

BACKGROUNDER



CONTEMPRA™. AN INNOVATIVE LOWER CARBON CEMENT THAT CAN REDUCE CO₂ EMISSIONS BY 900,000 TONNES. EVERY YEAR.

Cement is an essential ingredient in concrete, the indispensable construction material that is literally the foundation of modern communities. Reflecting the cement industry's commitment to being a proactive partner in finding solutions for a low carbon future, Contempra is a new cement that reduces CO₂ emissions by 10%¹ while still producing concrete of comparable strength and durability to concrete produced with regular Portland cement. Contempra is recognized under the name Portland-limestone cement in CSA cement and concrete standards.

Introduced in the Canadian market in 2011, Contempra is today rapidly becoming the preferred standard for the majority of new construction projects in Canada. In British Columbia alone, it already accounts for nearly 50% of the domestic cement consumed in the province. This uptake will accelerate as more and more developers, builders and infrastructure decision makers specify the carbon-reduced cement for their projects, leading to potential GHG reductions of up to 900,000 tonnes annually. This is equal to saving over 347 million liters of gas. Or planting 23 million trees.

Contempra makes concrete — already renowned for its safety, sustainability, durability, resiliency, versatility and energy-efficient attributes — the solution of choice for a low carbon built environment.

HOW DOES CONTEMPRA WORK?

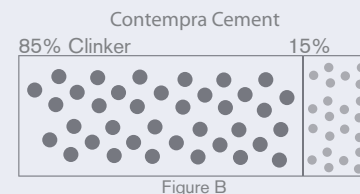
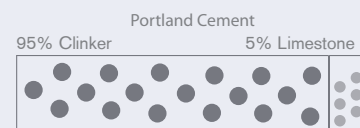
Contempra's 10% reduction in CO₂ emissions occurs during the cement manufacturing process. While regular Portland cement may contain up to 5% limestone, Contempra is made by intergrinding regular clinker — the main ingredient in cement — with up to 15% limestone. Clinker

is the energy intensive component in cement. The clinker used to make Contempra is the same clinker that is used to manufacture regular Portland cement. Reducing the clinker content of cement in this way reduces the amount of emissions associated with its manufacturing.

HOW IS CONTEMPRA MANUFACTURED?

Contempra's manufacturing process involves modifying the clinker and limestone proportions before the final grinding takes place. The limestone, being a softer material, is ground finer than the clinker. However, both the clinker and the limestone in Contempra are ground finer than in regular Portland cement. The particle size and the particle size distribution in Contempra cement has a significant impact on the properties of the final product — concrete. This process of achieving the proper size and distribution of particles in Contempra cement is commonly referred to as "optimizing" the cement.

The result of this optimization process is shown in Figures A and B below:



CONTEMPRA: LESS GHGs, YET COMPARABLE PERFORMANCE TO REGULAR PORTLAND CEMENT

The cement industry has invested considerable resources to optimize the properties of Contempra to be comparable to regular Portland cement. On average, the Contempra clinker and limestone particles are smaller in size, producing a "particle packing effect" that increases the resulting strength of the concrete.

The limestone is subjected to three quality assurance tests prior to manufacturing to ensure that Contempra will provide suitable performance. These tests are for

¹Lindita Bushi and Jamie Meil, Athena Sustainable Materials Institute, An Environmental Life Cycle Assessment of PortlandLimestone and Ordinary Portland Cements in Concrete, 2014

BACKGROUND

calcium carbonate content, clay content and total organic carbon content.

Since Contempra is optimized to provide performance comparable to regular Portland cement manufactured in Canada, no significant changes are required to concrete mix designs when using Contempra.

INNOVATIVE YET PROVEN

The introduction of Contempra in Canada reflects the Canadian cement industry's dedication to innovation and unwavering commitment to reducing its environmental footprint.

By reducing the amount of clinker used in manufacturing cement — its main ingredient and most energy-intensive component — the industry has taken one of the most important steps in its recent history toward reducing the environmental impact of cement.

While still new to the Canadian market, Contempra has an extensive proven track record in Europe — where it is known as Portland-limestone cement — in a variety of commercial and residential applications for over 35 years.

The European cement standard allows for Portland-limestone cement made with up to 35% limestone content. The most popular cement sold in Europe today is Portland-limestone cement with a limestone content of up to 20%. The 15% limestone limit applied to Contempra cement in Canada is well within the maximum limit of 35% permitted in European cement standards.

EXTENSIVELY TESTED

Before Portland-limestone cement was adopted by the Canadian Standards Association (CSA) A3001 and A23.1 Standards — which regulate cement manufacturing and use in Canada — the industry conducted extensive research and testing to verify its adequacy for the Canadian environment and construction industry. This included a thorough review of European literature on Portland-limestone cement, followed by comprehensive cement and concrete testing programs performed by various Canadian cement manufacturers and participating university

researchers. The tests conclusively confirmed that optimized Contempra cement (Portland-limestone cement) produces concrete with strength and durability properties equal to that produced using regular Portland cement.

Field trials carried out in the harsher climates of Québec, Nova Scotia, and Ontario over three winters also demonstrated that Contempra produced concrete durability characteristics that compared very well with concrete using regular Portland cement.



IN CANADIAN BUILDING CODES

Contempra is included under the name Portland-limestone cement in the CSA cement and concrete standards, referenced in the 2010 National Building Code of Canada.

Initially, Contempra was prohibited from use in sulphate exposure environments due to a lack of Canadian data demonstrating its durability in such conditions. More recently, and in response to recent successful sulphate testing programs, the new CSA A3001-13 and A23.1-14 Standards now provide specifications for the use of Portland-limestone cement (Contempra)

in sulphate exposure environments.

REGISTERED ENVIRONMENTAL PRODUCT DECLARATION

Environmental Product Declarations measure a wide range of environmental impacts (for example, greenhouse gas emissions, toxic substances, habitat destruction, water impacts, ozone depletion, etc.) at every step of a product's life cycle — from raw material extraction and processing, to manufacturing, distribution and disposal or recycling at end of life.

The Cement Association of Canada has registered an EPD for Portland-limestone cement (Contempra) with the CSA Group. The cement EPD, which were prepared by the Athena Sustainable Materials Institute, can be viewed on CSA Group's EPD registry listings.

WIDELY AVAILABLE

Contempra is widely available across Canada.

THE CEMENT AND CONCRETE INDUSTRY: YOUR PARTNER IN REDUCING CARBON EMISSIONS

The cement and concrete industry has, and continues to, make significant investments in reducing our manufacturing footprint. Since 1990, we have voluntarily reduced cement manufacturing emissions by over 15%. In addition to introducing Contempra, our industry is also pursuing a transition to low carbon fuels such as biomass, construction and demolition waste and other non-recyclable materials. This reduces GHGs in cement manufacturing and supports diversion of non-recyclable materials from landfills.

Contempra-based concrete buildings in this fact sheet:

- Front: Telus Garden, Vancouver
- Back: Trump tower, Vancouver



ABOUT THE CEMENT ASSOCIATION OF CANADA (CAC)

The CAC is the voice of Canada's cement industry. A vital contributor to the country's economy and infrastructure, the industry provides a reliable domestic supply of high quality cement required to build our country's sustainable communities and is committed to the environmentally responsible manufacturing of cement and concrete products. Visit cement.ca for more information.



contempra™
Cement engineered for a better tomorrow

CONCRETE
even smarter than you think™