CHEM CONCRETE PTY LTD

Manufacturer & Supplier of Hybrid Concrete Waterproofing Admixtures

ABN: 79 652 759 772

Operating in Australia, New Zealand, USA, Canada & UK with Distributors in Major Countries.

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Carbon Footprint Reduction Using Hybrid ChemConcrete-WP Admixture

Summary

The Hybrid ChemConcrete-WP Admixture reduces the carbon footprint of concrete by cutting cement usage by up to 32%, enhancing strength and durability, and almost tripling the lifespan of structures, at the recommended dosages. This leads to significant CO_2 savings of around 135 kg/m³ from reduced cement and 975 kg/m³ from extended lifespan, totaling 1110 kg CO_2 per cubic meter of concrete. This represents a remarkable **reduction of over 85% in CO_2 emissions** compared to traditional concrete over the lifespan of the concrete structures.

How ChemConcrete Admixture reduces the carbon footprint?

ChemConcrete-WP Admixture improves the properties of concrete in several key ways, each of which directly contributes to reducing the carbon footprint. Below are the three primary ways in which this reduction occurs.

1. Reduction in Cement Usage by Up to 32% Through Strength Enhancement

Cement is the primary component in concrete that generates CO_2 emissions. The production of cement is an energy-intensive process, responsible for about 9% of global CO_2 emissions. Extensive experimental research demonstrated that concrete containing Hybrid ChemConcrete-WP Admixture, with a cement content of 340 kg per cubic meter, achieved strength values equivalent to those of control concrete with 500 kg of cement per cubic meter. This means that ready-mix concrete suppliers can reduce the amount of cement by up to 32% and achieve the same strength values. Concrete containing ChemConcrete Admixture offers permanent waterproofing, excellent durability, substantial strength improvement, extended service-life, and significantly reduced carbon footprint.

By using ChemConcrete-WP admixture, the concrete mix can require up to 32% less cement (or cementitious materials) while still maintaining or improving the material's properties. This reduction in cement usage directly translates into lower CO_2 emissions, as less energy is required for cement production. Lower cement usage means fewer CO_2 emissions from cement production, reducing the overall environmental impact of the concrete. For example, cement contributes approximately 420 kg of CO_2 per cubic meter of concrete; therefore, a 32% reduction results in 134.40 kg less CO_2 per cubic meter.

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2. Increased Durability and Lifespan

ChemConcrete-WP Admixture improves the durability properties of concrete, making it stronger and more resilient. Increased durability means the concrete can withstand corrosive and harsh environmental conditions without degrading. This improvement reduces or eliminates the need for repairs, replacements, or additional resources to maintain the structure. The improved durability allows for more efficient designs with reduced materials usage. Over time, the need for much fewer repairs and less materials leads to a cumulative reduction in carbon emissions.

Typically, concrete structures have a lifespan of around 50 to 100 years before requiring significant repairs or replacement. ChemConcrete-WP Admixture extends this lifespan to 150 to 300 years, effectively tripling the durability of the structure. This extended lifespan delays the need for demolition, reconstruction, and the production of new concrete, all of which are carbon-intensive processes. By tripling the lifespan of the concrete, ChemConcrete Admixture reduces the frequency of reconstruction over time. Fewer demolitions and rebuilds mean less production of new concrete, leading to a significant long-term reduction in CO_2 emissions**.**

3. Minimal CO2 Emissions in the Production of the ChemConcrete-WP

ChemConcrete-WP Admixture has been designed to enhance the properties of concrete while minimizing its environmental impact. One of the key considerations is the carbon footprint of the production process for the admixture itself. However, there are several reasons why the production of this admixture generates very minimal CO_2 emissions.

The manufacturing process for ChemConcrete-WP Admixture typically involves the use of advanced chemical formulations that do not require energy-intensive methods, such as those needed for cement production (e.g., heating materials at high temperatures in kilns). As a result, the energy input required is significantly lower compared to traditional cement production, leading to significantly lower CO_2 emissions. Moreover, the amount of ChemConcrete-WP Admixture required to achieve significant improvements in concrete performance is relatively small—typically 10 to 20 liters per cubic metre of concrete (2 – 4 gallons per cubic yard). This means that even if the production of the admixture had a modest carbon footprint, the small quantity used would contribute only a minor amount to the overall CO_2 emissions.

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Carbon Footprint Analysis

In this section, numerical values are used to illustrate how ChemConcrete-WP Admixture reduces the carbon footprint of concrete through reduction in cement usage, enhanced durability, increased strength, and extended lifespan of the concrete. We will compare a standard concrete mix (without ChemConcrete Admixture) to a mix that incorporates ChemConcrete-WP Admixture.

