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1024 Laboratory

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

TEST REPORT

Test Report No: TR14-15

Customer Details: Nu-Wall Aluminium Cladding Limited
P.O. Box 74-280
Greenlane
Auckland 1546

Date of Test: 15 July & 16 August 2014.

Test & Sample Details: Test on selected Nu-Wall horizontal and vertical Aluminium Cladding profiles in accordance with AS/NZS 4284: 2008 Testing of Building Façades.

Summary of Test:

Preliminary Tests:

Following exposure to the agreed serviceability pressures of ±2500 Pa, the static water penetration test indicated water penetration through one end of the head flashing of the window installation in the horizontal cladding section. Testing was halted to allow redesign of the head flashing and installation details. Subsequent preliminary testing of the redesigned head details required a further top edge seal addition before complying.

Structural Test at Serviceability Limit State Wind Pressure:

No structural deflection tests on the timber framed test unit were required. The Nu-wall Aluminium cladding system was exposed to Serviceability test pressures of ±2500 Pa, prior to the air infiltration and water penetration tests.

Air Infiltration Test

The test sample air infiltration complied with the maximum recommended rate of 1.6 l/s.m^2 for "Air Conditioned" buildings.

Water penetration test by Static pressure:

Following the modifications to the window head installation details, the Nu-Wall Aluminium cladding system demonstrated compliance with the "no water penetration" requirement at a test pressure of 750 Pa, and subsequently following the ULS Structural Test, at a test pressure of 875 Pa.

Water penetration test by Cyclic pressure:

Following the modifications to the window head installation details, the Nu-Wall Aluminium cladding system demonstrated compliance with the "no water penetration" requirement at cyclic test pressures up to 750 - 1500 Pa, and

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John Yolland **John Moore**

subsequently following the ULS Structural Test, at test pressures up to 875 – 1750 Pa.

Structural test at Ultimate limit state wind pressure:

The Nu-Wall Aluminium cladding system complied with Ultimate limit State structural tests of +4.5 kPa, and -4.1 kPa. No structural damage or collapse was observed.

Description

The test sample consisted of a single storey timber framed structure, using one of the most common horizontal cladding profiles (Louvre 150) on one half of the available opening and a vertical cladding profile (E200) on the opposite section, each with a window installation detail. Two panels of the stepped section also used the E200 in a horizontal arrangement. Both sections using part of the stepped external face incorporated sample details of internal and external corners. Both sections incorporated a control joint of the alternate orientation to the profile run. General details of the test structure as well as the full details of the Nu-Wall installation details and fixing methods are shown in the attached Nu-wall drawings.

E200 vertical cladding

Louvre 150 horizontal cladding Initial window

Internal corner horizontal cladding

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PERFORMANCE SPECIFICATIONS:

The following initial performance requirements for the Nu-Wall aluminium cladding system were agreed with the clients for assessing performance:

Serviceability Wind Pressure	±2.50 kPa (equivalent to ULS ≅ 3.6 kPa)
Water penetration by Static pressure;	750 Pa
Water penetration by Cyclic pressures:	up to 750 – 1500 Pa
Structural Test at Ultimate Limit State:	±3.6 kPa (or greater)

TESTING:

The tests were performed using the testing procedures of AS/NZS 4284:2008 Testing of Building Facades, in the IANZ accredited window test facility of Open Building Solutions Ltd, with representatives of the client in attendance.

As the Nu-Wall Aluminium cladding system was installed onto a timber framed support structure, generally complying with the requirements of NZS 3604: 2011, the measurement of deflections of structural elements was not required. The test pressures for providing compliance in excess of the Extra High Wind Zone and the 2.5 kPa ULS limit of NZS 3604 were agreed with the clients. The AS/NZS 4284: 2008 optional air infiltration tests were conducted on the test sample.

The measurement of the optional air infiltration rate was achieved by measuring the total leakage of the test installation including possible small air leakages of the test enclosure and the building in perimeter. As the total air infiltration rates were less than the required net leakage rates for the test sample only, no sealed air infiltration measurements were required.

The pre-set series of Static and Cyclic pressure water penetration tests were based on a serviceability wind pressure of 2500 Pa. The Structural test at the agreed minimum Ultimate Limit State pressures up to the maximum available test pressures was conducted following the cyclic water penetration tests even though the cladding was a pressure equalised cavity system in which only the air barrier and frame structure would be fully evaluated.

Results

PRELIMINARY STRUCTURAL TEST 15/7/14

The Nu-Wall aluminium cladding system was exposed to the agreed Serviceability test pressures of ±2.50 kPa. No structural damage was observed.

PRELIMINARY STATIC PRESSURE WATER PENETRATION TEST - 15/7/14

During the preliminary test the Nu-Wall aluminium cladding system demonstrated "no water penetration" at a test pressure of 455 Pa, but at a pressure of 750 Pa water penetration was observed from one end of the head flashing of the window installation in the horizontal cladding section. Testing was discontinued to allow the client to undertake redesign.

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PRELIMINARY STATIC PRESSURE WATER PENETRATION TEST - 16/8/14

Following the changes to the window head flashing system, a further preliminary static water penetration test was carried out, resulting in some water penetration down one side of the window jamb when tested at 750 Pa. An addition of a length of sealing wedge into the external horizontal gap between the wall panel and the protruding head flashing, was added by the client, before retesting to prove its effectiveness.

STRUCTURAL TEST AT SERVICEABLITY LIMIT STATE (AS/NZS 4284:2008)

Following the changes to the window head flashing system on the window set into the Louvre 150 horizontal cladding, the Nu-Wall aluminium cladding system was exposed to the agreed Serviceability test pressures of ±2.50 kPa. No deflection measurements were required on the timber frame structure. No structural damage was observed.

AIR INFILTRATION

Overall window area	11.5 m^2
Recommended air infiltration rate	1.6 l/s.m^2
Air Conditioned requirement	18.4 l/s
Positive Air Infiltration Test	
Total air flow (sample + booth)	16.1 l/s
Negative Air Infiltration Test	
Total air flow (sample + booth)	15.9 l/s

The Nu-Wall aluminium cladding system complied with the recommended "Air Conditioning" 1.6 l/s.m^2 air Infiltration rate of the standard.

STATIC PRESSURE WATER PENETRATION (AS/NZS 4284:2008)

Test pressure	750 Pa
Test duration	15 minutes

Following the modifications to the window head installation details, the Nu-Wall Aluminium cladding system demonstrated compliance with the "no water penetration" requirement at a test pressure of 750 Pa.

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CYCLIC PRESSURE WATER PENETRATION (AS/NZS 4284:2008)

Test Pressure, Pa	Duration, mins	Comments
375 - 750	5	No water penetration observed
500 - 1000	5	No water penetration observed
750 - 1500	5	No water penetration observed

Following the modifications to the window head installation details, the Nu-Wall Aluminium cladding system demonstrated compliance with the "no water penetration" requirement at cyclic test pressures up to 750 - 1500 Pa.

STRUCTURAL TEST AT ULTIMATE LIMIT STATE (AS/NZS 4284:2008)

The Nu-Wall Aluminium cladding system complied with Ultimate limit State structural tests of +4.5 kPa, and -4.1 kPa. No structural damage or collapse was observed.

ADDITIONAL STATIC PRESSURE WATER PENETRATION (AS/NZS 4284:2008)

Test pressure	875 Pa
Test duration	15 minutes

Following the Structural test at Ultimate limit State pressures of +4.5 kPa and -4.1 kPa, the Nu-Wall Aluminium cladding system demonstrated compliance with the "no water penetration" requirement at a test pressure of 875 Pa.

ADDITIONAL CYCLIC PRESSURE WATER PENETRATION (AS/NZS 4284:2008)

Test Pressure, Pa	Duration, mins	Comments
437 - 875	5	No water penetration observed
656 - 1312	5	No water penetration observed
875 - 1750	5	No water penetration observed

Following the Structural test at Ultimate limit State pressures of +4.5 kPa and -4.1 kPa, the Nu-Wall Aluminium cladding system demonstrated compliance with the "no water penetration" requirement at cyclic test pressures up to 875 - 1750 Pa.

.....
Authorised Signatory

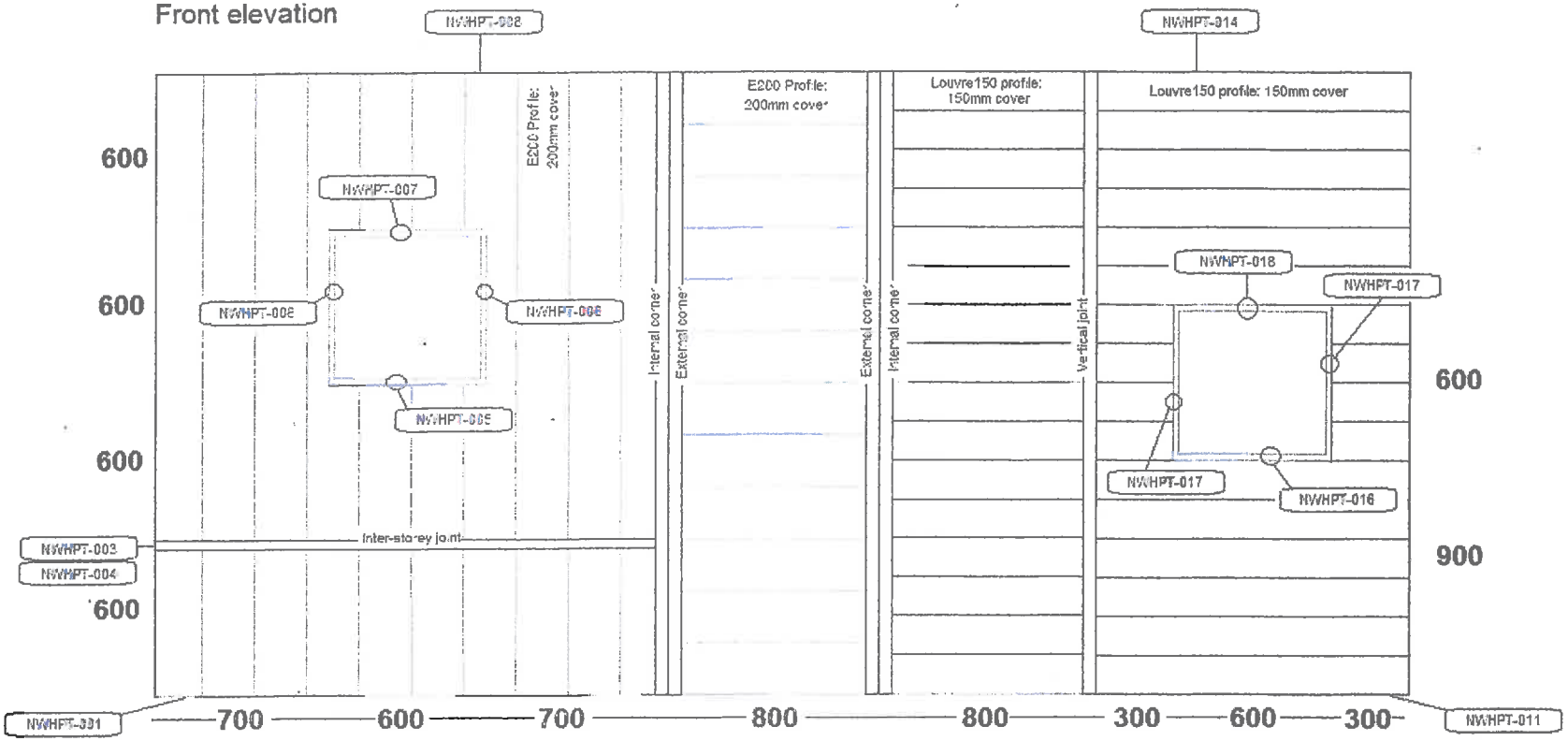
22 August 2014

Tested by:..... Checked by:.....

