NATIONAL PRECAST
CONCRETE ASSOCIATION AUSTRALIA

# Guidance Note:

# Weatherproofing compliance of precast concrete to NCC 2022

This is an update of a National Precast Guidance Note by the same title which referenced the now superseded 2019 version of the National Construction Code (NCC). NCC 2022 is current and applicable as of 1st May, 2023.

**Background**

The NCC is effectively Building law in all Australian jurisdictions. The key aspects which MUST be complied with are termed **Performance Requirements.**

This compliance may be via **"Deemed to Satisfy" (DtS)** provisions, where offered, or via a **Performance Solution.**

DtS provisions are specific actions detailed within the NCC or in some external document referenced by the NCC (eg. an Australian Standard).

Rules for an acceptable Performance Solution are given in the NCC.

A Performance Solution must be verified by one or more stated Assessment Methods (Evidence of suitability; Verification Method; Expert Judgement; Comparison with DtS provisions).

The first step in correctly applying the NCC is to determine the Class of building being considered. Buildings of Classes 1 and 10 are addressed in NCC Vol 2, and buildings of Classes 2 to 9 are addressed in NCC Vol 1.

**The issue**

Concerning the **weatherproofing of external walls** (not to be confused with waterproofing of internal wet areas or of below ground structures) the Performance Requirement in Vol 1 is provision F3P1, and in Vol 2 provision H2P2. The wording is identical, other than the detailed limitations.

The Performance Requirement in F3P1 Weatherproofing, reads as follows:

> "A roof and external wall (including openings around windows and doors) must prevent the penetration of water that could cause –
> 1. unhealthy or dangerous conditions, or loss of amenity for occupants; and
> 2. undue dampness or deterioration of building elements."

Design and construction to AS 3600 - or any related structural concrete Standards - are currently *not* referenced as DtS to achieve compliance with F3P1.

## The solution

It is the opinion of National Precast that the designer of structural concrete is best placed to comply via the Expert Judgement path.

This path involves engaging a relevantly qualified and experienced designer - such as a Professional Engineer, who will determine whether the Performance Solution complies with the NCC Performance Requirements.

This Guidance Note can be used to inform and support that Expert Judgement.

Applying engineering principles to the Performance Requirement, the consideration is whether water – typically rainfall – is able to penetrate the external walls of the structure (assuming no or minimal hydrostatic pressure).

The three ways water can potentially penetrate through precast-type wall construction are via:

1. Uncontrolled material cracking, and / or
2. Jointing between wall elements, and / or
3. Material permeability.

In the case of **uncontrolled material cracking** – the crack control provisions in AS 3600 are adequate and AS 3600 is already cited as DtS in the NCC regarding structural behaviour Performance Requirements. This also relates to the accepted corrosion protection for embedded reinforcement (refer AS 3600).

In the case of **jointing between wall elements** – there are numerous effective solutions in practice which prohibit the passage of water through a precast wall joint and permit free drainage (refer "Details for Buildings", National Precast, 2013 and "Precast Concrete Handbook", Edition 2, National Precast Concrete Association Australia and Concrete Institute of Australia, 2009). Required joint widths may be controlled by applying the dimensional tolerance provisions in AS 3600.

In the case of **material permeability** – concrete mix designs with lower water/cement ratio have corresponding decreased permeability (thereby hindering capillary action), as well as increased strength. Under the typical conditions of rainfall (intermittent wetting with negligible hydrostatic pressure), all concrete complying with AS 3600 is practically impermeable for weatherproofing purposes. Surface coating systems should not be required.

Additionally, concrete strengths generally associated with precast elements (typically f'c = 40MPa as a minimum, i.e., 40MPa at 28 days), aided by the superior compaction and curing inherent with precast, is an efficient way to achieve effective concrete impermeability (refer to "Guide to Concrete Construction", T4,1Cement Concrete Aggregates Australia, 2020).

## Conclusion

In summary, the use of reinforced or prestressed precast concrete walls - combined with the manufacturing methods typically used for precast concrete - together with appropriate joint designs and good site construction practices, make weatherproofing of precast concrete walls readily achievable, as evidenced by the long history and performance of this type of construction in Australia for over 100 years.