mpa UK Concrete

Concrete protects against fire

Key facts

1. Concrete does not burn.[1]

2. Concrete does not add fuel to a fire, unlike timber.

3. Concrete and masonry are effective fire shields, providing safe means of escape.

Fire is one of the key risks to any building. The building materials chosen can make a significant difference to fire safety. Concrete and masonry minimise fire risk because of their inherent material properties.

In most cases, concrete does not require any additional fire protection because of its built-in resistance to fire. It does not burn and has a slow rate of heat transfer. Concrete ensures that structural integrity remains, fire compartments are not compromised and shielding from heat can be relied upon.

Key benefits of concrete and masonry[2]

1. Concrete and masonry do not burn, and do not add to the fire load, unlike timber.
2. Concrete and masonry have high resistance to fire and can stop fire spreading.
3. Concrete and masonry are effective fire shields, providing safe means of escape for occupants and protection for firefighters.
4. Concrete and masonry do not produce any smoke or toxic gases in a fire.
5. Unlike metals and plastics, concrete and masonry do not drip molten particles, which can spread the fire.
6. Concrete and masonry provide built-in fire protection – there is normally no need for additional measures.
7. Concrete's robustness in fire facilitates firefighting and reduces the risk of structural collapse.
8. Concrete and masonry are typically easy to repair after a fire, and so help businesses to recover sooner.

Concrete is also far less sensitive to construction errors - or even householders' DIY - than other materials.

Fire risk should be a factor in any public policy position that determines choice of building materials. The Committee on Climate Change last year called for a large increase in the use of timber, based on a limited assessment of its carbon impact that did not account for whole-life performance. This recommendation did not consider the clear increase in fire risk from using combustible materials.

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1 Concrete is designated as combustion class A1 - "non combustible" - under BS EN 13501. https://publications.europa.eu/en/publication-detail/-/publication/999ef8f3-56e7-4a99-8e20-01f910b77d2e/language-en

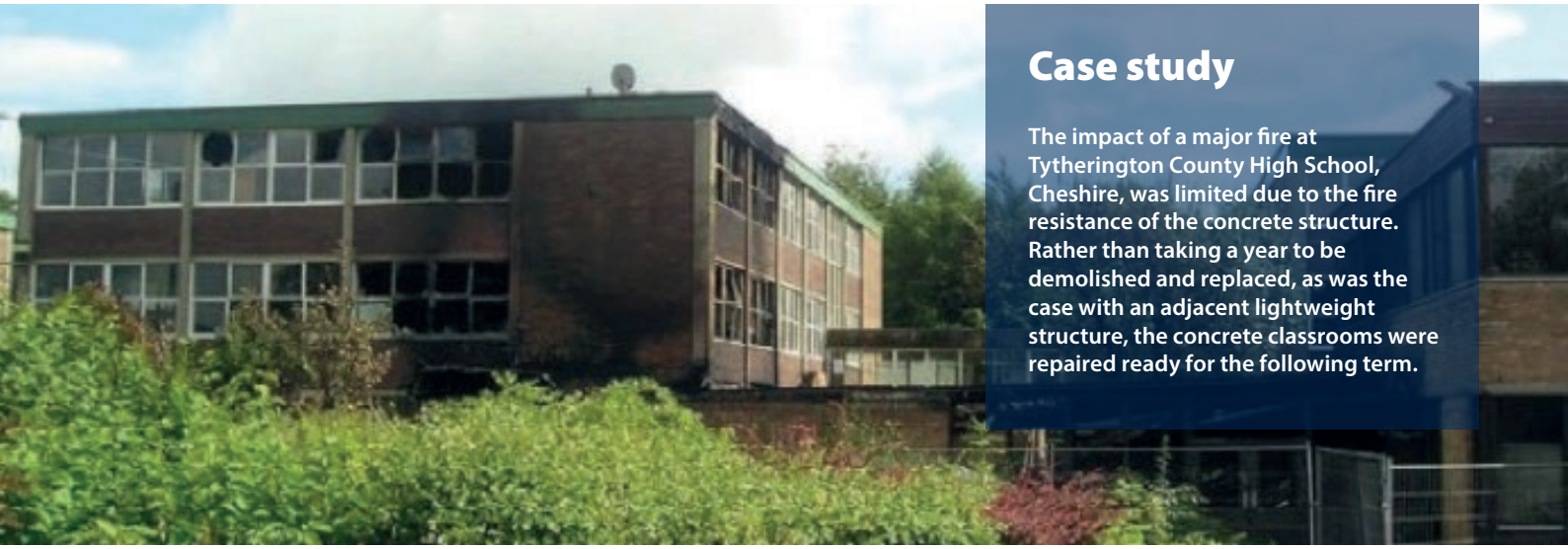
2 From The Concrete Centre, "Concrete and Fire Safety"

Timber risks: growing body of evidence

A structure made of combustible materials such as timber can add significant fuel. This increases the chances of compartmentation failing and the fire spreading. The current fire safety tests for structural elements, developed for non-combustible materials such as concrete, include the combustible timber as part of the fuel load. Recent fires have seen structural elements made of timber become fuel for the fire, including one at a retirement complex in Crewe with vulnerable elderly residents.

This is underlined by research published by MHCLG that shows that timber buildings suffer more widespread fire damage than non-timber buildings.[3] While building regulations rightly prioritise saving lives, growth in non-traditional building materials increases the risk of buildings being destroyed.

Recent Arup research found that Cross Laminated Timber (CLT) can delaminate, meaning that fresh layers are exposed to fire. This reinvigorates the fire, taking it close to the peak temperature again. In several tests, the fire continued well after the starting fuel had burnt out, with only the CLT in the test providing fuel.[4]



Case study

The impact of a major fire at Tytherington County High School, Cheshire, was limited due to the fire resistance of the concrete structure. Rather than taking a year to be demolished and replaced, as was the case with an adjacent lightweight structure, the concrete classrooms were repaired ready for the following term.

Key policy asks:

1.
Public bodies should not favour combustible materials over non-combustible without very solid evidence and in full knowledge of the balance of risks, including fire.

2.
Current fire safety tests that do not count the fuel load of the material being tested should be reconsidered if timber use is expanded.

3.
Non-combustible materials should be favoured for multiple occupancy buildings such as student accommodation and buildings with vulnerable occupants such as retirement homes.

4.
Government should consider whether property protection should be explicitly considered as a secondary goal after life protection when setting building regulations, which currently focus solely on protecting life.

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UK Concrete is part of the Mineral Products Association, the trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar and silica sand industries.

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3 Completed timber buildings suffered a larger area of damage, to a statistically significant degree. DCLG (2012) " Analysis of fires in buildings of timber framed construction, England, 2009-10 to 2011-12" https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/66062/Timber_frame_analysis_17_Jan.pdf

4 Deeny et al, (2018) "Fire safety design in modern timber buildings" The Structural Engineer