

## INDUSTRY GUIDE:

# PERFORMANCE SOLUTIONS FOR PLUMBING INSTALLATIONS

**Note:** The term 'Alternative Solution' has been changed to 'Performance Solution' in the Plumbing Code of Australia (PCA) 2016.

## 1. OBJECTIVE

This information guide is intended to provide clear guidance for plumbing practitioners on the procedures and documentation requirements for the carrying out of a Performance Solution.

## 2. PERFORMANCE REQUIREMENTS

The Plumbing Code of Australia (PCA) is adopted by and forms part of the *Plumbing Regulations 2008*. The Performance Requirements of the PCA can be achieved through:

1. Formulating a Performance Solution which complies with the Performance Requirements, or is demonstrated to be at least equivalent to the Deemed to Satisfy (DtS) provisions,
2. Complying with the DtS provisions, such as the referenced Standard AS/NZS 3500 Plumbing and drainage suite and/or other relevant plumbing standards where applicable, or
3. A combination of the above.

## 3. WHAT IS A PERFORMANCE SOLUTION?

A **Performance Solution** is one of the three pathways (as set out in section 2 above) to achieve compliance with the Performance Requirements of the PCA. Most plumbing installations use the DtS method, by following the requirements in the referenced Standards - such as the AS/NZS 3500 Plumbing and Drainage suite. However, where a DtS method for a particular plumbing installation does not exist, or where a unique or site specific solution is required/desired, then a Performance Solution approach may be used. A Performance Solution may be used for any design and must be developed prior to the commencement of installation.

## 4. PERFORMANCE SOLUTION OR PLUMBING MODIFICATION

The VBA may modify the plumbing regulations to not apply, or apply with specified variations under Section 221ZZO of the *Building Act 1993* (see the VBA website for further information on how to apply for a modification). The VBA must be satisfied that the plumbing regulation is inappropriate in the particular circumstances and that the modification is reasonable and not detrimental to the public interest. For example, the VBA may issue a modification declaration to an applicant declaring that a provision of the plumbing regulations, the PCA or referenced standard does not apply, or applies with specified variations, to specified plumbing work.

In contrast, a Performance Solution is an alternative pathway for complying with the performance requirements of the PCA. A Performance Solution uses a non - DtS method to demonstrate compliance with the Performance Requirements specified within the PCA.

## 5. ADDITIONAL INFORMATION ON PERFORMANCE SOLUTIONS

As well as this information guide, there is additional guidance information including online videos and case studies available on the website of the Australian Building Codes Board (ABCB) at [www.abcb.gov.au/about-the-national-construction-code/NCC\\_Performance\\_Based\\_Code.aspx](http://www.abcb.gov.au/about-the-national-construction-code/NCC_Performance_Based_Code.aspx). Part A of the PCA also provides further information on the use of Performance Solutions. It is recommended that practitioners also consult these documents when considering or developing Performance Solutions.

## 6. RECOMMENDED PROCESS FOR DEVELOPING A PERFORMANCE SOLUTION

The following process outlines the key stages in the development of a Performance Solution. Steps 1 to 6 should be completed **before** the plumbing work is carried out. Steps 8 and 9 must be completed after the work is carried out.

1. Consult with key stakeholders including the building owner or owner's representative
2. Prepare a performance based design brief
3. Carry out analysis
4. Undertake any necessary modelling or testing
5. Collate and evaluate results
6. Prepare a final report
7. Carry out the installation
8. Detail the Performance Solution on the Compliance Certificate
9. Copies of the documentation should be kept along with the Compliance Certificate by the practitioner and the property owner

As the licensed plumbing practitioner is required to certify and sign off on the plumbing installation as part of the Compliance Certificate process, it is their responsibility to ensure that the above requirements are met. The responsible plumbing practitioner may consider engaging one or more Recognised Expert(s) to assist with some of the above requirements.

More detailed information on each of the steps for developing a Performance Solution is contained in Appendix 1.

## 7. ASSESSMENT METHODS

The PCA offers practitioners four methods (or any combinations of them) to determine whether a Performance Solution complies with the Performance Requirements. These are:

- a) Evidence of the fit for purpose of the installation determined and demonstrated according to the methods contained in Section A2.2 *Evidence of Suitability* in the PCA.
- b) By verifying compliance of the Performance Solution using the following *Verification Methods*:
  - i) by calculation and certification by persons or organisations with *recognised credentials* in the design or testing in the relevant class of plumbing work, or;
  - ii) by satisfying the required criteria when tested in accordance with a specified test method endorsed by a *recognised certification body*.
- c) By comparing their solution with the Deemed-to-Satisfy provisions contained in the PCA (this will likely require a comparison with provisions in the relevant Australian Standards).

