(2)(a), Window Engineering Consultants (Complete test) s9(2)(a) Thermosash Commercial Ltd (Complete test) s9(2)(a) Mott MacDonald s9(2)(a), Mott MacDonald s9(2)(a), Counties Manukau Health s9(2)(a) Insite Facades

1.0 SUMMARY

Three windows were tested at Level 4 of the Scott Building at Middlemore Hospital in South Auckland. The windows are part of an existing building which is undergoing a re-clad process. Levels 4 and 5 of the building are newer than the buildings lower levels and Window Engineering Consultants has been engaged to perform 'bench-mark' testing on some selected existing windows to assist in the client's decision-making process.

Unit 1: Corridor Strip curtainwall panel with louvre spandrel panel
Test Standard: AAMA 501.2- Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems

The was uncontrolled water penetration at test location 6 - the vision-spandrel horizontal member. The water appeared to enter the building at the junction between the louvre plenum and the window transom. All other locations tested showed no visible water penetration.

Unit 2: Bed-room fixed window
Test Standard: AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.

There was uncontrolled water penetration through the right-hand-side rear sill tray fixing after 2 minutes of testing at 200 Pa static pressure. Testing was suspended after approximately 3 minutes of static pressure to avoid water damage to the surrounding structure with no other leak locations observed in this time.

Tested by: s9(2)(a)

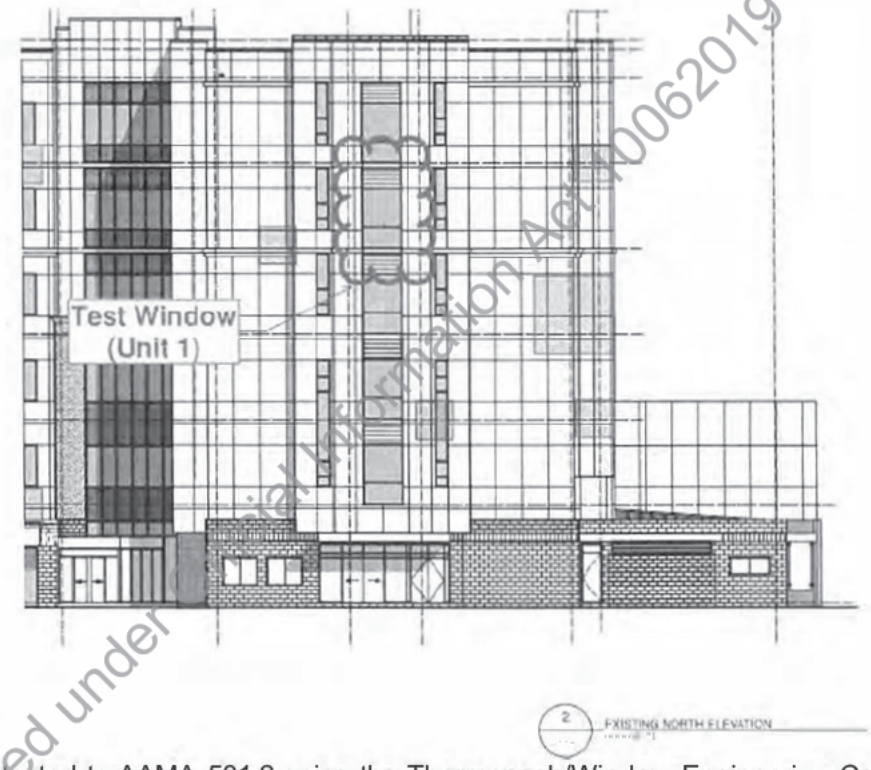
Unit 3: Bathroom awning sash
Test Standard: AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.

There was uncontrolled water penetration through the right-hand-side rear mitre joint between the sill and the jamb of the awning sash perimeter frame. Air leakage was also noticed at the same location on the left-hand-side under 300 Pa static water pressure.

After 8-mins 30-secs, the pressure was reduced to 200 Pa with water still penetrating at the same location. The test was suspended after 10mins.