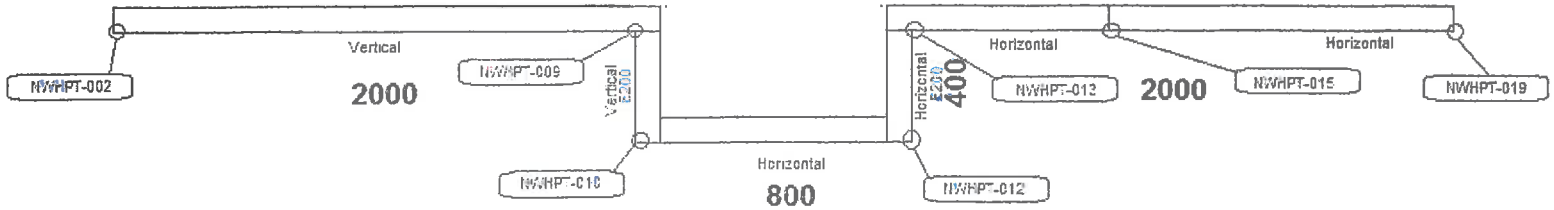
John Yolland **John Moore**

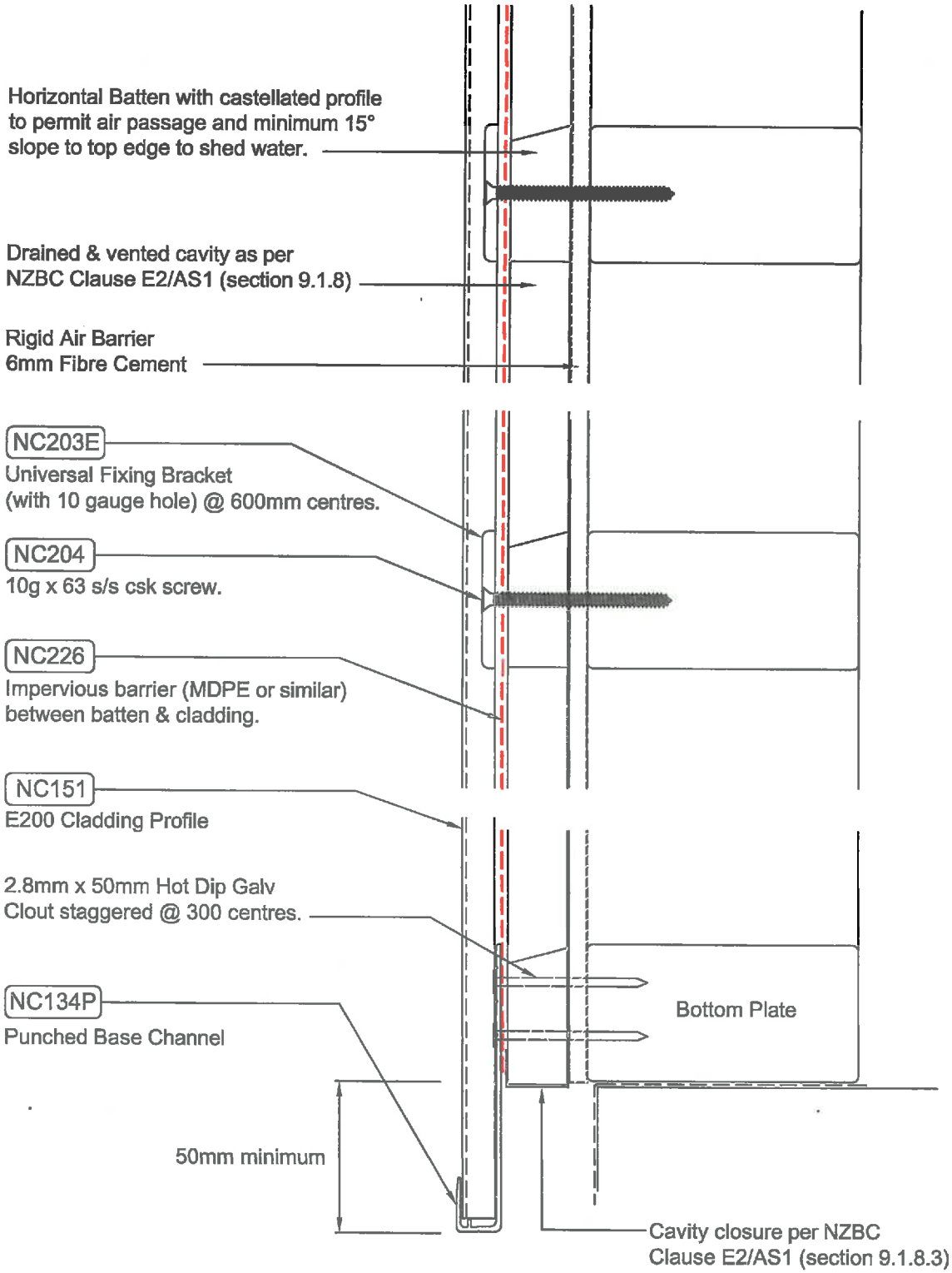
Nu-Wall NZS4284 testing; July/August 2014 - detail drawing key