NOTE: Practitioners should be aware that they must provide suitable evidence to demonstrate the comparison.

- d) The *Expert Judgement* of a person who has the qualifications and experience to determine whether an installation complies with all relevant Performance Requirements.

## 8. PERFORMANCE SOLUTIONS AND WATERMARK

Practitioners should note that a Performance Solution cannot be used to exempt a plumbing material or product from the WaterMark product certification scheme. That is, the plumbing product or material used in a Performance Solution must be WaterMark certified products (where required by clause A2.1 (b) (i) in “**Part A2.1 Suitability of materials and products**” of the PCA).

Where the plumbing product or material is not required to be WaterMark certified, a product or material is still required to demonstrate it is “fit for purpose” in accordance with the PCA Clause A2.1 (a) and A2.1 (d) requirements.

## 9. PERFORMANCE SOLUTIONS AND INSURANCE

Current plumbing insurance provides for consumers to make a claim against the plumbing practitioner’s insurance policy in a number of circumstances. As Performance Solutions may carry with them increased risk for the plumbing practitioner and/or consumer, it is important that any work carried out under this method complies with all relevant requirements under the plumbing regulatory framework. Failure to do so may affect the practitioner’s insurance cover and/or premium.

It is recommended that plumbing practitioners consult their insurance company to confirm that their insurance covers them for plumbing work carried out under a Performance Solution method.

## 10. RECOGNISED EXPERTS AND LIABILITY

In formulating a Performance Solution, practitioners may engage the services of appropriately qualified and relevant *Recognised Experts* to assist with the design. It is recommended that practitioners consider what forms of redress (e.g. civil, legal, others?) they may have in the event that the advice relied upon from the *Recognised Expert* results in the Performance Solution failing to comply with the Performance Requirements (i.e. non-compliant plumbing work).

Under Victorian plumbing laws, a plumbing practitioner will be deemed responsible for the plumbing work and held liable for any Performance Solution failing to comply with the Performance Requirements (i.e. non-compliant plumbing installations), even if the work was installed on the basis of an *Expert Judgement* and/or advice from a *Recognised Expert*. i.e. a plumbing practitioner can not transfer their liability to a third party even if the third party was relied upon as *Recognised Experts*.

In determining whether the persons/organisations engaged are adequately qualified and experienced to be *Recognised Experts*, the VBA recommends as a minimum the following tests:

- a) Does the person/organisation have the relevant qualifications and experience to determine whether the proposed Performance Solution complies with the performance requirements?
- b) What type of relevant qualifications and experience do they have? Is it in the same or similar area as that proposed for the Performance Solution?
- c) Is the level of expertise consistent with the degree of complexity of the plumbing installation, site or building?

NOTE: The VBA does not make formal or individual determinations on who may be considered as a *Recognised Expert* due to the complexity and variability of each installation.

## 11. COMPLIANCE CERTIFICATES

The costs associated with the development of a Performance Solution must be factored into the total value of plumbing work when determining whether the work may trigger the need for the issue of a Compliance Certificate under section 221ZL of the *Building Act 1993*. Due to the anticipated time, costs, level of evidence required and complexity associated with a Performance Solution, it is highly likely that the total cost alone of a proposed Performance Solution will exceed the threshold \$750 required for issuing a Compliance Certificate, even before factoring in materials and labour costs associated with the installation.

Where a practitioner carries out work as a Performance Solution, this must be identified as such on the Compliance Certificate. This will identify the installation as being carried out under a Performance Solution approach (instead of the Deemed to Satisfy approach) and allow the installation to be assessed differently when the installation is being audited, investigated by the VBA or accessed by other practitioners in the future. In the absence of this information, the VBA can only assume that the installation was carried out according to the DtS method.

All supporting information, documentation, reports and correspondence collected for the Performance Solution must be kept with the Compliance Certificate. A copy of the Performance Solution documentation report should be provided to the property owner so that any future maintenance, repairs, alterations, etc. by others can be informed of what was previously carried out.

These will need to be retained for a minimum 10 year period with the relevant compliance certificate by the plumbing practitioner responsible for carrying out the installation.

## Appendix 1: Process for developing a Performance Solution

The following recommended steps provide more detailed information on how to develop a Performance Solution.