2.0 TEST SETUP and RESULTS

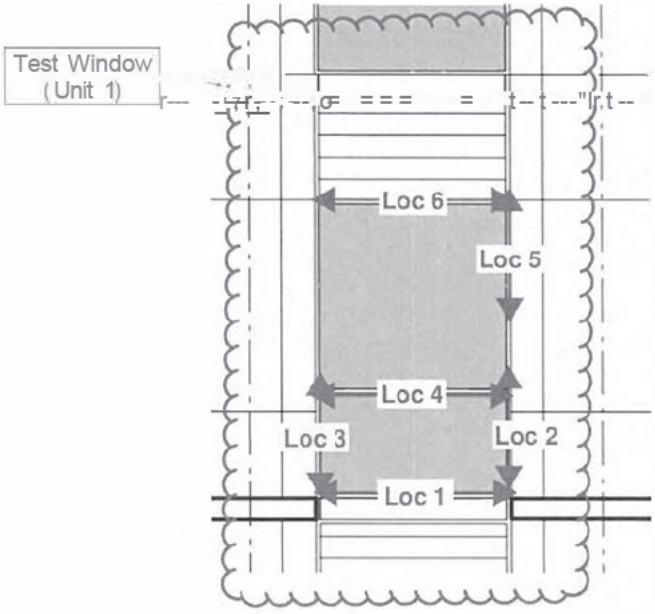
Unit 1: Corridor Strip curtainwall panel with louvre spandrel panel



Unit 1 was tested to AAMA 501.2 using the Thermosash/Window Engineering Consultants onsite test equipment being ...

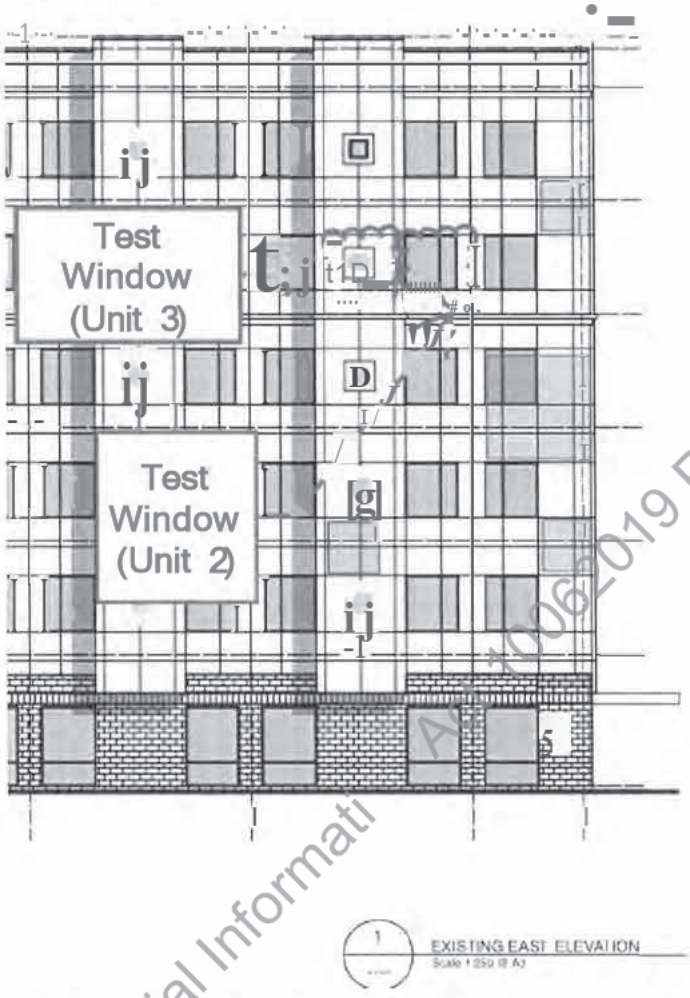
Grundfos Water Pump
Garden Hose to 200L water reservoir
Type B25, #6.030 brass spray nozzle
19mm dia. Feed high pressure hose
Calibrated Pressure Gauge(# CPS 1N8150- 11/02/2019)

The window was split into approx. 1.5-metre sections which were tested for 5 minutes each with the water nozzle 300mm away. The test operator had to work the nozzle around scaffolding however this was discussed and accepted with the specifier during testing.



Loe	Time	Notes
1	12.03-12.08	OK
2	12.08-12.13	OK
3	12.26-12.31	OK
4	12.31-12.36	OK
5	12.39-12.44	OK
6	12.45-12.47	Water penetration visible at both ends.

