

# FIRE SAFETY: BENEFITS OF BUILDING WITH CONCRETE



Concrete's **resistance to fire**<sup>[1]</sup> improves the safety of occupants, fire fighters and neighbours. After a fire, in most cases buildings can quickly return to use **boosting community resilience**.

**Put simply, concrete is non-combustible<sup>[2]</sup> it doesn't burn, release toxic fumes, produce smoke.<sup>[3]</sup>**

Concrete has a slow rate of heat transfer, which means it takes a long time for fire to affect its structural, loadbearing ability, and the concrete also acts as a fire shield, allowing safe evacuation of the occupants, less risk for the fire service personnel, and helps stop the spread of fire to other buildings.<sup>[4][5]</sup>

Concrete is also the clear choice for use in bushfire prone areas, offering a barrier to the intense heat and flame<sup>[6]</sup> and by helping to stop the spread of flames.<sup>[1]</sup>

During a fire, temperatures can reach more than 1000°C very quickly with thermal gradients of tens of degrees Celsius per minute.

In these conditions, construction materials may partially or totally lose their mechanical properties, leading to the collapse of structural elements.<sup>[7]</sup> In addition to immediate safety concerns, such a complete building collapse brings longer-term social and economic disruption.

As a result, fire resistance (a specific property of structural elements) and fire resilience (the capacity of a building to maintain function in the aftermath of a fire) are interlinked.

If appropriately designed, concrete is both resistant to fire and able to provide fire resilience<sup>[7][8]</sup> to the built environment.

## Concrete's advantages include:

- Resistance to fire without burning, melting, or producing toxic gases;<sup>[1][6][7]</sup>
- Ability to act as a fire barrier, reducing the spread of fire to neighbouring spaces or buildings;<sup>[1][7][8]</sup>
- Ability to act as an insulator, reducing transfer of heat to adjacent spaces;<sup>[1][6][7]</sup>

- Maintain integrity during a fire, including during extinction, without developing large deformations, ensuring compartmentation of the fire is maintained and reducing the risk of structural collapse;<sup>[7]</sup>
- No emissions of CO<sup>2</sup> or substances dangerous to people or the environment when affected by fire;<sup>[1]</sup>
- No need for additional fire protection measures and materials;<sup>[1]</sup>
- No risk that building refurbishment will compromise fire protection measures, as these measures not needed, unlike for other structural materials;<sup>[1]</sup>
- Reduces risk posed by faulty fire safety measures (fire doors, alarms, ventilation strategies, sprinklers) because concrete is inherently fire resistant;<sup>[1]</sup>

Beyond these practical benefits, it is becoming increasingly common to recognise resilient structures as a key component of economic, social and environmental sustainability. By helping to limit the extent of damage caused by fire, concrete buildings ensure communities recover more quickly and lower the need for demolition and reconstruction, reducing the economic and environmental cost of fire events.

## References:

- [1] Bushfire Resilient Building Guidance for Queensland Homes (2020) Queensland Government and CSIRO - Page 91
- [2] Non combustible means not deemed combustible as determined by AS 1530.1 - combustibility tests for materials. Refer RMIT Fire Testing Report (2020) for testing on the non-combustibility of Concrete. [bit.ly/3LmLVJS](https://bit.ly/3LmLVJS)
- [3] A Comprehensive Review on Fire Damage Assessment of Reinforced Concrete Structures (2022) Qin D, Gao P, Aslam F, Sufian M, and Alabduljabbar H.
- [4] Establishing the List of Products Belonging to Classes A 'No Contribution to Fire' (1996) European Commission
- [5] AS 3959:2018 Construction of Buildings in Bushfire-prone Areas Clause 5.4.1 (2018)
- [6] Australia National Construction Code (2019) Specification C1.1 Fire-resisting Construction
- [7] Structural Design for Safety (2016) Buchanan A, and Abu K. 2nd Edition
- [8] Bushfire Best Practice Guide: Floors and Subfloors (2022) CSIRO



Find out more.

**SUSTAINABLE  
FOR LIFE**

[www.futureproofwithconcrete.com.au](http://www.futureproofwithconcrete.com.au)

Since the information provided is intended for general guidance only and in no way replaces the services of professional consultants on particular projects, no legal liability is accepted by Cement Concrete & Aggregates Australia for its use and/or reliance on it by any person.

**Concrete.**  
**FUTUREPROOF**  
**your build™**