Front elevation



Plan

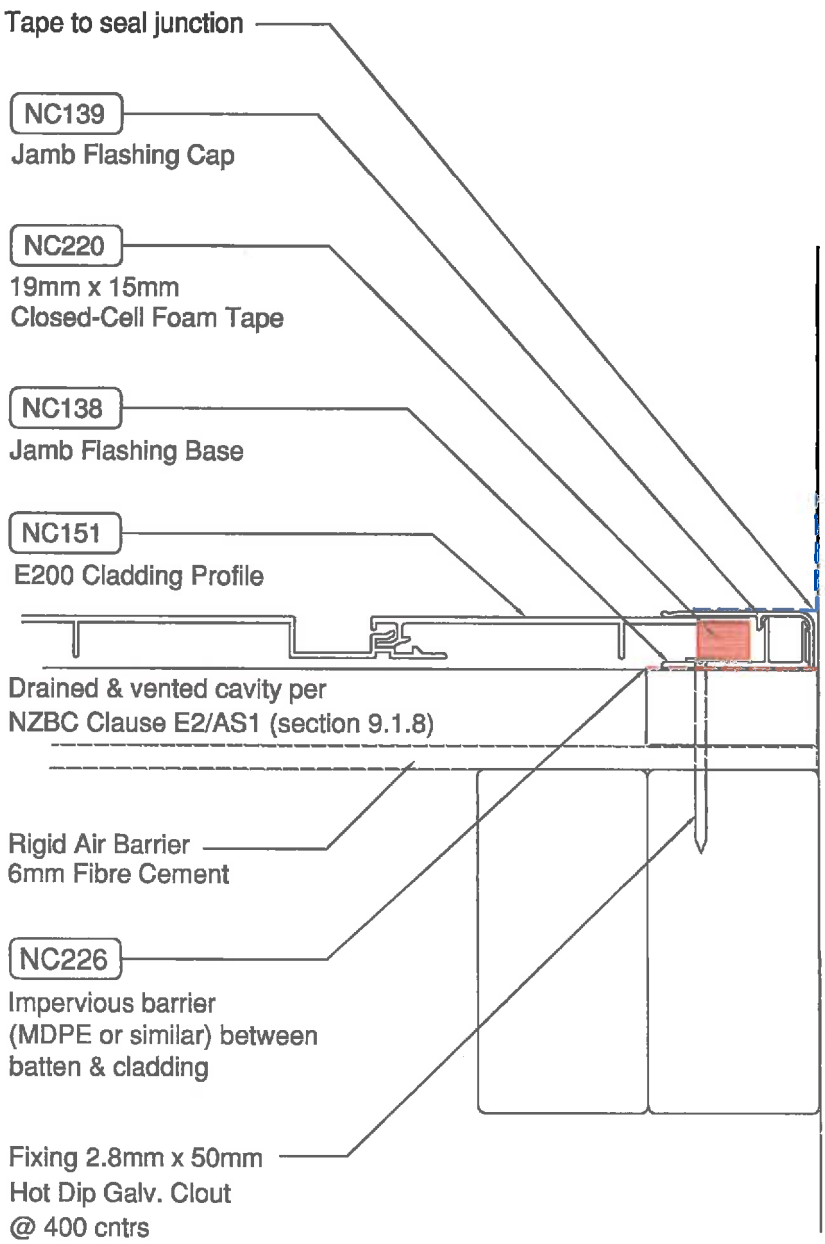




NWHPT-001 - Vertical Cladding Base Channel

Scale 1:2

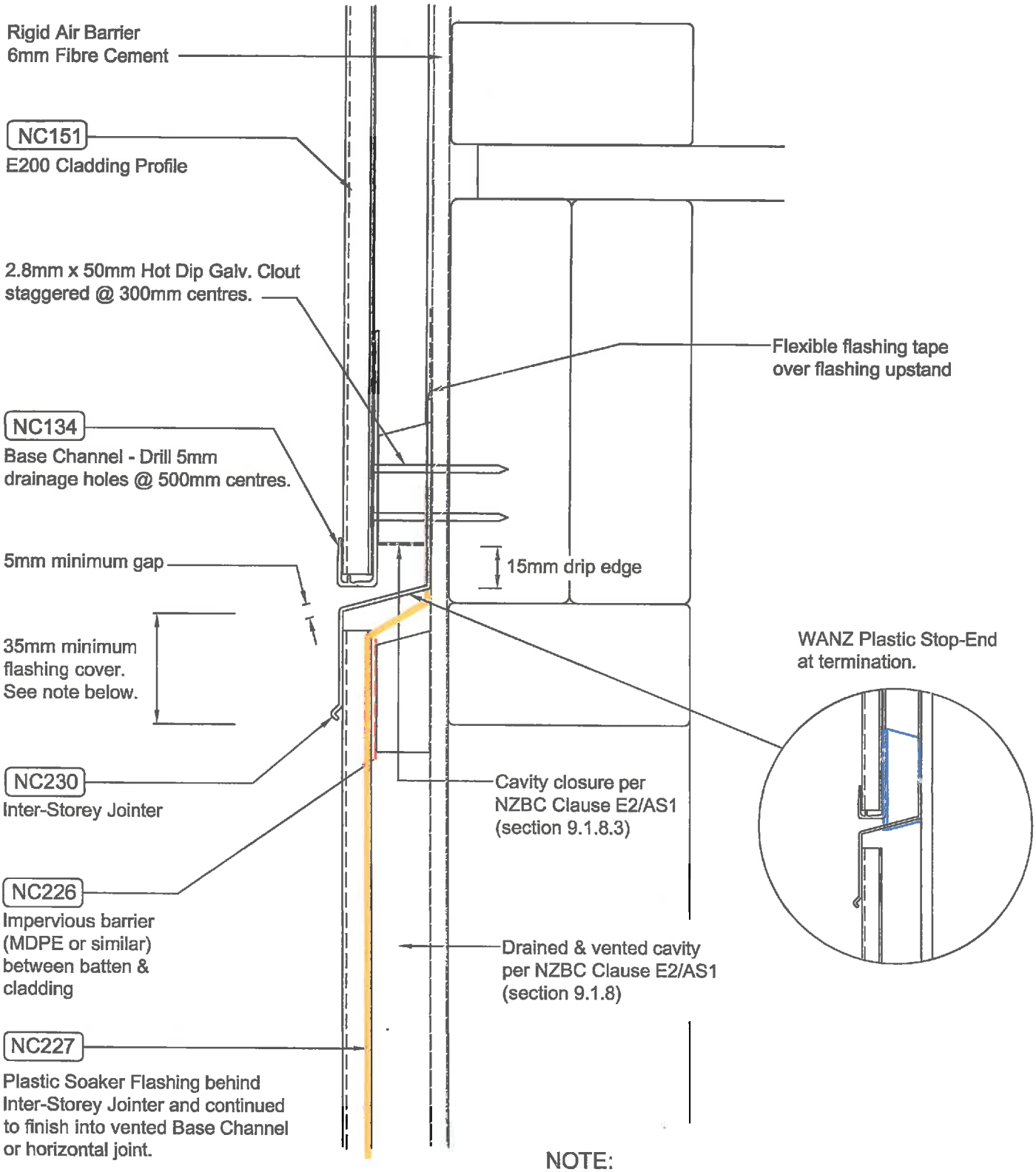
August 2014



NWHPT-002 - Vertical Cladding Termination at Booth Wall

Scale 1:2

August 2014



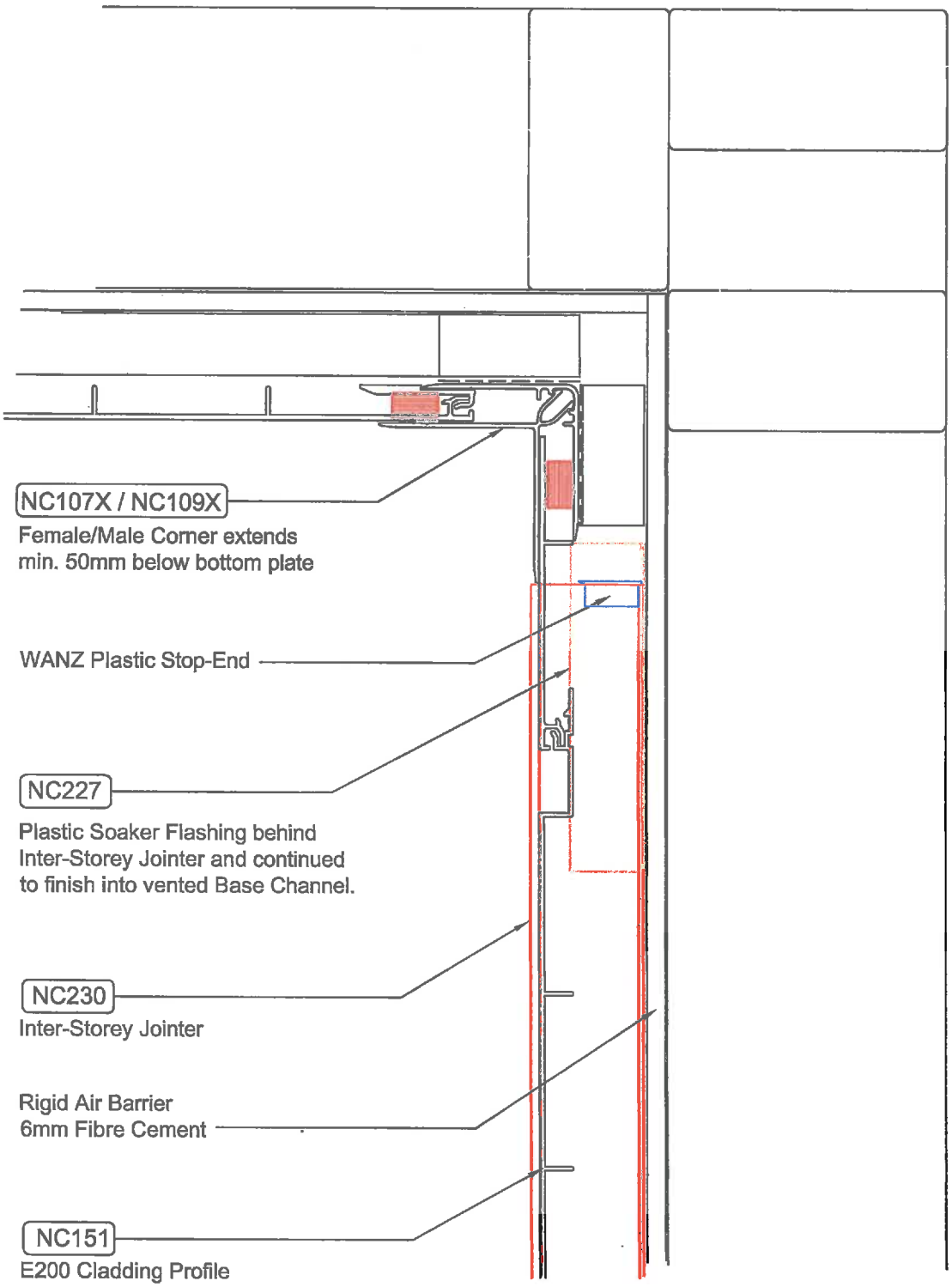
NOTE:

This detail is to be used to limit continuous cavities to the lesser of two storeys or 7 metres. Refer E2/AS1 Table 7 for flashing cover requirements

NWHPT-003 Vertical Cladding Inter-Storey Joint Showing Termination Detail.

Scale 1:2

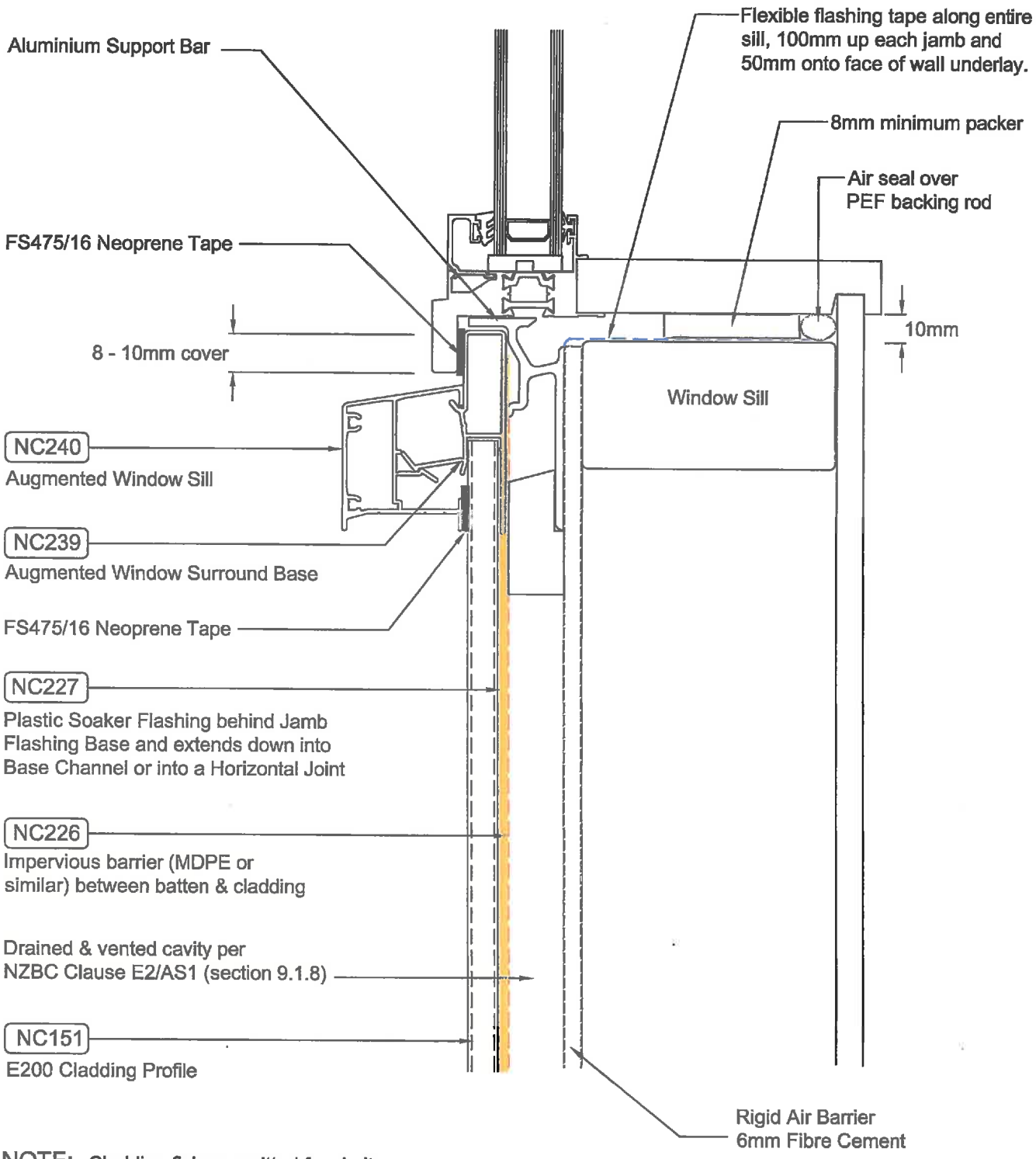
August 2014



NWHPT-004 - Vertical Cladding Inter-Storey Joint Stop-End Plan View

Scale 1:2

August 2014

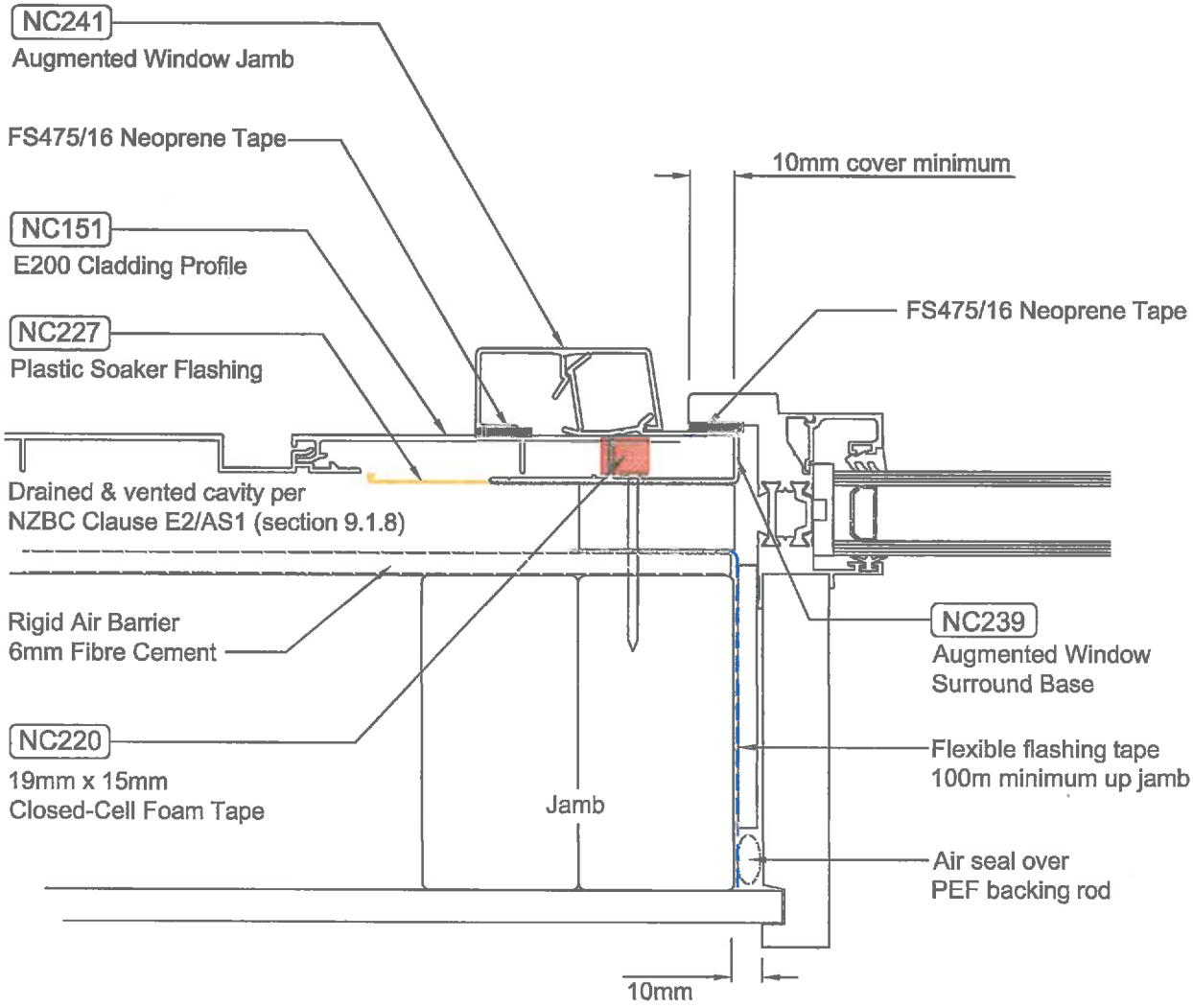


NOTE: Cladding fixings omitted for clarity.

