

AFS Logicwall System

National Construction Code (NCC 2015)



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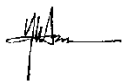
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Table of Contents

1.0	Introduction and Summary	1
2.0	Definition	1
3.0	Limitations	1
4.0	References	2
5.0	Assessment of Compliance of the AFS Logicwall System as a unique wall system	3
5.1	Previous Test carried out on a Unique Wall System	3
5.2	System and test specimen comparison	3
5.3	Standard Details of the Logicwall System	4
5.3.1	General Assessment	5
6.0	Conclusion and Recommendation	6
6.1	Assessment of Standard Details of the Logicwall system	6
6.2	Compliance to NCC2015	6
Appendix A		
	AFS Logicwall System – Virtual Test Prototype	A

1.0 Introduction and Summary

AECOM was engaged by CSR Building Products Ltd to provide consultancy advice pertaining to weatherproofing compliance of the AFS Logicwall System, in accordance with the Verification Methods of the NCC 2015 Building Code of Australia.

This advice is provided in light of a test carried out by CSIRO on a Hebel wall system, entitled '*Water penetration testing to the Verification Methods FV1 & V2.2.1 (weatherproofing), of the National Construction Code (NCC) 2015 on a Hebel 75 mm panel wall system*' (report number DTF1021) dated 27 January 2015.

The aim of this report is:

- To provide a professional judgement/assessment/opinion (in accordance with section A0.9 (d) Assessment Methods of NCC 2015 Volume One and section 1.09 (d) of NCC 2015 – Volume 2 of the Building Code of Australia) as a unique wall system.
- Provide an opinion on the standard details of the AFS Logicwall System from a weatherproofing point of view.
- Assess similarities between the previously tested Hebel wall system and the AFS Logicwall System to provide a basis for the professional judgement.
- The AFS Logicwall System is a unique wall system. This report provides an opinion on the weatherproofing aspects as a unique wall system based on the results of an earlier test carried out by CSIRO in accordance with the Verification Methods FV1 & V2.2.1 (weatherproofing), of the NCC.

2.0 Definition

Weatherproofing referred to this report relates to the ingress of water into the building during wet weather conditions only.

For a unique wall system, no water ingress is allowed on the inside surface of the façade.

The following references have been shortened/ abbreviated:

National Construction Code Series 2015	NCC 2015
CSIRO report on the Hebel wall system, entitled ' <i>Water penetration testing to the Verification Methods FV1 & V2.2.1 (weatherproofing), of the National Construction Code (NCC) 2015 on a Hebel 75 mm panel wall system</i> ' (report number DTF1021) dated 27 January 2015.	CSIRO Hebel report
AFS Logicwall System	Logicwall system

3.0 Limitations

The works are limited to the scope described above and to the weatherproofing verification methods in the NCC 2015 which was issued and effective to the States and Territories from 1 May 2015. Reference is made to the results of the CSIRO Hebel report.

No structural assessment of the framing members, fixings and wall panels, including building movements or the location of the joints in the Logicwall system was carried out as part of this work.

This opinion is based on relevant details from the AFS Designer Manual 2015 Edition and excludes the following:

- The requirements of NCC 2015 other than an opinion on the weatherproofing of the Logicwall system with reference to Verification methods FV1 & V2.2.1 (weatherproofing) of the NCC.
- Façade systems other than the Logicwall system.
- Interface with other systems.

- Fire and acoustic requirements.
- Structural design including the durability of the components of the system.
- Site installation works.
- Windows, doors and other services

Note that AECOM have assumed that all design and installation works will be carried out in strict accordance with the recommendations from AFS.

This report has been prepared for CSR Building Products Ltd and should not be relied upon by any third party. No responsibility is undertaken to any third party in the use of this report.

4.0 References

The following is referenced:

- CSIRO report on the Hebel wall system, entitled '*Water penetration testing to the Verification methods FV1 & V2.2.1 (weatherproofing), of the National Construction Code (NCC) 2015 on a Hebel 75 mm panel wall system*' (report number DTF1021) dated 27 January 2015.
- Verification Methods of NCC 2015 issued and effective to the States and Territories from 1 May 2015.
- The following Chapters from the AFS Designer 2015 Edition:
 - Chapter F – External Design Considerations
 - Chapter I – Architectural Detailing
 - Chapter J – Trade Coordination

5.0 Assessment of Compliance of the AFS Logicwall System as a unique wall system

5.1 Previous Test carried out on a Unique Wall System

Based on tests carried out by CSIRO (and as detailed in the CSIRO Hebel report), the CSR Hebel wall system demonstrated performance satisfying the compliance requirement when tested to Verification Methods FV1 & V2.2.1 of NCC2015 (see CSIRO Hebel report) with a serviceability pressure of +0.68 kPa and -1.27 kPa.

The test specimen comprised a timber frame which acted as the primary support structure for the 75 mm thick CSR Hebel panels.