1. Reduction in Cement Usage by Up to 32%

Cement production is one of the largest contributors to CO_2 emissions in concrete. For every 1 cubic meter of concrete, it is estimated that about 420 kg of CO_2 is emitted. When using ChemConcrete-WP Admixture, the cement content can be reduced by up to 32%, resulting in significant CO_2 savings.

Parameter	Concrete Without Admixture	Concrete With Admixture	Reduction
CO_2 emissions from cement (kg CO_2)	420 kg	285 kg	135 kg less CO_2

2. Extending the Lifespan of Concrete

ChemConcrete-WP Admixture increases the strength and durability properties of the concrete, meaning less material will be required for the projects, and fewer repairs will be needed over the concrete's lifespan. Lets assume the lifespan of concrete without the admixture is 100 years, while the same concrete with ChemConcrete-WP Admixture lasts for 300 years, trippling its lifespan as proven by rigorous independednt and in-house test results. Without the admixture, the concrete would need to be replaced at least once over a 100-year period, leading to triple the CO_2 emissions.

Parameter	Concrete Without Admixture	Concrete With ChemConcrete Admixture	Impact
Lifespan (years)	100 years	300 years	—
Number of rebuilds/replacements in 90 years	2 rebuild	0 rebuild	2 rebuild less
Total CO_2 emissions (including cement savings)	1260 kg CO_2 per cubic meter	285 kg CO_2 per cubic meter	975 kg CO_2 per cubic meter less

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Now, we combine these factors—cement reduction, increased durability, and lifespan extension—to calculate the total CO_2 reduction per cubic meter of concrete.

Factor	CO_2 Saved (kg CO_2 per m^3)
Reduction in cement usage (32% less)	135 kg CO_2
Increased lifespan (tripling)	975 kg CO_2
Total CO_2 savings per cubic meter	1110 kg CO_2

To calculate the percentage reduction in CO_2 emissions achieved using the ChemConcrete-WP Admixture, we compare the total CO_2 emissions with and without the admixture. In conventional Portland cement concrete, the production of 1 cubic meter results in approximately 420 kg of CO_2 emissions from cement. Over a 300-year period, the concrete would need to be replaced at least twice (due to a 100-year lifespan), leading to a total of 1260 kg of CO_2 emissions per cubic meter. The ChemConcrete-WP Admixture reduces CO_2 emissions by 1110 kg per cubic meter. When compared to the original emissions of 1260 kg per cubic meter, the reduction of 1110 kg represents over 85% decrease in CO_2 emissions. This means the ChemConcrete-WP Admixture significantly reduces the environmental impact of concrete production over its lifecycle.

CHEM CONCRETE offers a highly cost-effective, reliable, and proven solution for concrete manufacturers. By incorporating ChemConcrete Admixture, the overall cost of concrete can be reduced due to significant savings in cement usage. While the addition of ChemConcrete Admixture slightly increases the initial material cost, the 32% reduction in cement usage offsets this increase, **resulting in an overall decrease in the cost per cubic meter of concrete**.

Concrete Type	Cost per m^3	Cement Usage	Durability	Waterproofing	Carbon Footprint
Normal concrete	-	High	Limited	Limited	High
Concrete treated with ChemConcrete Admixture	5 – 10% higher	Low (significant savings)	Enhanced (longer lifespan)	Superior (better sealing)	Lower (eco-friendly)

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ChemConcrete effectively **balances cost efficiency with superior performance**. By reducing cement usage while delivering enhanced durability, permanent waterproofing, and sustainability, it ensures a **cost-competitive and environmentally friendly** solution for modern concrete applications.

Conclusions

Hybrid ChemConcrete-WP Admixture is a game-changer for the construction industry, addressing the urgent need for sustainable practices. By reducing cement usage, enhancing durability, and tripling concrete lifespan, the admixture significantly lowers the carbon footprint of concrete structures. With a total reduction of around **1110 kg CO_2 per cubic meter (over 85%)**, this innovative solution not only meets all structural and performance demands but also aligns with global climate goals.

References

- Khaiyum, M.Z.; Sarker, S.; Kabir, G. Evaluation of Carbon Emission Factors in the Cement Industry: An Emerging Economy Context, *Sustainability, 15*, 15407, 2023.
- Sukontasukkul, P., "Methodology for Calculating Carbon Dioxide Emission in the Production of Ready-Mixed Concrete." *1st International Conference on Computational Technologies in Concrete Structures (CTCS'09)*, Jeju, South Korea, 2009.
- Adesina, A., Recent advances in the concrete industry to reduce its carbon dioxide emissions. *Environmental Challenges* 1, Elsevier, 2020.
- Jahandari, S., Tao, Z., Alim, MA., Li, W., "Integral waterproof concrete: A comprehensive review", *Journal of Building Engineering*, 2023.

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