



## FIRE SAFETY with concrete

The concrete sector, which is at the heart of construction, must address citizens' concerns regarding the safety of their homes and other buildings. Together with architects, firefighter associations, and insurance entities, we have a responsibility to address the growing issue of safety and to identify solutions to tackle the concerns of European citizens. Every year more than 4 000 people die in fires in Europe, 80% of which start in their own homes<sup>1</sup>. In the drive towards ever more energy efficient buildings, fire safety needs to be kept in mind in order to avoid increasing fire loads in buildings. Otherwise, we will continue to see an increased risk of fires occurring, more and more often with devastating consequences.

### The concrete case

Concrete is....  
*Non-combustible*

Concrete does not burn and concrete elements retain their strength at high temperatures, so concrete structures can withstand the effects of a fire without requiring any other form of active or passive protection. This safety comes at no additional cost and will always be there, even if the building changes over time (due to refurbishment or accidents). This means that concrete has much more to offer than other structural materials when it comes to safety.

### Protecting people

Firstly, concrete acts as a shield, preventing a fire from spreading from one room to another. This can slow the progress of the fire and give building occupants more time to escape. Furthermore, it acts as a shield for fire-fighters which allows them to tackle and control the fire, whilst minimising the risk to themselves. Secondly, it maintains the robustness and stability of the building or infrastructure. This means that the risk of a concrete building collapsing in the event of a fire is minimal. Finally, concrete does not emit toxic gases, which is important for the health and safety of occupants and fire-fighters alike.



Safety comes as standard with concrete. It does not require special coatings or sealers. Concrete elements have unsurpassed and proven fire resistance properties. Concrete elements do not burn or melt and retain their structural stability at high temperatures.

Concrete is....  
*Fire resistant*

### Minimising the economic impact

Fires can have a significant economic impact on citizens and business. Given the robustness of concrete, not only is it not damaged by the water used when putting out a fire, it is also easy to repair. This lowers the costs of reconstruction and helps economic activities to recover sooner, reducing negative impacts on workers and businesses. Concrete's excellent fire safety properties are valued by property insurers: concrete buildings benefit from reduced fire insurance premiums.

### Protecting the environment

Since concrete does not emit smoke and toxic gases, this minimises the impact of a fire on the environment. In addition, the water used for extinguishing fires is not contaminated.

Concrete has....  
*Built-in fire protection*



Concrete is...  
*The material of choice for fire safety!*



Kinkempois Tunnel (link E25-E40) in Liege, Belgium, using concrete pavement  
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### Fire Safety Engineering - A need for caution

Fire safety engineering (FSE) is a relatively new way in which the level of fire safety can be calculated during the design of a building. FSE can offer architectures more freedom and possibilities, but due to the complexity of fire phenomena, care must be taken with regard to the use of assumptions and simplifications, and the reliability of different measures (such as active and passive protection, escape plans). For this reason, the use of structural elements with high resilience and resistance to fire can guarantee a high level of safety, and robust fire safety engineering design.

### Fire Safety Engineering with concrete

A recent study by CERIB<sup>2</sup> provides an example of Fire Safety Engineering applied to an 8-storey concrete building, but also shows that concrete structures designed without specific fire safety measures equally provide excellent fire safety. A detailed structural analysis indicated that no failure occurred even after the building was subjected to a critical 10-hour natural fire scenario.

Concrete makes tunnels safer. Why? Because not only does concrete not burn, it doesn't emit toxic gases in the event of a fire. This means that people have more time to escape, the risk to their health is minimised, and access for fire fighters is not impeded.

<sup>1</sup>Fire Safe Europe

<sup>2</sup>Probabilistic Study of the Resistance of a Generic Concrete Structure according to Eurocode Natural Fire by M. Heidari et al., 2015

## POLICY RECOMMENDATIONS

1. The Concrete Initiative calls on the EU to develop a coherent strategy to ensure fire safety is not adversely affected by EU or national regulations
2. Greater importance should be given to the passive strength of a structure to withstand a fire
3. Legislation governing tunnels should ensure the use of non-combustible pavement materials, as is already the case in some Member States.