NWHPT-005 - Vertical Cladding Window Sill - Augmented Surround

Scale 1:2

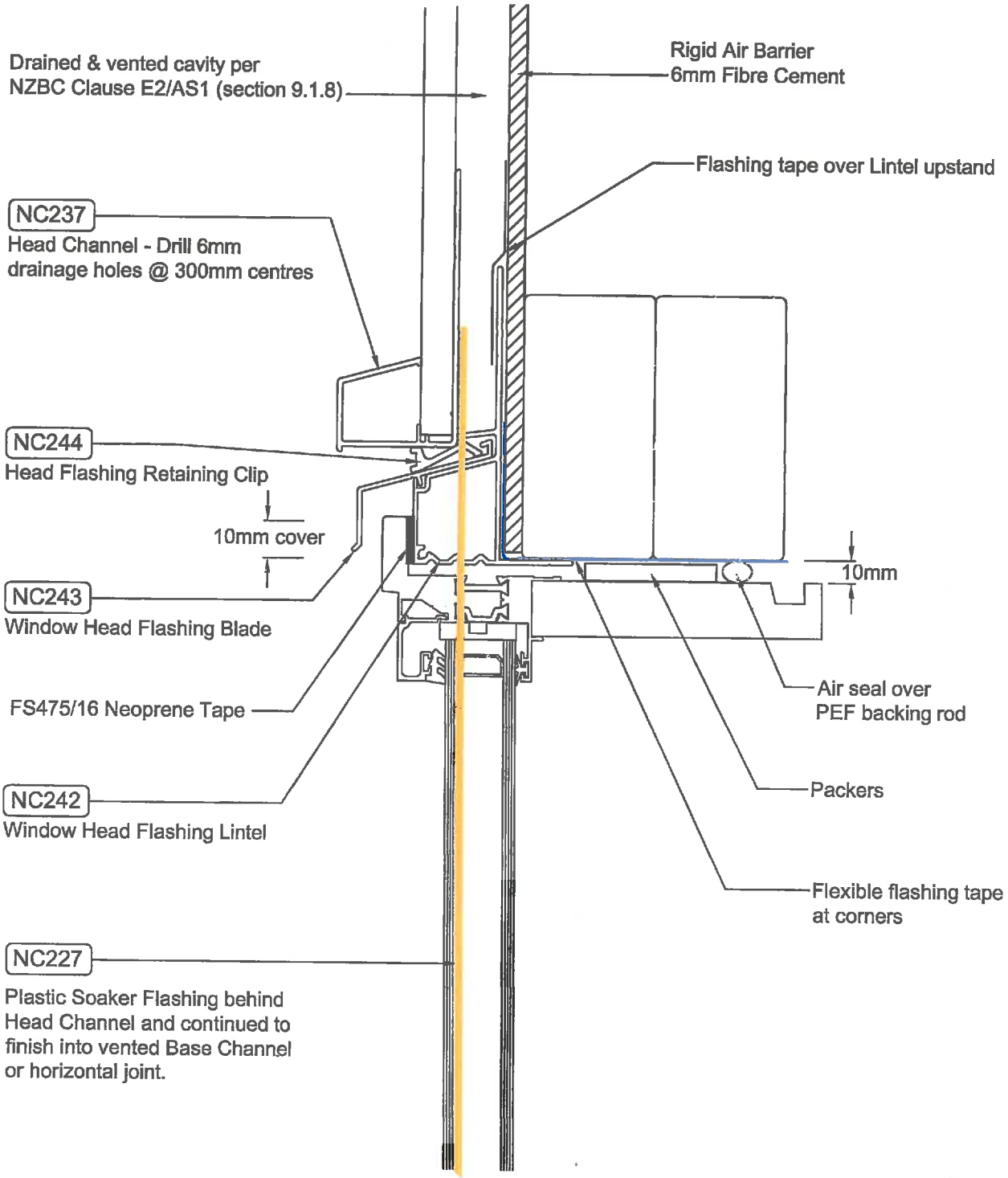
August 2014



NWHPT-006 - Vertical Cladding Window Jamb - Augmented Surround

Scale 1:2

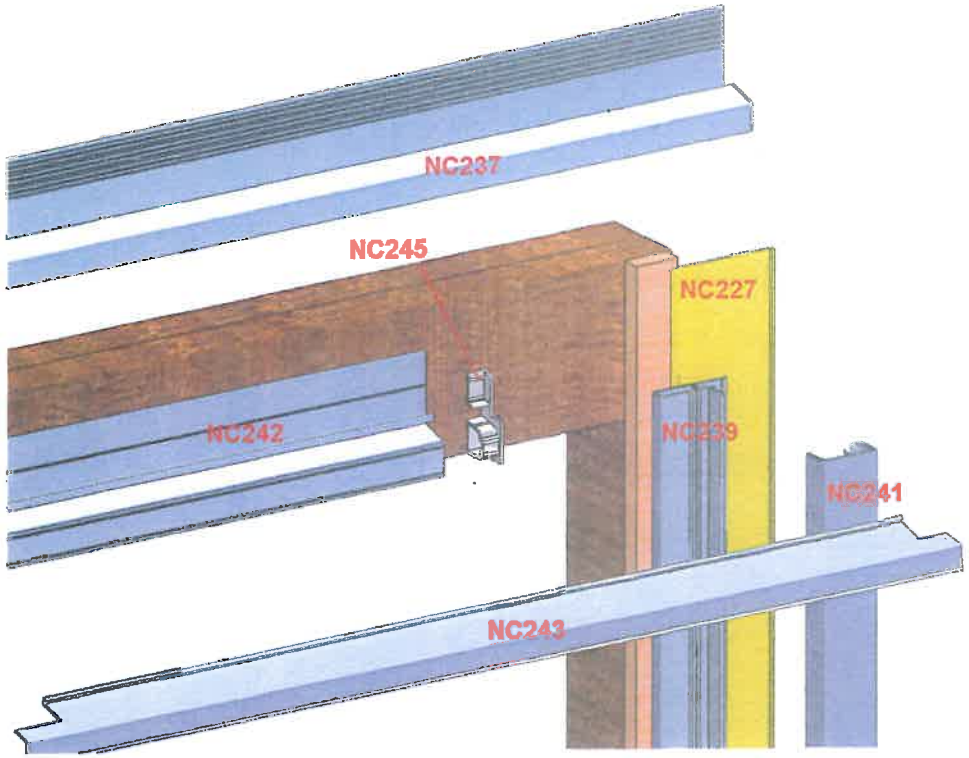
August 2014



NWHPT-007 - Vertical Cladding Window Head

Scale 1:2

August 2014



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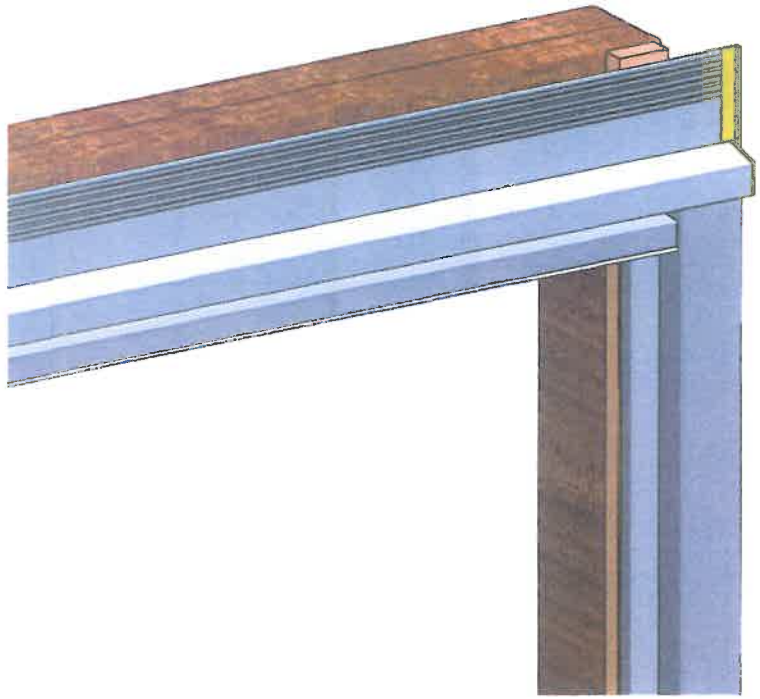