Unit 2: Bed-room fixed window



Unit 2 was tested to AAMA 502 using the Thermosash/Window Engineering Consultants onsite test equipment being...

Grundfos Water Pump
Garden Hose to 200L water reservoir
Spray Rig with Spraying Systems Co. 1/4HH-14WSQ nozzles
Fluxline 0-40 l/min Flow Meter
1800 W Household Vacuum
Calibrated DPM Auto-zeroing micromanometer

The spray nozzles were arranged in a 3-wide by 2-high gird with the top row of nozzles being in line with the window head and at 1200mm spacings. Mounted 600mm from the test window, the nozzles cover an area of 8.64m^2. The test flow rate was maintained above 26 Umin (usually 28 Umin) to ensure the required 3.0Um^2.min met.

The internal linings and sill flashing were removed by the main contractor. In site staff then fitted 3mm thick aluminium angles around the window to the structure behind the window rear air seal. 6mm thick Acrylic sheet pre-fitted with pressure relief valves and tubing for pressure measurement was then fixed off to the angles with closed cell foam tape between.

Due to the nature of the building and hospital environment, the reference pressure for the micromanometer had to be taken from inside the hospital building. This was discussed with

the specifier onsite and agreed that as it was a calm weather day and the window was shielded with wrapped scaffold this would be acceptable.

Unit 2 was initially subjected to a 5-minute soak before the vacuum was turned on. The relief valves were adjusted until the specified 200 Pa test pressure was achieved within 40 seconds.

The test was suspended after 2 minutes of pressure differential as uncontrolled water was entering the building through the right-hand-side rear sill fixing when viewed from inside.

