



## How Australian Buildings Can Stay Safe During Bushfires

***With bushfires burning in North America and Australia, Senior Building Physics + Sustainability Engineer Lawrence Le looks at Australia's strict fire engineering requirements which maximise the protection and safety of building occupants.***

Bushfires can pose a significant threat to life and property, particularly in regions like Australia where the climate and vegetation can create conditions that contribute to more frequent or intense bushfires. Buildings in bushfire-prone areas must therefore adhere to strict fire engineering requirements to maximise the protection and safety of their occupants.

In bushfire emergencies, the critical goal is to ensure the safety of all occupants which typically involves a safe evacuation. However, there are some scenarios where this is not feasible, and it becomes more important for occupants to take shelter within the building itself. This is especially true for vulnerable populations, such as school children or the elderly, where evacuation may be challenging or dangerous due to mobility or volume of occupants.

The concept of "internal tenability" as per the Australian Building Codes Board (2022) refers to the ability for a building to preserve a safe and habitable environment that protects occupants during a bushfire event. Ensuring internal tenability is vital as it enables occupants to take shelter during a bushfire event, increasing the time available for a safe evacuation route to be secured. Refuge areas within the building should be designed so that occupants can be supplied with smoke-free air and to avoid serious discomfort or burns from internal surfaces of the building during a bushfire event.

**Internal tenability in the NCC**

The recent changes to the National Construction Code (NCC) 2022 Volume One of the Building Code of Australia (BCA) sets out new bushfire tenability requirements that must be met for Class 9a health-care buildings, Class 9b early childhood centres and schools, and Class 9c residential care buildings in designated bushfire prone areas. These building classes must satisfy the following internal tenability criteria as set out in Specification 43 (S43C9) in the NCC 2022 Volume One throughout the duration of occupancy during a bushfire event:

- a) An air handling system must be provided that is capable of—
  - i. being adjusted for full recycling of internal air for a period of not less than 4 hours to avoid the introduction of smoke into the building; and
  - ii. maintaining an internal air temperature of not more than 25°C.
- b) The building envelope must be designed such that if an air handling system required by (a) fails, then—
  - i. internal air temperatures can be maintained below 39°C; and
  - ii. internal surface temperatures can be maintained below 60°C.
- c) If the building is divided into separate compartments then, for the purposes of (a), each compartment must have a separate air handling system.
- d) Each air handling system required by (a) must be designed to account for the activation of smoke detectors from low concentrations of smoke from external sources, so as to ensure that air-conditioning and other essential systems remain operational.

**How Inhabit can help**

Inhabit, a part of Egis Group, can provide modelling services to assist project teams in evaluating how their building design can achieve internal tenability during a bushfire event in the event of air handling system failure – for demonstrating NCC compliance, and for projects where the identified risk suggests greater understanding and design response should be implemented.

Our services include providing a comprehensive solution to demonstrating internal air and surface temperatures and can fulfil the requirements in S43C9 of the NCC in collaboration with the project mechanical engineer and bushfire consultant. As every building and project is unique, our simulation tools can adapt to various forms of building envelopes and façade types, locations, and Bushfire Attack Levels.

### **References**

- ABCB, Guide to National Construction Code Volume One. Canberra: Australian Building Codes Board, 2022.