Assembled

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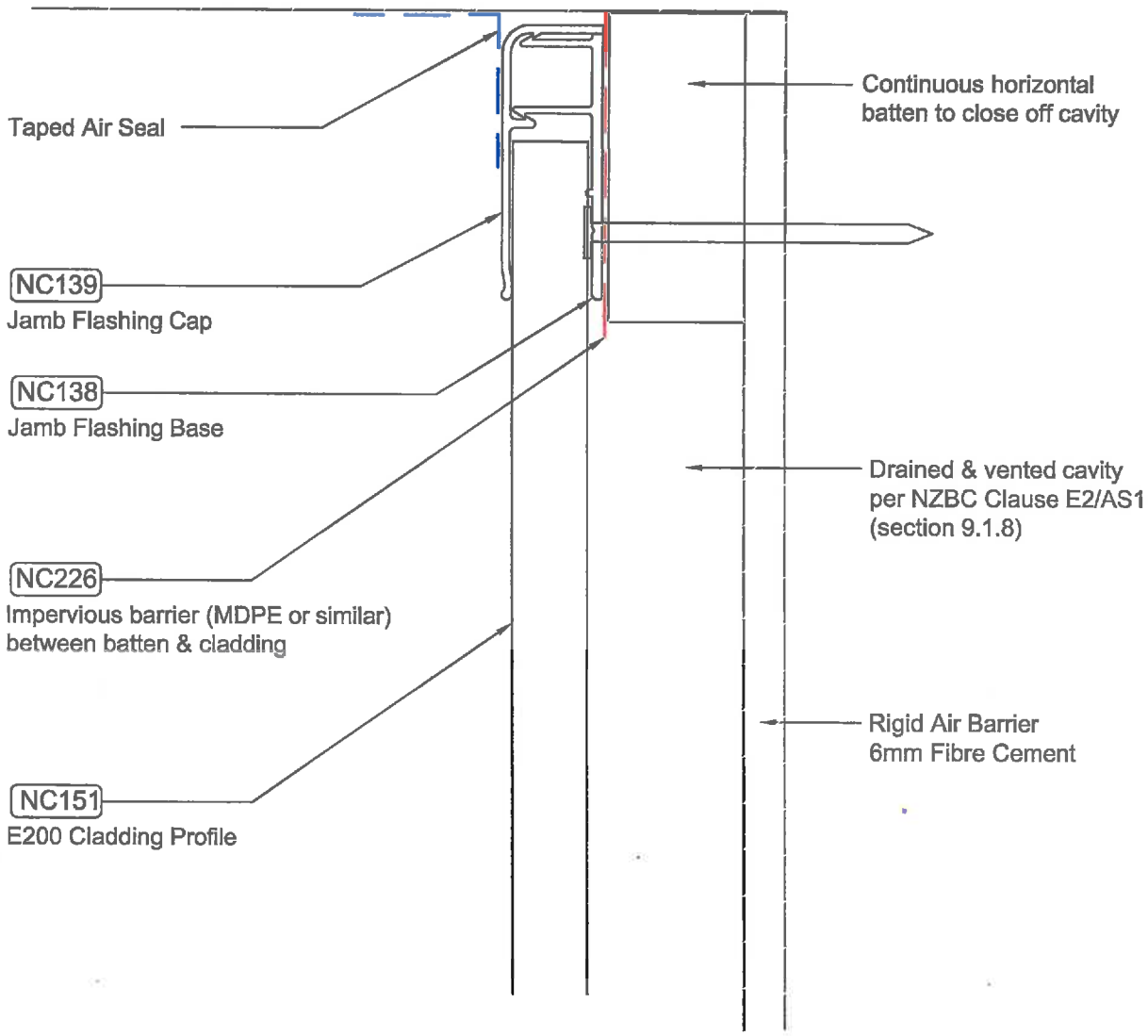
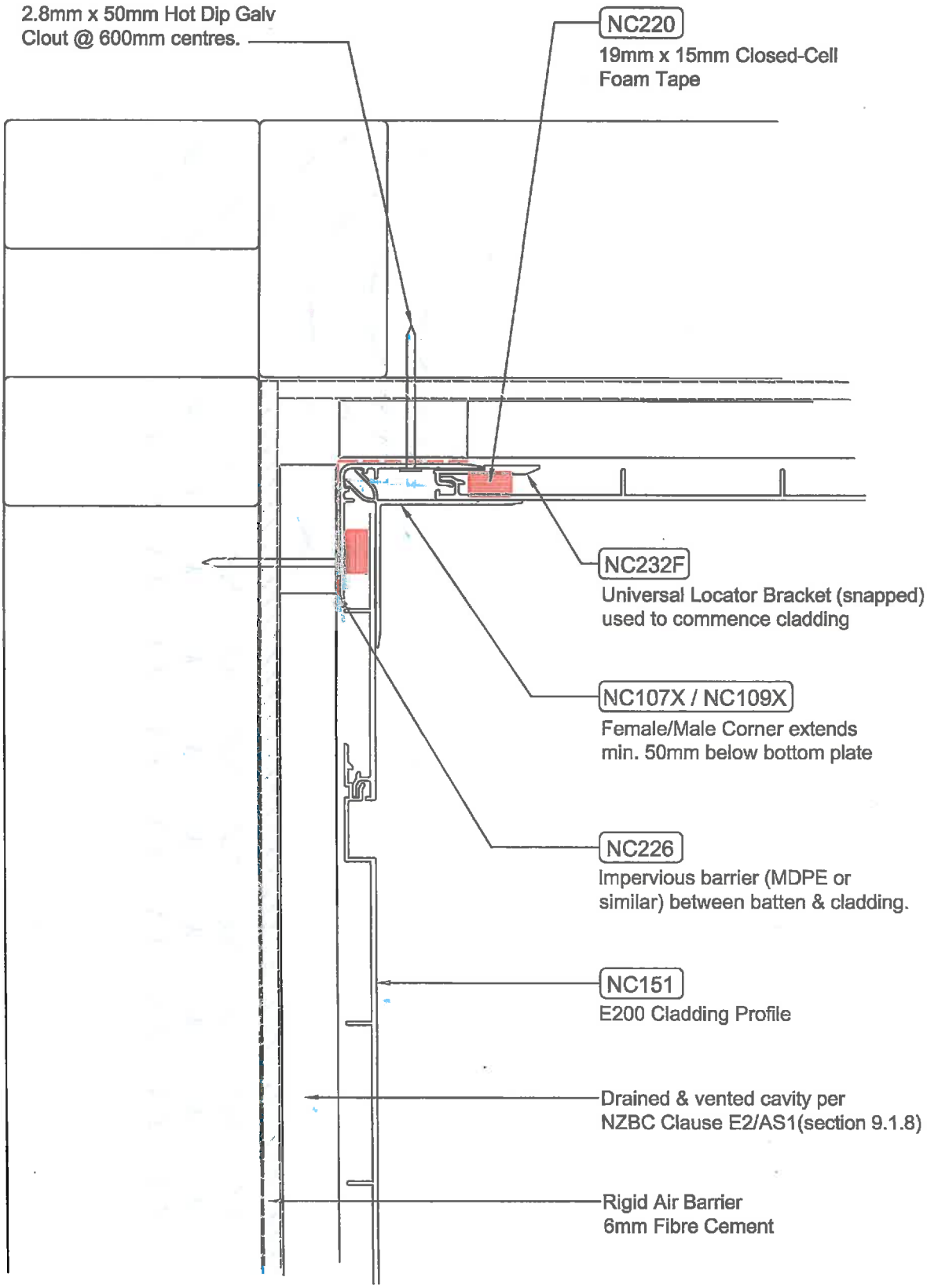
Augmented window surround - ref. drawings NWHPT006, NWHPT007