### STEP 1: PREPARE A PERFORMANCE BASED DESIGN BRIEF

A performance based design brief is a document that sets out the proposed Performance Solution. It should include and describe the following elements:

- 1. What is the proposed Performance Solution, its scope, rationale for the Performance Solution, where is it to be installed, and the type of plumbing work?**
- 2. What are the applicable performance requirements and applicable DTS (if any) provisions?**

Section **A0.8 Relevant Performance Requirements** of the PCA replicated as following applies:

a) Where a *Performance Requirement* is satisfied entirely by a *Performance Solution*:

- i) Identify the relevant *Performance Requirement* from the Section or Part to which the *Performance Solution* applies.
- ii) Identify *Performance Requirements* from other Sections or Parts that are relevant to any aspects of the *Performance Solution* proposed or that are affected by the application of the *Performance Solution*.

b) Where a *Performance Requirement* is satisfied by a *Performance Solution* in combination with a *Deemed to Satisfy Solution*:

- i) Identify the relevant *Deemed to Satisfy Provisions* of each Section or Part that is to be the subject of the *Performance Solution*.
- ii) Identify the *Performance Requirements* from the same Sections or Parts that are relevant to the identified *Deemed to Satisfy Provisions*.
- iii) Identify *Performance Requirements* from other Sections or Parts that are relevant to any aspects of the *Performance Solution* proposed or that are affected by the application of the *Deemed to Satisfy Provisions* that are the subject of the *Performance Solution*.

- 3. Who has been consulted in developing the Performance Solution?**

Examples can include:

- the building owner,
- relevant recognised expert,
- builder/developer (if applicable),
- other relevant regulatory bodies e.g. water authorities, EPA, council, fire authorities; and
- the VBA.

- 4. Are the owners aware of and agree to the Performance Solution? How will this be demonstrated?**

Before commencing a Performance Solution, the property owners should be consulted. Agreement from an owner may be demonstrated through an acknowledgment letter or some other forms of approval.

**5. What Assessment Method (see A0.6 Assessment Method of the PCA) will be used to demonstrate that the Performance Solution complies with the Performance Requirements?**

The PCA provides for four different methods, or any combination of, that can be used to determine that the Performance Solution complies with the relevant performance requirements. The plumbing practitioner will need to determine which of the Assessment Methods will be used. This information will need to be provided in the design brief, including the results, analysis, modelling and calculations used under “Step 2 – Carry out analysis, modelling or testing” below.

The Assessment Methods (replicated from the PCA) are as follows:

Assessment Method A

Evidence to support that the use of a material or *product*, the design or the form of construction meets a *Performance Requirement* or a *Deemed to Satisfy Provision* as described in **A2.2**.

If this method is used, the following applies (replicated from **A2.2 Evidence of suitability** of the PCA):

- a) Evidence to support that a material or *product* subject to **A2.1 (b) (i)** has been certified and authorised must be in the form of a *WaterMark Licence*.
- b) Evidence to support that any other material or *product*, or a design, form of construction or installation, meets a *Performance Requirement* or a *Deemed-to-Satisfy Provision* may be in the form of one or a combination of the following:
  - (i) \*\*\*\*\*
  - (ii) A report issued by a *Recognised Expert* or a *Registered Testing Authority* showing that the material, *product*, design, form of construction or installation has been submitted to the tests listed in a report, and setting out the results of those tests and any other relevant information that demonstrates its suitability for use in the *plumbing* or *drainage* installation.
  - (iii) A certificate from a *professional engineer* or other appropriately qualified person which—
    - a) certifies that a material, *product*, design, form of construction or installation complies with the requirements of the NCC; and
    - b) sets out the basis on which certification is given and the extent to which relevant specifications, rules, codes of practice or other publications have been relied upon.
  - (iv) Any other form of documentary evidence that correctly describes the properties and performance of the material, form of construction or installation and, as *required*, demonstrates its suitability for use in the *plumbing* or *drainage* installation.
- c) Any copy of documentary evidence submitted must be a complete copy of the original report or document.

Where a *Recognised Expert* is used to assist in the formulation of a Performance Solution, the relevant person(s) must have appropriate and relevant qualifications and experience in the area of plumbing and drainage in question. Depending on the nature and complexity of the proposed solution, a *Recognised Expert* may include

manufacturers, engineers, industry expert and the like.

#### Assessment Method B

*Verification Methods* such as—

- i) The *Verification Methods* in the NCC; or
- ii) Such other *Verification Methods* as the authority having jurisdiction accepts for determining compliance with the *Performance Requirements*.