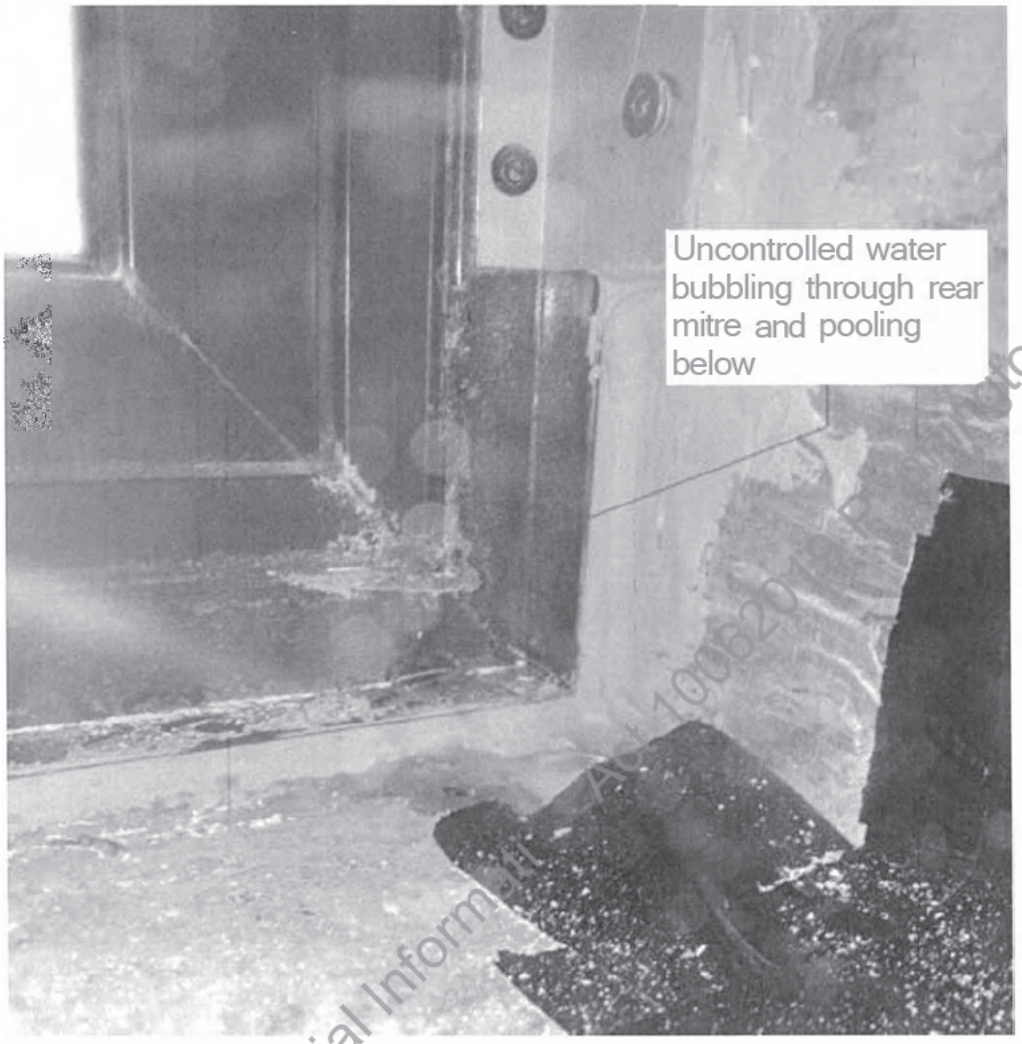
Unit 3: Bathroom awning sash

Unit 3 was tested using the same equipment and procedure as Unit 2 with the exceptions below.

The masking and duct tape were applied to the waterproof membrane/building paper behind the rear air seal and continued past onto the internal shower vinyl wall covering. The Acrylic sheet was then direct fixed to the taped area with closed cell foam tape and screw fixings.

Only one spray nozzle was used and set 800mm off the face of the window approx. 100mm below the head of the window and centred. The flow rate was adjusted to >8 Umin to account for the new coverage area and ensure 3.0 $L/m^2.min$ was maintained.

Again, the window was soaked for 5 minutes prior to applying the specified 300 Pa pressure differential. Immediately, air leakage was observed via localised dust through the mitre joints of the awning sash perimeter frame. Uncontrolled water slowly entered through the RHS lower mitre joint. After 8 minutes, the pressure was adjusted to a 200 Pa differential and water and air leakage was still observed before testing was suspended after 10 minutes.



s9(2)(a)