5.2 System and test specimen comparison

CSR has sought to verify that the Logicwall system will comply with the weatherproofing verification requirements of National Construction Code (NCC) 2015 if tested in a similar manner as detailed in the CSIRO Hebel report. The following discussion refers to the compliance of Logicwall in accordance with NCC 2015, in reference to the similarities between the Logicwall and Hebel wall system and the previous tests as noted above.

The Hebel wall system is a face sealed system and is classified as a unique wall system with reference to NCC 2015. CSIRO has demonstrated that the Hebel wall system, when tested, did not have presence of water on the inside surface of the façade. CSIRO has therefore determined that the Hebel system satisfied the compliance criteria as set out in Volume One (Class 2 to Class 9 Buildings) in Section F-Health and Amenity of NCC2015.

A comparison between the Hebel wall system and the Logicwall system is shown in Table 1 below. As previously stated, the aim of this comparison is to provide a basis for the professional opinion on the weatherproofing compliance of the Logicwall system without the need of physically carrying out the verification tests as described in NCC2015. A mock or virtual test prototype was assembled for comparative reasons. Illustrations of the Logicwall system (virtual test prototype) are included in Figures 1 and 2 in Appendix A.

This opinion is based on the wind pressures adopted in the CSIRO Hebel report.

Table 1: Comparison of the tested Hebel wall system and the AFS Logicwall system

System comparison			
Component	Hebel Wall System (Tested by CSIRO to be NCC compliant)	Logicwall System	Comments
Cladding	Face sealed system	Face sealed system	Both systems form a consistent waterproof membrane.
Wall panel	Single monolithic	Single monolithic	The wall panels of both systems are monolithic.
Sealant	Waterproofing sealant	Waterproofing sealant	All joints and interfaces have flexible weather sealant to provide an external seal.
Coating	Render base coat	Render base coat	The external wall skin of both systems is rendered and sealed with a proprietary waterproofing membrane.

5.3 Standard Details of the Logicwall System

A virtual prototype test model of the AFS Logicwall system was assembled (see Appendix A) using the standard details as described in Chapters F, I and J of the AFS Designer 2015 Manual. These details were compared with the tested CSR Hebel system.

The following table provides a comparison of the two systems.

Table 2: Comparison between the test components of the tested Hebel wall system and Logicwall system

Test specimen comparison			
<i>Note: Refer to CSIRO Hebel report Refer to AFS Designer 2015 Edition for references listed</i>			
Component	Hebel Wall System (Tested by CSIRO to be NCC compliant)	AFS Logicwall System	Comments
Vertical and Horizontal control joints	The joints are continuously sealed along the external face of the panel.	The joint details are similar to the Hebel control joints. See Chapter I Figure 2.4.1.	The control joint is capable of accommodating a certain amount of movement, which includes building movement to minimise cracking in the walls.
Wall junctions	The walls are butted with adhesive and rendered	The junctions are monolithic after concreting See Chapter I, Figures 2.3.1, 2.3.2 and 2.3.3	Hebel: All panel interfaces are joined with proprietary adhesive and rendered. Logicwall: 1. Core filling process creates monolithic wall section 2. Compressed fibre cement skin joined with proprietary render system
Windows	The windows in the Hebel test were face sealed against the wall panels.	Windows are not part of the system and provided the fenestrations are appropriately sealed at the interface with the windows, the system should remain water tight during the test. See Chapter I, Figures 2.7.4 or 2.7.5	Both systems require fenestrations to be sealed to the window frame for the test.
Doors	The doors in the Hebel test were face sealed against the wall panels.	Doors are not part of the system and provided the fenestrations are appropriately sealed at the interface with the doors, the system should remain water tight during the test.	Both systems require the fenestrations to be sealed to the door frame for the test.

Electrical box	The electrical box was face sealed against the wall panels.	Electrical box to be similarly sealed.	Both systems require the electrical box to be fully sealed to the fenestration.
Balcony drainage	N/A	N/A	
Parapet flashings	The top of the panels are flashed	The panels are flashed See chapter I, Figures 2.9.4	Appropriate flashing of both systems will provide the necessary weatherproofing requirements
Footer and header termination systems	Sealed against floor structure	Sealed against floor structure See Chapter I Figure 2.1.1, 2.1.2, 2.1.3, 2.1.7 and 2.1.9	Both systems are sealed at header and footer locations.

5.3.1 General Assessment

Based on the assessment of the standard details of the Logicwall system (see Table 2) from a waterproofing point of view, the following is noted:

- The Logicwall system is similar to the previously tested Hebel wall system as both are face sealed systems.
- The weatherproofing of the Logicwall system is based on the assumption that the design of the AFS panels is structurally adequate in accordance with the appropriate loading codes.
- The weatherproofing of the Logicwall system assumes that it is appropriately articulated and designed to suit the requirements of the appropriate Australian Standards.
- Seals and associated flashings in the system are not compromised and will perform appropriately to prevent water ingress at the joints.

6.0 Conclusion and Recommendation

6.1 Assessment of Standard Details of the Logicwall system

Based on the available details from AFS Designer 2015, it is AECOM's opinion that the weatherproofing of the Logicwall system can be maintained provided the seals and associated flashings are not compromised during construction or when in service and will perform appropriately to prevent water ingress at the joints.

