

High rise apartment stack



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 plumber is seeking to design a single stack system for a 12 storey residential apartment building. However, under the DTS Provisions of NCC Volume Three, the Plumbing Code of Australia (PCA), a single stack system allows for a 100mm DN stack to connect fixtures extending a maximum of 10 consecutive storeys only. To overcome this limitation, a Performance Solution is considered.



Prepare a performance-based design brief

What are the design objectives?

To avoid unnecessary build costs, minimise ongoing maintenance and achieve efficiencies through innovative design.

Who should be consulted?

The building owner, the plumbing practitioner, the hydraulic consultant, the developer, the builder and the appropriate regulatory approval authority.

What is the basis of the Performance Solution?

Extending single stack design principles, based on a reduction in water flows using more water efficient tapware and fixtures, allowing for fixtures on additional levels to be connected to the stack without increasing discharge flows.

What evidence is proposed?

Comparison with DTS Provisions.

Which DTS Provisions are applicable?

- B1.4 of NCC Volume Three, which calls up AS/NZS 3500.1.
- B1.2 of NCC Volume Three, which sets the water efficiency requirements for sanitary fixtures.
- B1.3 and B2.4 of NCC Volume Three, which set the water efficiency requirements through a maximum flow rate of cold and heated water outlets.
- B2.9 of NCC Volume Three, which calls up AS/NZS 3500.4.
- C1.3 and C2.4 of NCC Volume Three, which calls up AS/NZS 3500.2.

Which Performance Requirement is applicable?

- BP1.2 Design, construction and installation of cold water services.
- BP2.3 Design, construction and installation of heated water services.
- CP1.1 Design, construction and installation of sanitary plumbing systems.
- CP2.1 Design, construction and installation of sanitary drainage systems.

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.



Carry out analysis

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

Assessment Methods are listed in A2.2 of Part A2 and state that any Assessment Method, or combination of them, may be used to determine that a solution complies with the Performance Requirements. In this scenario, Comparison with the DTS Provisions will be used as the Assessment Method.

To support the extended single stack Performance Solution, the plumber prepares calculations which demonstrate that through the use of water efficient tapware and fixtures, flow rates are reduced to equal or less than that of a 10 storey single stack system constructed using the DTS Provisions.

In this example, the following supporting evidence is used to verify compliance:

- Calculations showing L/s flow rates of all fixtures, prepared by a consultant with recognised credentials.
- Documentation of all fixtures and tapware used to achieve flow rates as specified in calculation sheets.
- Expected flow rate calculations demonstrating the sanitary drainage design for the extended single stack system are equal to or less than the DTS Provisions for a 10 storey single stack, prepared by a consultant with recognised credentials.
- Detailed hydraulic design.



Evaluate results

To verify that the relevant Performance Requirements have been satisfied, the hydraulic consultant and plumber:

- Collate all documentation of fixtures and associated flow rates used in the building;
- Analyse and compare design calculations and flow rate data of that of the DTS Provisions; and
- Obtain a certification of the plans and calculations for the system by a person or organisation with recognised credentials (i.e. third-party review).



Prepare a final report

What should be in the final submission?

- Performance Solution documentation, including detailed hydraulic design, all calculations and certification as required by the regulatory approval authority.
- A comprehensive overview of the plumbing project, including verification calculation sheets and certification documentation from the recognised expert, including credentials.
- A statement from the owner of the building acknowledging acceptance of the Performance Solution.
- A statement from the developer and builder acknowledging acceptance of the Performance Solution.