#### Assessment Method C

Comparison with the *Deemed-to-Satisfy Provisions*.

#### Assessment Method D

*Expert Judgment*

*Expert Judgment* is the judgement of a person who has the qualifications and experience to determine whether the plumbing or drainage solution complies with the Performance Requirements. The principles applying to determining who is a *Recognised Expert* applies in this context.

**Ultimately, the responsible plumbing practitioner will have to approve the Performance Solution as they will carry the liability for the work. This is different to the building industry where the relevant building surveyor approves the proposed Performance Solution.**

#### *REMINDER 1:*

*Performance Solutions are only used for installations. It cannot be used to exempt plumbing materials and products from the requirement to be certified and authorised. Where a product or material is required to be WaterMarked, it must be certified under the WaterMark scheme.*

#### **6. Based on the preferred assessment method to be used, a set of agreed acceptance criteria will then need to be developed.**

The acceptance criteria are a set of parameters that must be met for the responsible practitioner to be satisfied that the assessment method and results will comply with the Performance Requirements.



### **STEP 2: CARRY OUT ANALYSIS, MODELLING OR TESTING**

Based on the preferred assessment method and acceptance criteria to be used, the next step is to carry out analysis, modelling or testing. This could take one or more forms, depending on the proposed Performance Solution. Examples of possible tools or methods of analysis, modelling or testing include:

- Comparative or absolute analysis
- Qualitative or quantitative analysis
- Deterministic or probabilistic analysis
- Empirical calculations

- In-situ or laboratory testing, e.g. testing by a recognised laboratory registered with the National Association of Testing Authorities (NATA)
- Computer aided modelling.



### **STEP 3: COLLATE AND EVALUATE RESULTS**

Once the results of the analysis, modelling or testing are completed, it needs to be collated and evaluated to determine whether it meets the agreed acceptance criteria. Further analysis, modelling or testing may be required if the results are not consistent or do not meet the agreed acceptance criteria. Relevant parties should review and agree that the results will satisfy the requirements.



### **STEP 4: PREPARE A FINAL REPORT**

The final report is an essential part of the mandatory documentation.

The report will need to document how the proposed Performance Solution will meet the performance requirements and contain all the necessary documentation and information as described above. These will need to be retained for a minimum 10 year period with the relevant compliance certificate (where applicable) by the plumbing practitioner responsible for carrying out the installation.

Full copies of the Performance Solution including the design brief, plans, results and final report should also be provided to the property owner. This information will also be relevant and important when the installation subjected to the Performance Solution needs to be worked on in future, such as repairs, servicing, alteration, and/or maintenance.



### **STEP 5: CARRY OUT THE INSTALLATION**

Carry out the Performance Solution installation in accordance with the approved design. The approved Performance Solution is similar to a DtS design solution; in that, deviations from the Performance Solution or approved design, like deviations from a DtS will be treated as non-compliant work.

It is critical that the plumbing installation carried out is in accordance with the Performance Solution and approved design as it is the Performance Solution and approved design that has been assessed and developed to meet the relevant performance requirement.

VBA audits carried out on a Performance Solution will assess whether the plumbing installation carried out is in accordance with the Performance Solution and approved design. In addition, the VBA will determine whether the correct process was followed in the development of the Performance Solution including ensuring the chosen assessment method is correctly undertaken.



#### **STEP 6: DETAIL THE PERFORMANCE SOLUTION ON THE COMPLIANCE CERTIFICATE**

Where an installation is carried out based on a Performance Solution instead of the DtS provisions, the responsible plumbing practitioner must also identify this information on the Compliance Certificate.

The following is an example of an acceptable set of information to be included on the Compliance Certificate:

“This plumbing work [DESCRIBE WHICH WORK IS CARRIED OUT UNDER A PERFORMANCE SOLUTION] has been installed as a Performance Solution to meet the performance requirements of [INSERT RELEVANT PERFORMANCE REQUIREMENTS] using the [INSERT ASSESSMENT METHOD USED] of the Plumbing Code of Australia [INSERT YEAR OF PUBLICATION].”

This should also include the Performance Solution report name, date, identification number, address and who it was prepared by.

*REMINDER 2: A Performance Solution must be developed in accordance with the procedures and process before the plumbing work is carried out.*



#### **STEP 7: RETAIN DOCUMENTS**

All documents including reports, tests and analysis must be retained by the plumbing practitioner for a minimum of 10 years.

All documents should be provided to the property owner along with copies of the Compliance Certificate.