

Weatherproofing (FV1.1)

FP1.4

The Performance Requirements of the National Construction Code (NCC) can be met using either a Performance Solution, a Deemed-To-Satisfy (DTS) Solution, or a combination of both. The following demonstrates the performance-based design process, aligning with the ABCB's Performance Solution Process guidance document.



Scenario

A property developer approached a manufacturer of a cladding system and expressed interest in using the product for an external façade on a proposed low-rise office building. The cladding comprises of a composite board system attached to masonry using furring channels. The cladding had not yet been tested in regards to its weatherproofing properties.



Prepare a performance-based design brief

What are the design objectives?

Aside from the client's objective for an aesthetically pleasing façade, it has been identified that the cladding must provide a degree of weatherproofing in order to satisfy the relevant NCC Performance Requirement¹.

Who should be consulted?

The client, builder, testing authority and the appropriate regulatory approval authority.

What is the basis of the Performance Solution?

As there are no DTS Provisions available, an alternative method is needed to meet the weatherproofing Performance Requirement. One way of achieving this is by using Verification Method FV1.1 in NCC Volume One, Section F.

What evidence is proposed?

- A calculation of the risk score determined in accordance with FV1.1(a)(i) and Table FV1.1, to demonstrate that the Verification Method is suitable to use for this scenario.
- Façade drawings demonstrating that the wall cladding type is a direct fixed cladding wall as per the NCC defined term, because this will dictate the testing specimen characteristics and test procedure required under FV1.1.
- Test report detailing results of the proposed façade system tests which verify that the façade system meets the test requirements of FV1.1.

Which DTS Provision is applicable?

There are no DTS Provisions in NCC Volume One for weatherproofing of external façades.

Which Performance Requirement is applicable?

The Performance Requirement for the external wall cladding solution in this scenario is FP1.4.

FP1.4 Weatherproofing — "A roof and external wall (including openings around windows and doors) must prevent the penetration of water that could cause —

- (a) unhealthy or dangerous conditions, or loss of amenity for occupants; and
- (b) undue dampness or deterioration of building elements."

Note: for brevity, the applicable Performance Requirements and DTS Provisions have been limited. When determining which Performance Requirements and DTS Provisions are applicable, consideration should be made to the latest edition of the NCC. This solution may also impact other Performance Requirements and DTS Provisions and must be considered in accordance with Part A2 of NCC 2019.

¹ It has been assumed that product compliance relating to other sections of NCC Volume One, such as fire resistance, has already been addressed.



Carry out analysis

Which Assessment Methods are the most suitable and where can they be found?

Assessment Methods are listed in A2.2(2) of Part A2. A2.2(2) states that any Assessment Method, or a combination of them, may be used to determine that a Performance Solution complies with the Performance Requirements. In this scenario, Verification Method FV1.1 is used as the Assessment Method.

How can the Assessment Method(s) be applied?

A test specimen of a complete façade system was constructed, including a wall junction, a window, doorway and footer and header termination system. This test specimen was representative of the façade system's intended application in the proposed project as verified by the stakeholder group.

A testing organisation was engaged to undertake testing of the typical façade system in accordance with FV1.1(c)(i) for a direct fix cladding wall, including a 100% positive and negative serviceability wind pressure test, static pressure test and a cyclic pressure test.

During the first test the test specimen showed some presence of water on the inside surface of the façade. As per FV1.1(d)(i), compliance is met only if no water is present on the inside surface of the façade. At this point, two options to proceed were available:

- Modify the cladding to resist water penetration; or
- Modify the design to become a cavity construction.

The area where water was present was examined and modifications were made to the façade system to rectify the problem. A second test specimen was manufactured and tested. After the second test it was noted that no water had penetrated through to the inside skin of the façade.



Evaluate results

Evaluation of the first test specimen's failure due to water penetration was noted and was used to inform the limitations of the façade system. After modification of the façade system the second test specimen showed no water present on the internal façade face. This was then used to form the basis for the design.

The stakeholder group reviewed the report from the testing organisation and agreed that the revised design for the external wall satisfies the acceptance criteria set out in FV1.1. This report is retained for submission to the regulatory authority as evidence of suitability that Performance Requirement FP1.4 is satisfied.



Prepare a final report

What should be in the final submission?

The final report provided by the testing organisation contains sufficient details, as outlined in FV1.1(e), to demonstrate that the modified façade system meets the test requirements of FV1.1. Subsequently, it is demonstrated that the proposed cladding system meets Performance Requirement FP1.4 for an external wall.

A covering letter is also provided to supplement this report summarising the key points relevant to this Performance Solution, which includes:

- A summary of the test report results, which include the required information outlined in FV1.1(e) and an overview of the limitations of the façade as indicated from the test results.
- Specification details on the installation requirements of the façade system in relation to its application on the proposed building design so that the cladding is installed correctly.
- Acceptance that the solution demonstrates compliance.