NWHPT-008 - Vertical Cladding Termination at Booth Ceiling

Scale 1:1

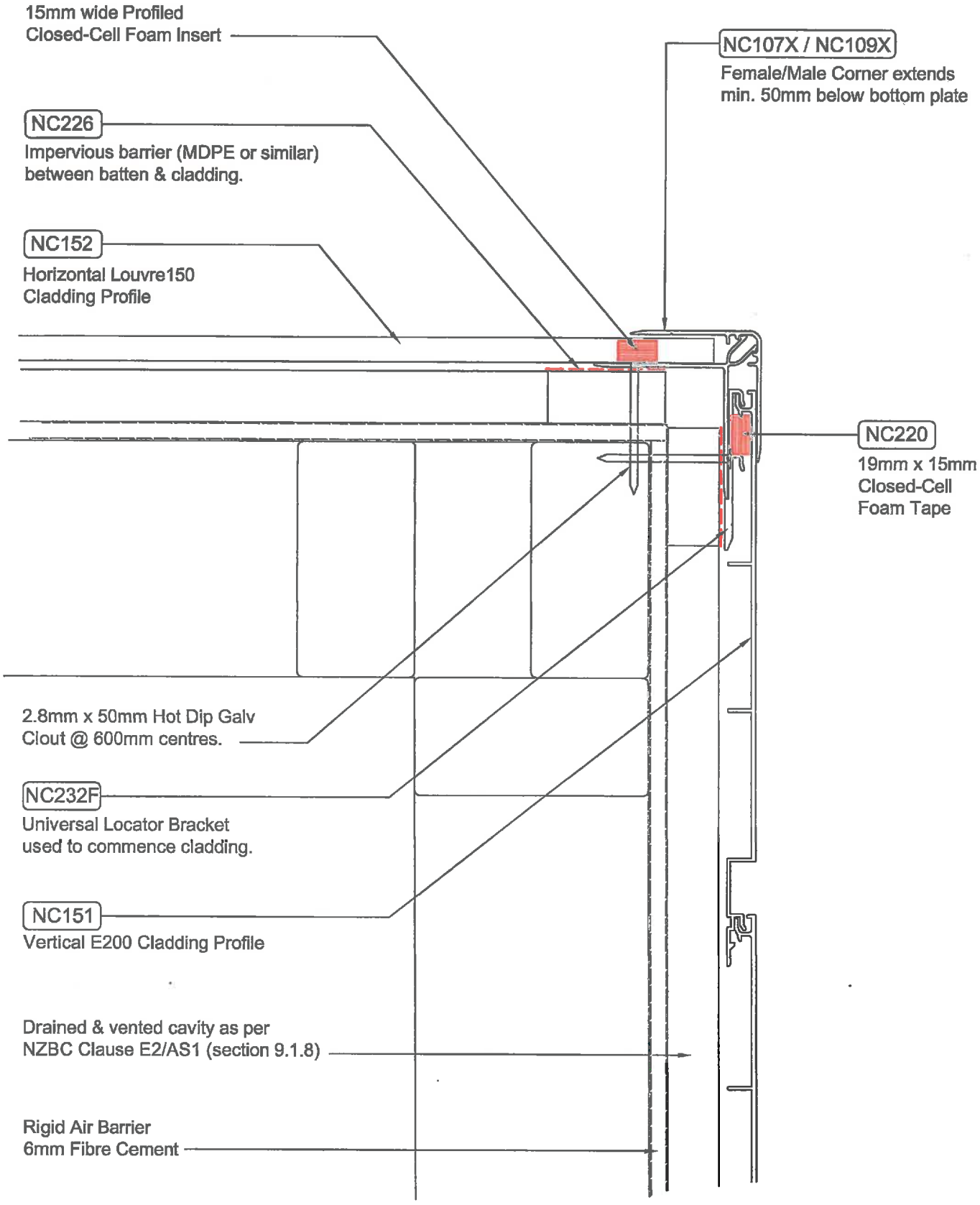
August 2014



NWHPT-009 - Vertical Cladding Internal Corner

Scale 1:2

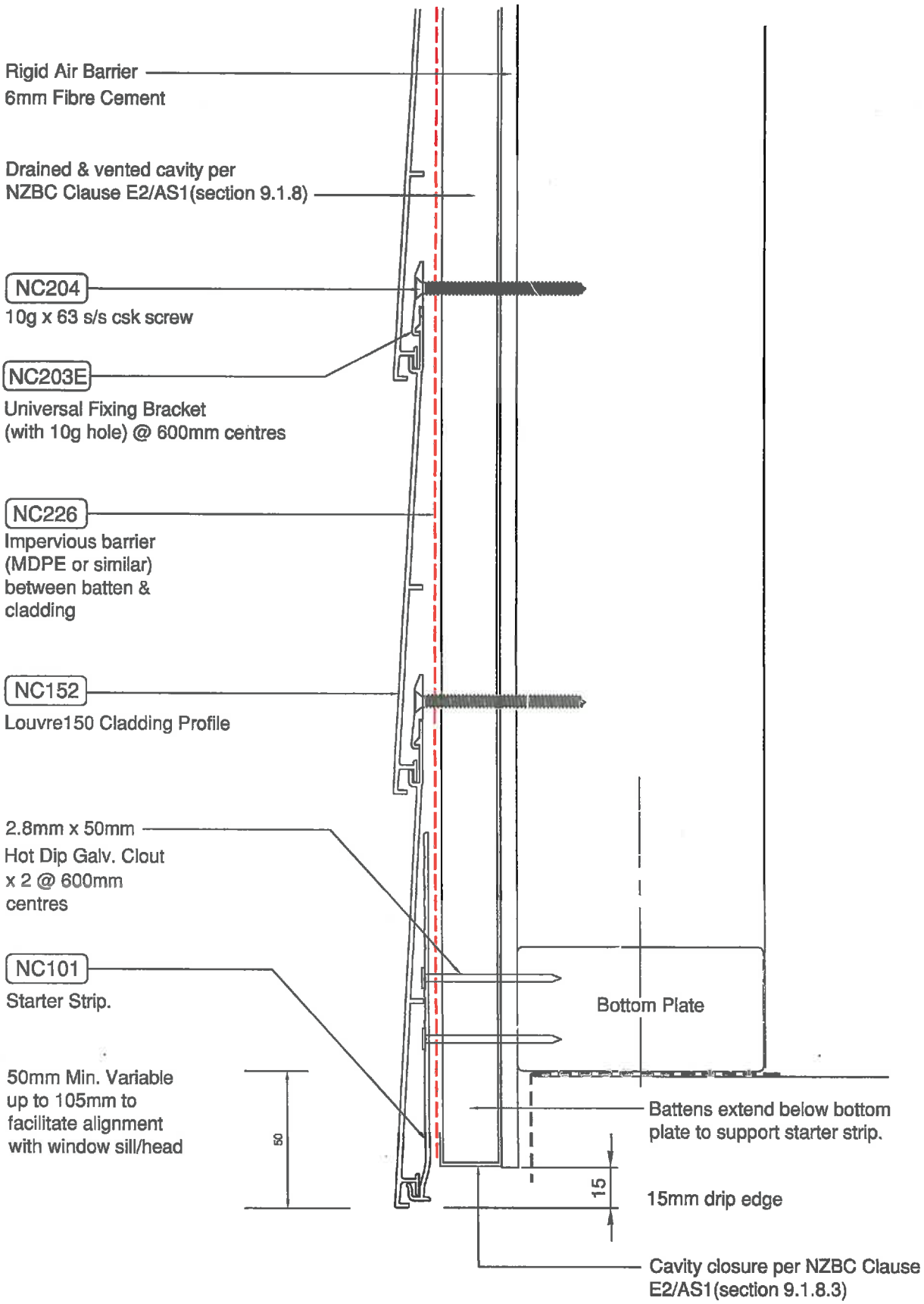
August 2014



NWHPT-010 - Vertical / Horizontal Cladding External Corner

Scale 1:2

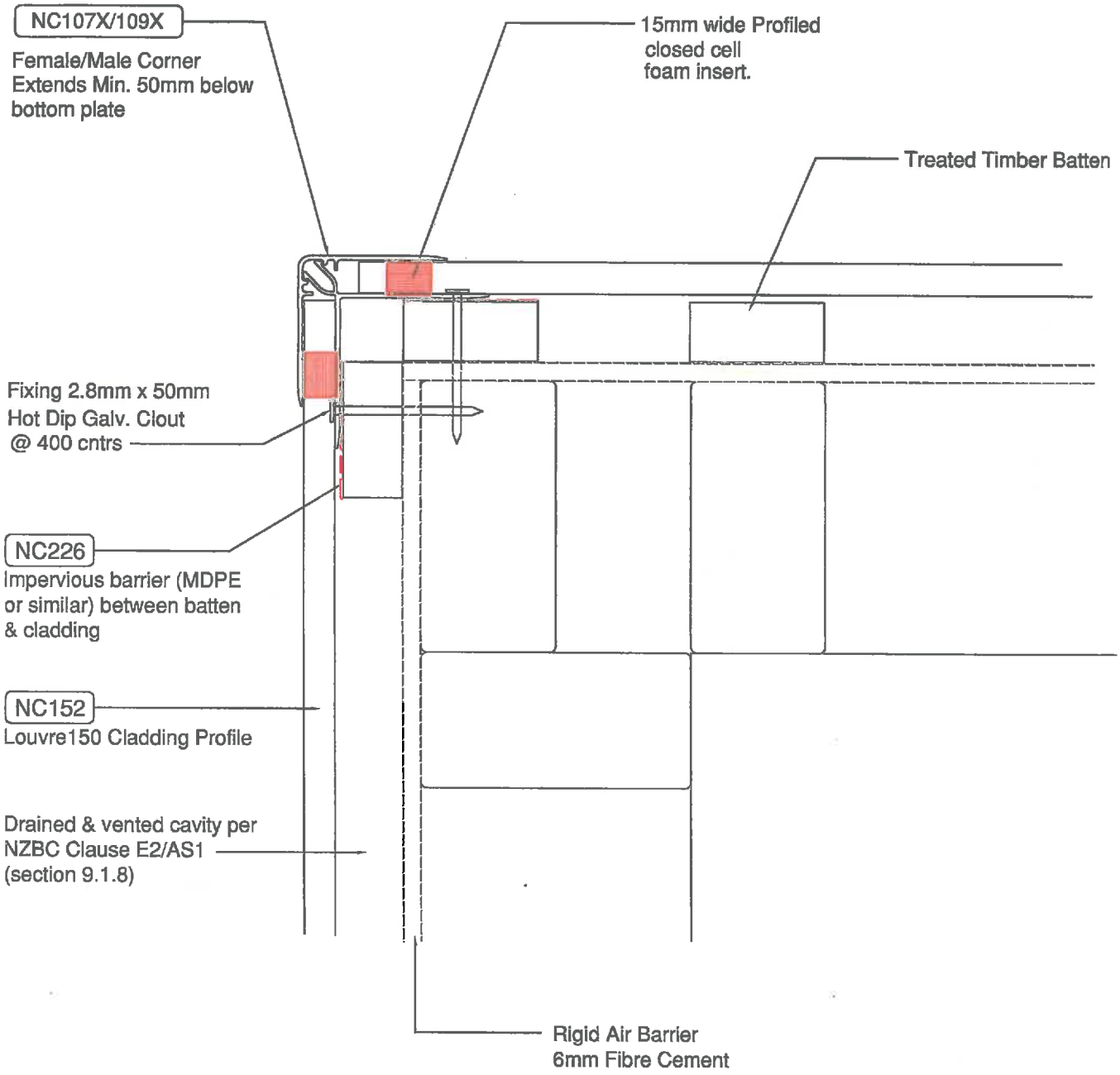
August 2014



NWHPT-011 - Horizontal Cladding Starter Strip

Scale 1:2

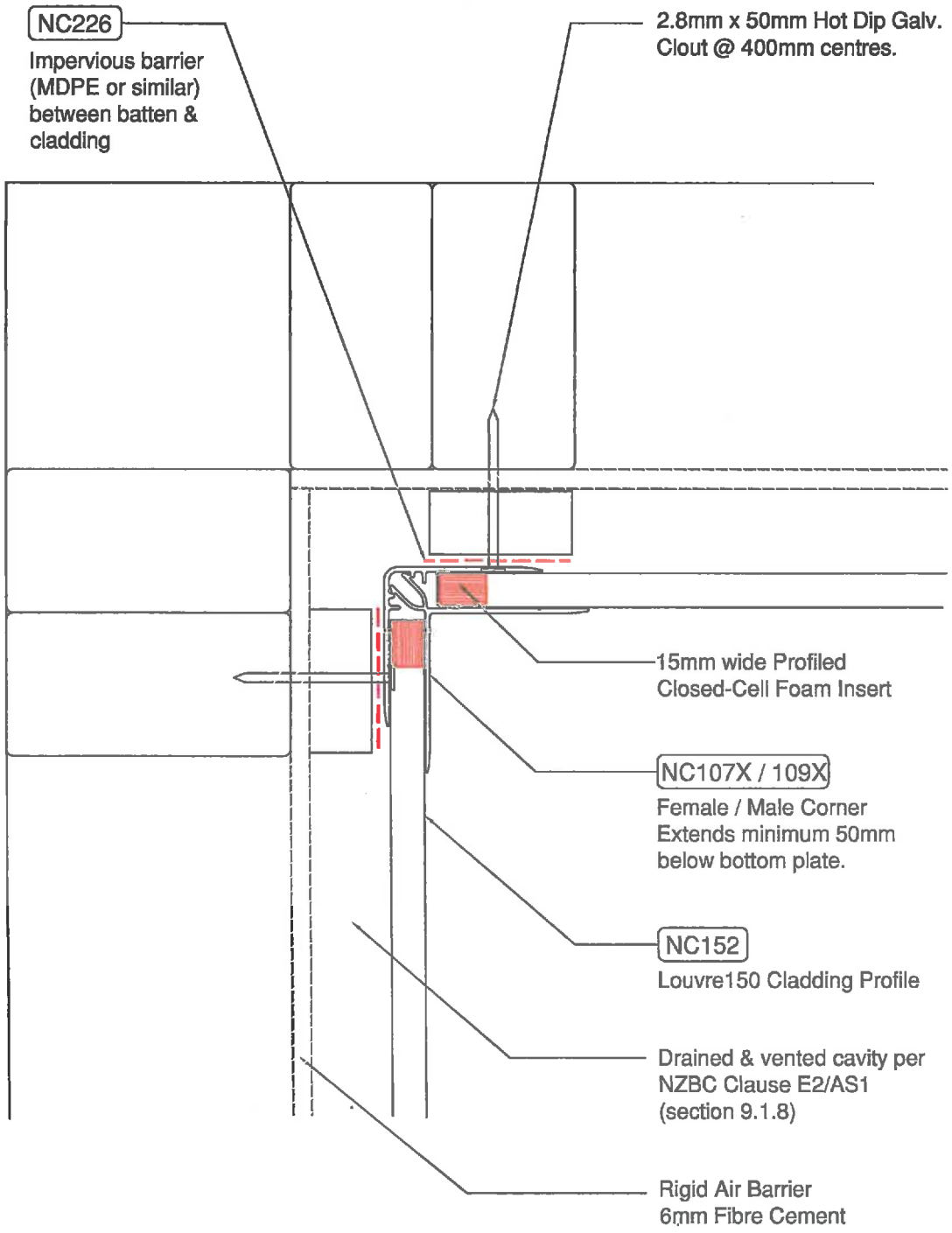
August 2014



NWHPT-012 - Horizontal Cladding External Corner

Scale 1:2

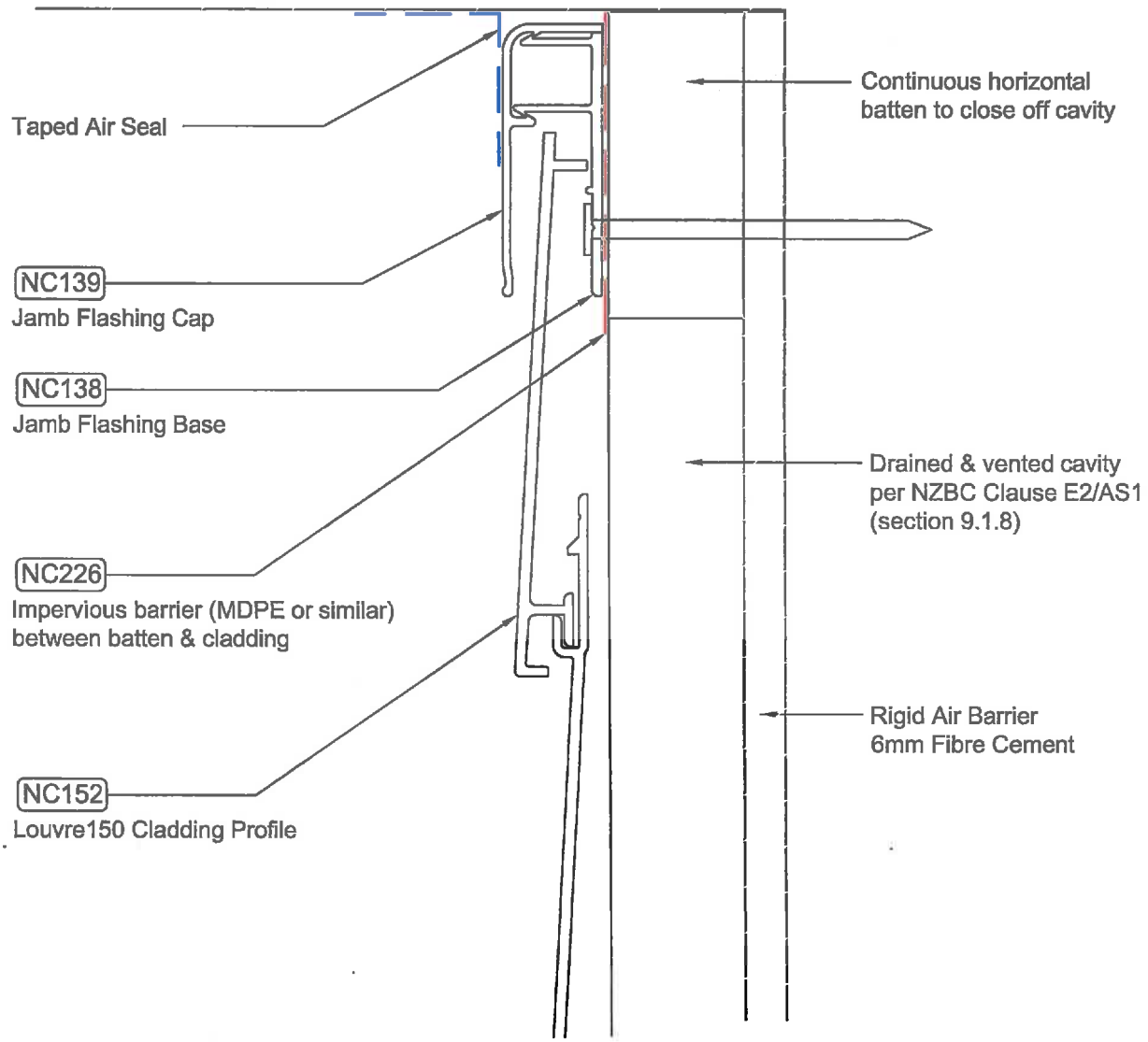