01/05/2019

Appendix B - Photos

Figure 1: Thermosash!WEC Staff spray Testing Unit 1

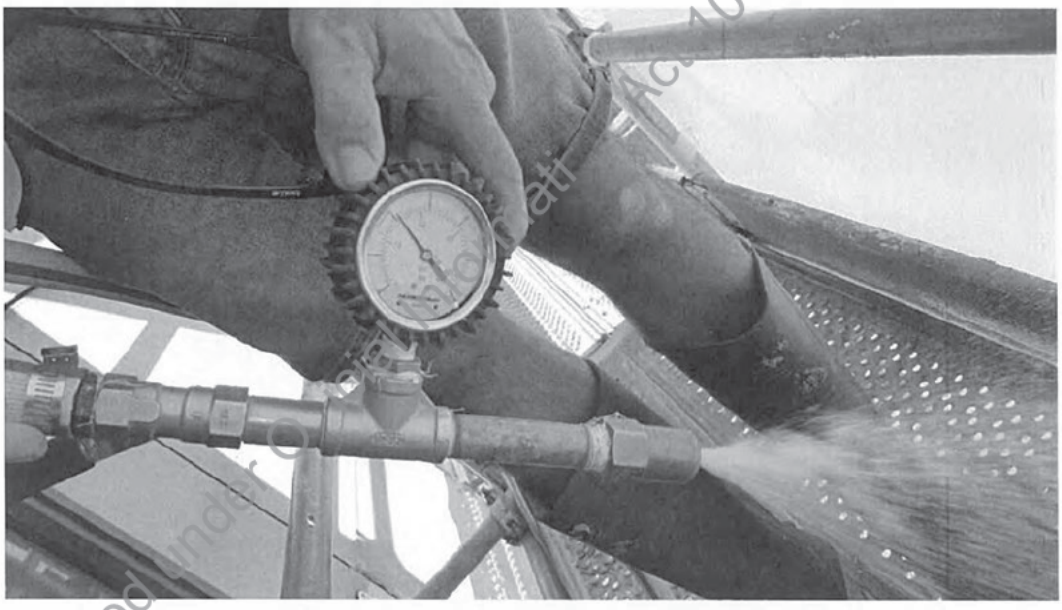


Figure 2: Pressure set at 30PSI on calibrated pressure gauge

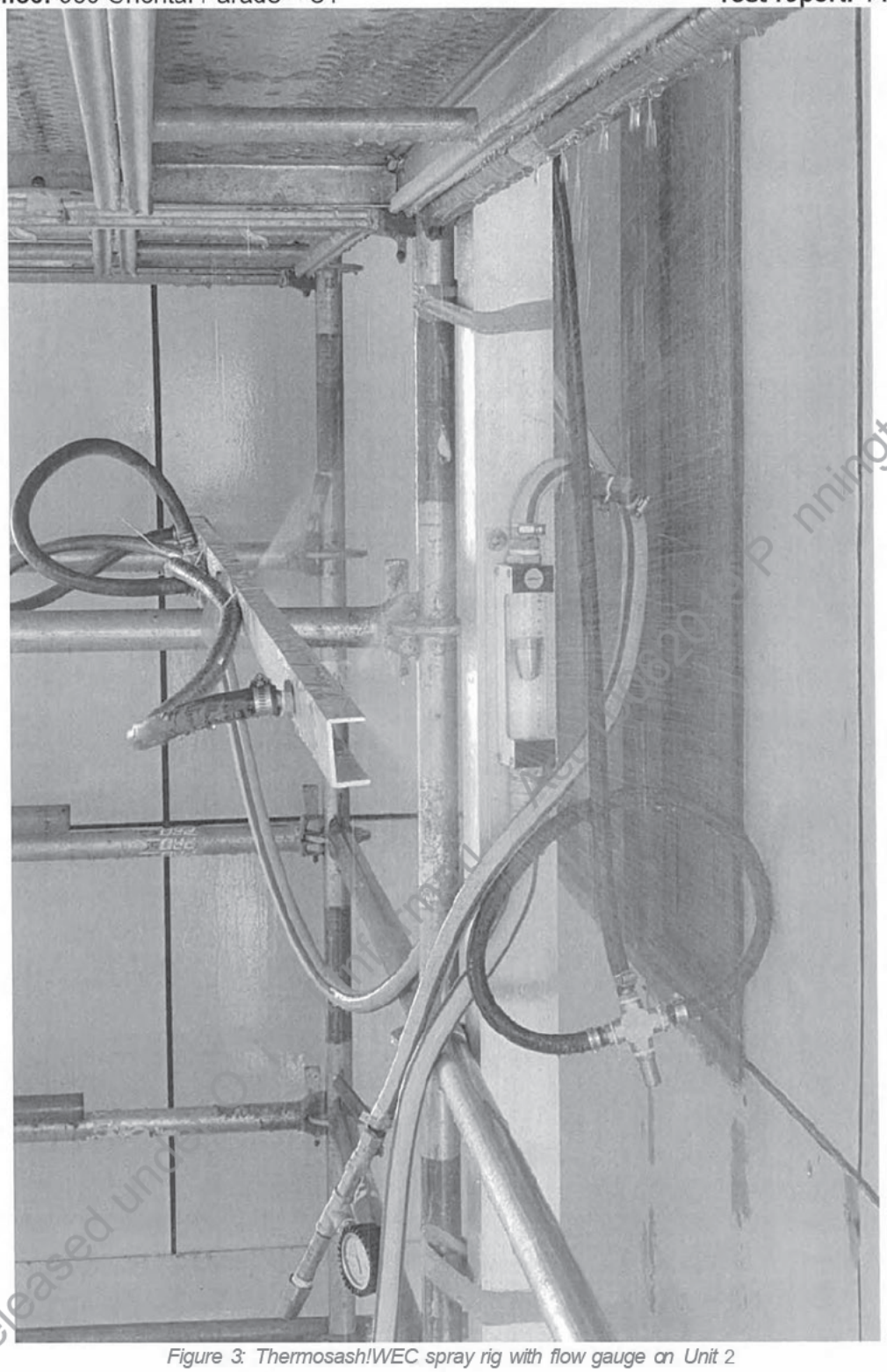


Figure 3: Thermosash!WEC spray rig with flow gauge on Unit 2

Figure 4: Unit 2 testing from inside with vacuum and pressure measurement tubing attached to acrylic surround

