Loss Prevention Standards – Asset Class(es)

# Low Carbon Concrete - Introduction

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**Concrete is an essential construction material used in a number of applications. Efforts are being made to improve the sustainability of the concrete manufacturing process and this Loss Prevention Standard provides an overview of low carbon concrete and areas for consideration when selecting low carbon concrete products.**

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## Introduction

Concrete is one of the most widely used construction materials globally with approximately 30 billion tonnes produced and used annually.

Despite its wide usage, concrete is currently responsible for around 8% of global $CO^2$ emissions, primarily due to the energy involved in manufacturing, and the resources quarried and consumed.

One of the ways of improving concrete sustainability is via the use of low carbon concrete (LCC). This is a generic term for concrete manufactured with a reduced carbon footprint when compared to that of traditional concrete.

This is typically currently achieved by the use of one or more of the strategies below:

- Replacing a proportion of the cement with alternative materials such as ground granulated blast furnace slag (GGBS), recovered Pulverised fly ash (PFA) from coal fired processes, limestone and/or calcined clays.
- Using carbon capture technologies to store $CO^2$ during the production process or re-use it.
- Using renewable energy sources for manufacturing.

This Loss Prevention Standard focusses on the low carbon concrete mixes and products and how to reduce the risks of defects.

**Note:** This document is not intended to address Liability exposures. The presumption is that all regulatory requirements, Fire Risk Assessments, and compliance with requirements placed by the local authority having jurisdiction which would include licencing, building permissions, regulations, codes, or standards, have or will be met.

## Understanding the Risks

The use of low carbon concrete mixes presents a number of challenges.

**Floor Slab Delamination**. Slow setting times can trap water which may lead to delamination and surface crusting.

**Slower Strength Gain**. Some concrete mixes take longer to gain full strength, which can lead to project delays.

**Cracking Risks**. Cracks can form as the concrete sets, which may affect structural integrity and finish.

**Surface Finish Problems**. The curing process and colours can impact finished surface aesthetics.

**Availability**. Current replacement materials may reduce as sustainable manufacturing methods evolve.

**Performance Uncertainty**. Concerns include durability, resistance to environmental factors, and overall lifespan.

**Expertise.** Suitably skilled and experienced workers may not be available on all sites.

## Managing the Risks

### Compliance

All low carbon concrete products should be compliant with local, national regulations, codes and standards.

- In the United Kingdom **BS8500 - Concrete. Complementary British Standard to BS EN 206 - Method of specifying and guidance for the specifier** has been reviewed to include concrete products with reduced cement content, the primary source of carbon dioxide emissions in concrete manufacturing, and increased use of Supplementary Cementitious Materials (SCMs).
- The standard allows designers and engineers to create concrete mixes that blend SCMs such as finely ground limestone, fly ash and GGBS and provides recommended limitations and thresholds, which should be followed.

### Established Products

Always use established materials from trusted suppliers with a proven track record of designing and supplying low carbon concrete products and material. This can help improve reliability and durability.

### Experienced Contractors and Designers

The use of low carbon concrete presents a number of technical challenges. Using contractors and designers skilled in working with low carbon concrete materials and the challenges, such as increased curing times, weather conditions and temperature limitations, delamination avoidance etc., can help prevent structural defects including shrinkage, swelling, latent defects, advanced weathering etc.

### Supervision

Low carbon concrete will likely require changes in accepted construction methods and processes. This creates the potential for errors or misjudged time saving practices. Ensure any work involving low carbon concrete is appropriately understood and supervised to ensure compliance with design specifications.

### Time Allowance

Ensure appropriate time is scheduled for any work involving low carbon concrete. Curing times and laying methods typically require more time than standard concrete. This can help prevent delays, bottlenecks and errors due to rushed work.

### Compatibility

Ensure careful analysis is undertaken when introducing low carbon concrete products to existing concrete structures or materials e.g. extensions, storey floor additions, basement excavations to existing buildings etc. The new and existing products should be compatible and not cause chemical reactions or issues with strength and bonding.

### Durability

Low carbon concrete products may have differing durability from other concrete materials within a project. This could impact end of life management, ongoing maintenance and inspection etc.

- Discuss any projects involving low carbon concrete with your Insurer and Broker. They can provide guidance and advice.

### Performance

Ensure low carbon concrete materials used to provide designated structural load bearing capacity, fire and explosion resistance are suitable for such applications. As with any concrete mix, it is very important to include a robust pre-construction testing regime that is appropriate for the intended end use application for the product and allow sufficient time in the program to accommodate this.

### Planning

Detailed planning and consideration of the various risk factors relating to the use of low carbon concrete can help reduce errors, faults and delays, all of which can increase costs.

- Ensure all stakeholders are involved in planning the use of low carbon concrete including the developer, design team, supplier, contractors, site management representatives.
- Include any necessary discussions within regular programme review meetings, to consider if any other time sensitive activities on the site should be delayed or resequenced.
- Take into consideration external or variable factors, such as weather.

### Inspection

Ensure all works are monitored during construction and a final inspection is undertaken post install to ensure compliance with design specifications and expectations. Detailed inspection plans and test documentation should be available for review for quality purposes.

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## Sources and Useful Links

- BS 8500-1 Concrete. Complementary British Standard to BS EN 206 - Method of specifying and guidance for the specifier
- BS 8500-2 Concrete. Complementary British Standard to BS EN 206 - Specification for constituent materials and concrete

## Additional Information

Relevant Loss Prevention Standards include:

- **Temporary Works - Introduction**

To find out more, please visit Aviva Risk Management Solutions or speak to one of our advisors.

## Email us at riskadvice@aviva.com or call 0345 366 6666.*

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