August 2014



NWHPT-013 - Horizontal Cladding Internal Corner

Scale 1:2

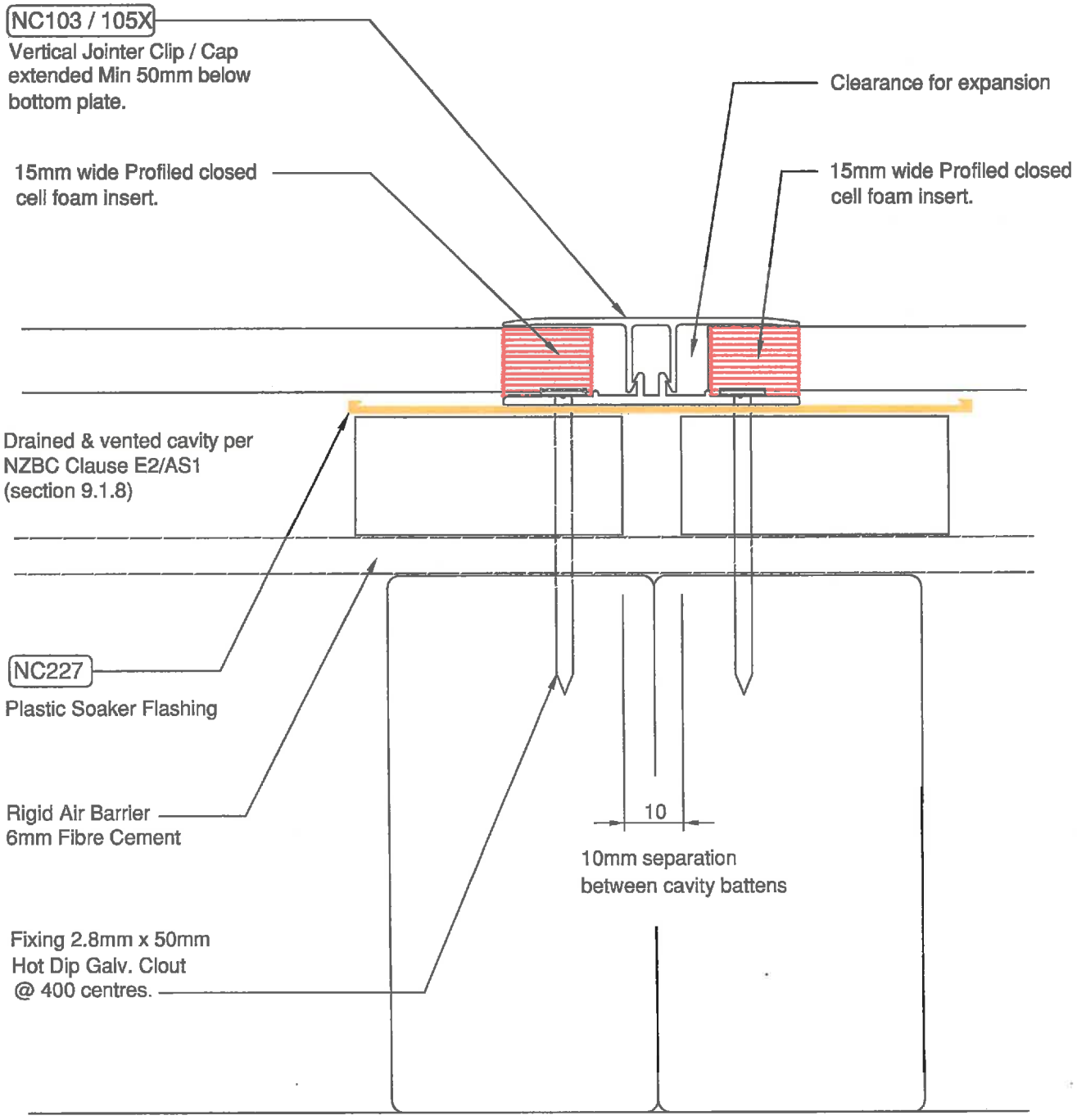
August 2014



NWHPT-014 - Horizontal Cladding Termination at Booth Ceiling

Scale 1:1

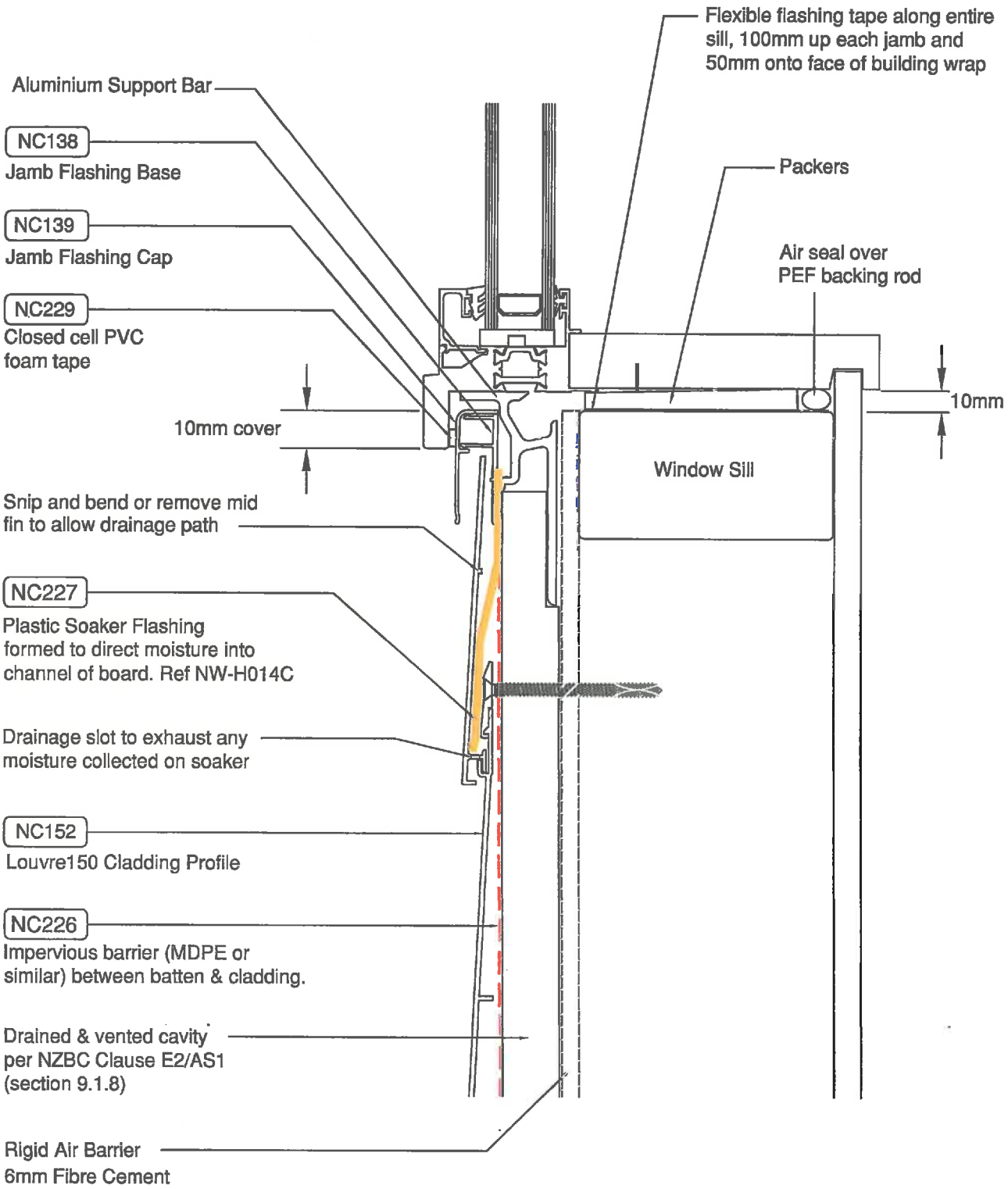
August 2014



NWHPT-015 - Horizontal Cladding Vertical Joint

Scale 1:1

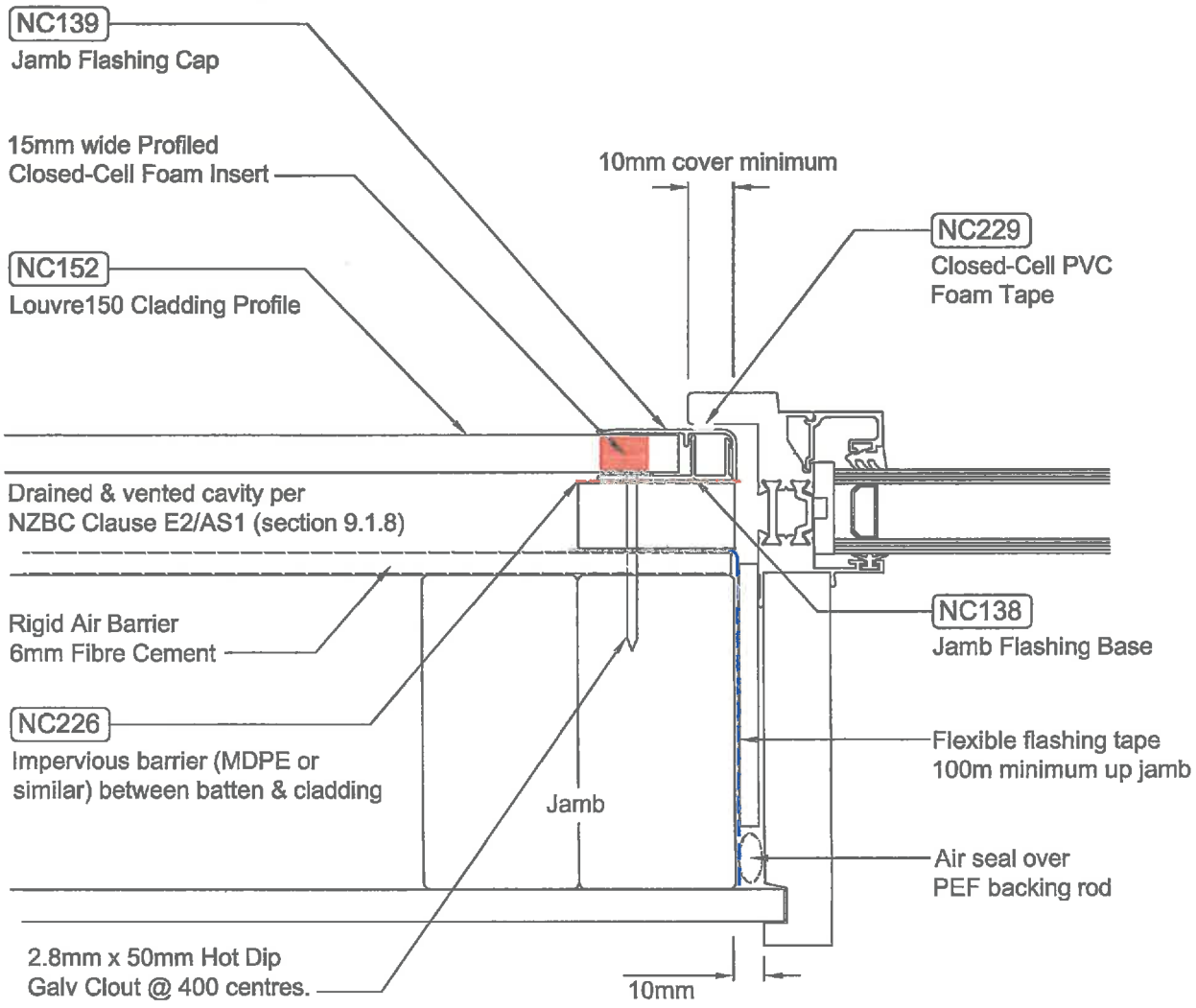
August 2014



NWHPT-016 - Horizontal Cladding Window Sill - Standard Surround

Scale 1:2

August 2014



NWHPT-017 - Horizontal Cladding Window Jamb - Standard Surround

Scale 1:2