Figure 5: Calibrated manometer measuring >200 Pa pressure differential on Unit 2

Figure 6: Unit 2 Acrylic with vacuum and measurement tubing attached

Figure 7: >300 Pa pressure differential reading during testing Unit 3

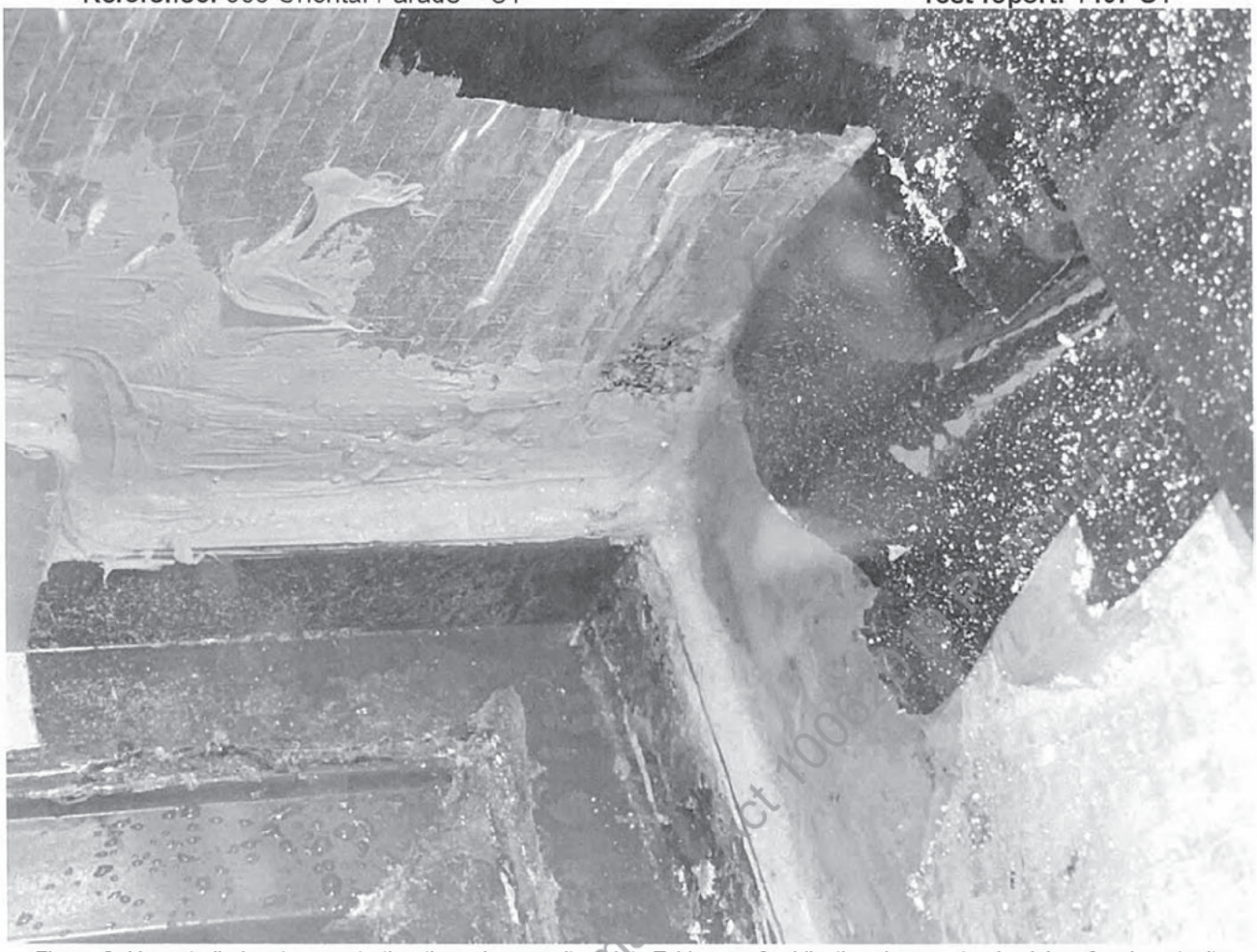


Figure 8: Uncontrolled water penetration through rear mitre joint. Evidence of oxidisation damage to aluminium framing at mitre joints on both sides.