6.2 Compliance to NCC2015

Based on the comparison between the tested Hebel wall system and Logicwall system, it is AECOM's opinion that both these systems are similar in terms of weatherproofing performance. They are both face sealed systems and are classified as a unique wall system in accordance with NCC 2015.

It is AECOM's opinion that this wall system will likely perform in a similar manner to the CSR Hebel wall system as a unique wall system and will demonstrate similar compliance to the requirements of NCC 2015 Verification Methods FV1 (volume one Class 2 to 9 buildings) and V2.2.1 (volume two – Class 1 and 10 buildings) if tested to the same loads and conditions.

Therefore, based on the above comparisons, it is AECOM's opinion and professional judgement that the Logicwall system will comply with the Weatherproofing Performance Requirements of Volume 1 and 2 of NCC2015 when subjected to similar loading conditions.

In addition, the following is recommended:

- Structural design of the supporting structure to be carried out for the appropriate design loads
- Appropriate joints (vertical and horizontal joints) to be provided to address building movements

Appendix A

AFS Logicwall System – Virtual Test Prototype

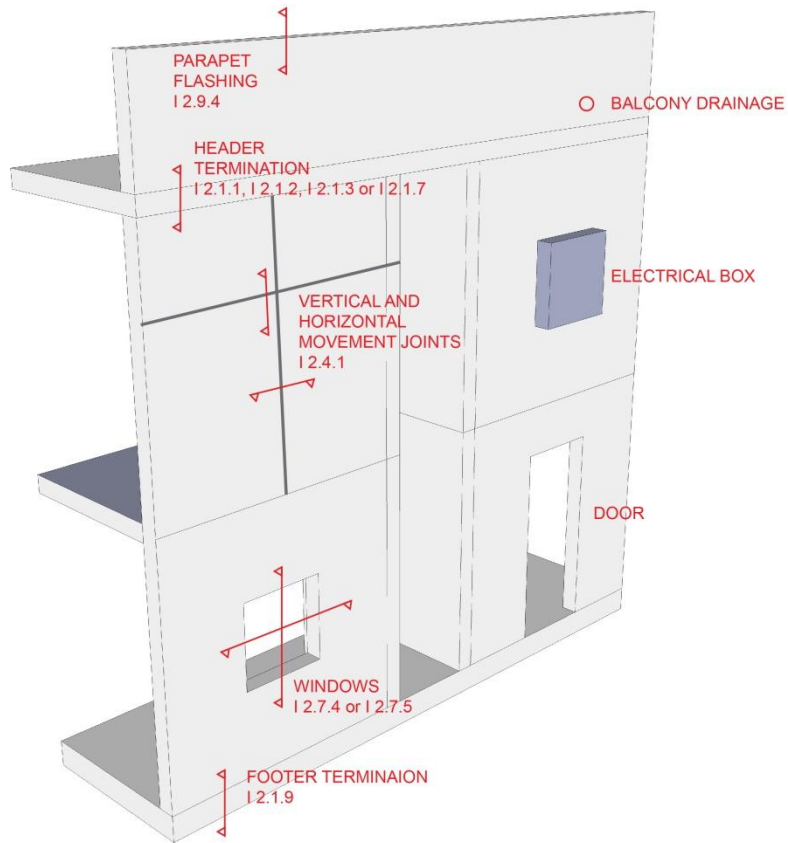


Figure 1: Test prototype of Logicwall system

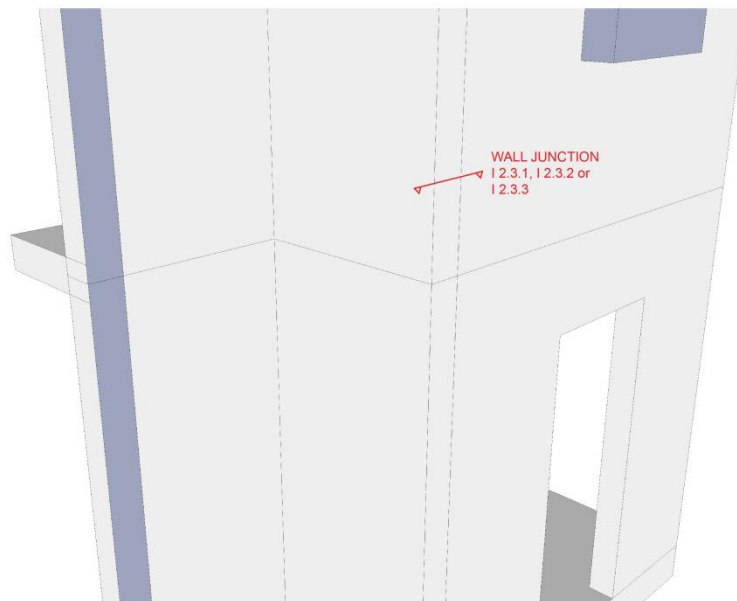


Figure 2: Test prototype of Logicwall system