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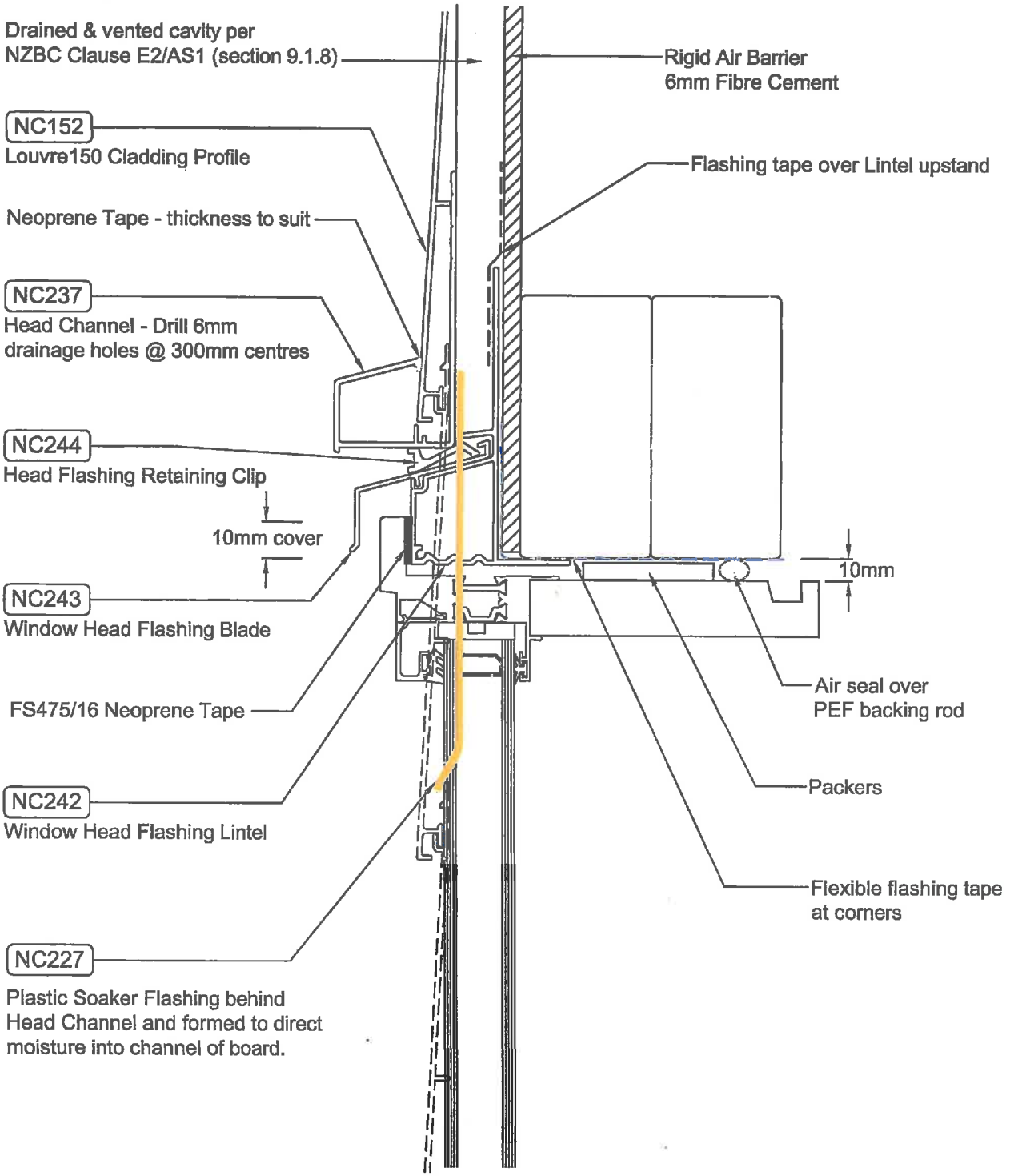
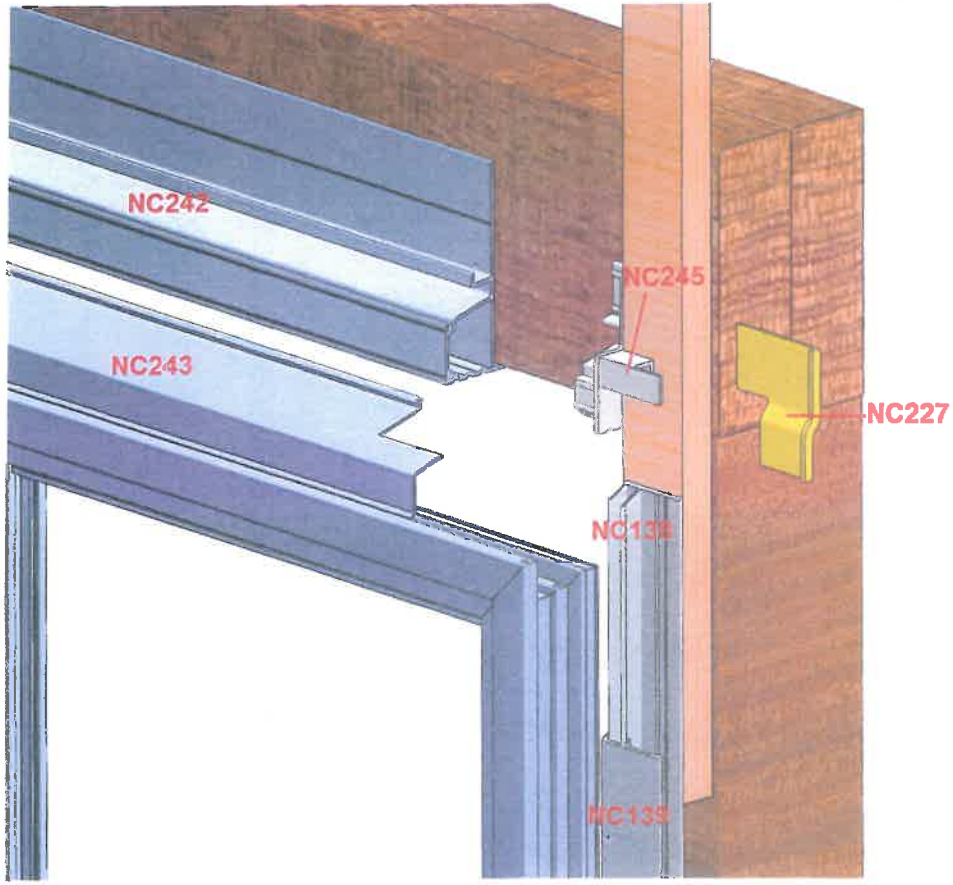


NWHPT-018 - Horizontal Cladding Window Head

Scale 1:2

August 2014



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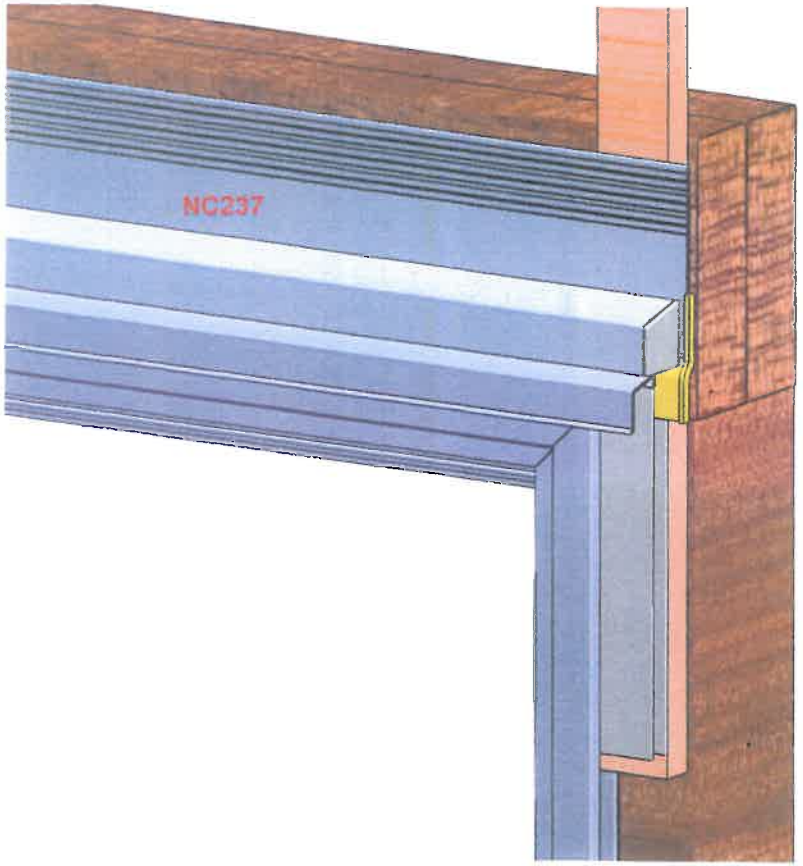

Assembled

Standard window surround - ref. drawings NWHPT-017, NWHPT-018

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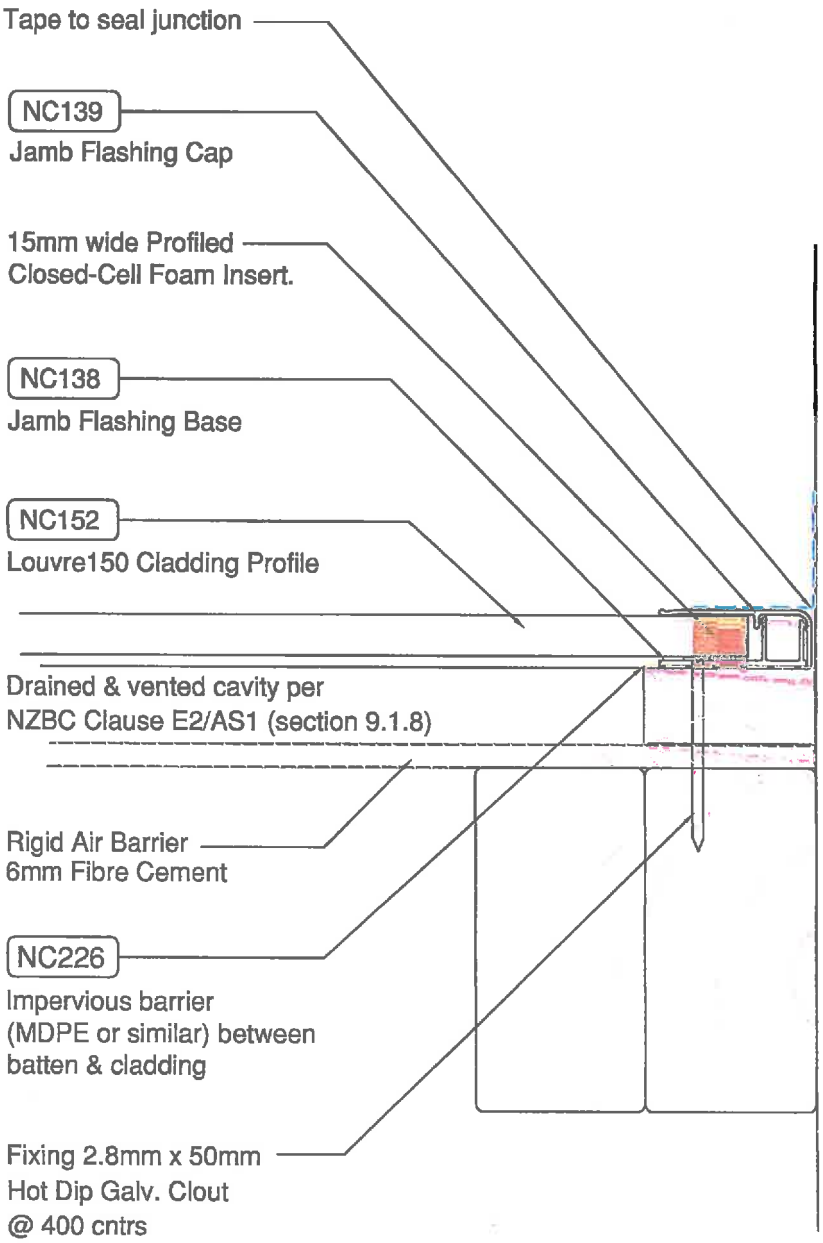
ALUMINIUM CLADDING



NWHPT-019 - Horizontal Cladding Termination at Booth Wall
Scale 1:2

August 2014