

BUSINESS BUZZ



Longer and stronger
Eco Cement continues to gain in excess of 16% strength up to 56 days.



Reduction of clinker content to 32 strength class (32N) cement has, reportedly, reduced the carbon footprint of a product to half the world average.

Images courtesy of AfriSam

'Eco cement' Half the carbon?

How does new Eco Cement compete with the extended cements of other manufacturers? *Tessa Kruger* investigates.

The new Eco Cement, apparently, has a significantly lower carbon footprint than the world-wide average for cement. This multi-purpose cement has been hailed by AfriSam as carrying half the carbon footprint of the world average for cement at 453 g/kg – this is, primarily, attributed to the substitution of clinker with mineral components; significantly reducing clinker content of the cement. This has been achieved without compromising the strength of the cement product. It is aimed mainly at the DIY market as well as significant green-building projects, according to AfriSam. It is available in 20 kg and 50 kg bags for use in bigger construction projects.

The Gauteng consumer would pay the same price of R68 for a 50 kg bag of Eco Cement as it does for a bag of conventional multi-purpose cement of the same 32,5 MPa strength while a 20 kg bag comes at a cost of around R35.

Comparing Eco Cement with conventional cement products, Mike McDonald, AfriSam's cement product manager, says that it can be applied with the same ease but consumers may achieve better finishes and brighter colours in the case of Eco Cement. The 32,5 N-strength product could be used to produce concrete of any desired strength which renders it suitable for residential and other structures. McDonald says that the longer the cement takes to strengthen, the better the interlink between particles. Eco Cement continues to gain in excess of 16% strength up to 56 days. It is also suitable for soil stabilisation in road-construction projects.

According to Lafarge South Africa, it has developed innovative formulations that give more rapid strength development which enhance productivity for concrete-brick and block makers.

Ingredients and characteristics

McDonald says AfriSam's Eco Cement product is the result of incremental steps in the group's efforts to develop a more carbon-efficient product over the past 10 years. "We have been looking at ways to reduce the carbon footprint of our product range by using mineral components since 2000." AfriSam started quantifying the CO₂ emissions of all its cement products last year and has put a carbon-footprint measurements emissions number on all its cement bags.

Reducing carbon-intensive clinker

In the process of developing Eco Cement, the group considered ways to reduce the clinker content of its cements to reduce its carbon footprint. Clinker is the most carbon-intensive ingredient of cements as 60% of the emitted CO₂ of cement emanates from the decarbonisation of limestone.

The balance of CO₂ emissions are attributed to factors such as coal consumption, electricity used in the manufacture of clinker, and finishing and dispatch, as well as hydrocarbons.

In order to reduce the amount of CO₂ emissions and, therefore, effectively the carbon footprint that originates from the clinker in the product, AfriSam replaces an amount of the clinker ingredient with an activated mineral component – a by-product of the ArcelorMittal steel-manufacturing process which carries a much lower inherent carbon load than clinker.

McDonald says the by-product carries only a small CO₂ penalty as the main product of steel already carries the carbon penalty.

AfriSam's marketing manager, Victor Bouguenon, says the carbon footprint of Eco Building Cement, as in the case of the producer's other cement products, is measured in accordance with the Cement CO₂ Protocol developed by the World Resources Council and the World Business Council for Sustainable Development on a cradle-to-gate basis.

Measuring the carbon footprint

This includes the carbon footprint emanating from the amount of clinker used in the manufacturing process, as well as the energy used in manufacturing and functions such as transporting materials between manufacturing sites, McDonald elaborates. "The energy used in operations comprises electricity and diesel for transport and drilling machines, as well as on-site power generation which is diesel-based," says Bouguenon. He says the annual use of electricity was obtained from meter readings and checked against the figures per kWh obtained from Eskom.

AfriSam's carbon-footprint assessment includes emissions from explosives used in quarries. These are converted to CO₂ equivalents.

Key concepts

Eco Cement
carbon emissions
clinker
carbon-intensive ingredient
decarbonisation of limestone
activated mineral component
"green cement" war

Overview

- AfriSam has released a new "green" product – Eco Building Cement – which it claims has half the carbon footprint of only 453 g/kg of the world average for cement.
- Lafarge claims it was the first cement company to introduce a complete range of 'green' cements in 2008.
- The lower carbon footprint is achieved by reducing clinker and adding specially formulated mineral components.
- The product can be used to manufacture durable concrete of any desired strength.
- The carbon footprint of all AfriSam's products is measured on a cradle-to-gate basis.
- AfriSam claims its carbon footprint is auditable.
- Carbon footprint should be defined in terms of direct emissions, energy emissions, and diesel and explosives used.
- Lafarge claims its Le Classic product is the "greenest" cement in its range of extended products.
- Lafarge claims to offer a complete range of extended cements.
- Over the past nine years, Lafarge has lowered CO₂ emissions by 20,7%/t of cement produced globally.
- Clinker is the most carbon-intensive ingredient of cements as 60% of the emitted CO₂ of cement emanates from the decarbonisation of limestone.

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Carbon-footprint measurement

Measuring and defining the product's carbon footprint cover the following three "scopes":

- Scope 1 – direct emissions given off through the cement-making process;
- Scope 2 – emissions from the energy used in the cement-making process; and
- Scope 3 – diesel and explosives used and the energy that they use.

During the assessment, additional calculations are done for the energy embedded in the treatment and supply of municipal water, including the impact of pumping.

Bouguenon says the manufacturer used default figures from the World Business Council for energies embedded in sewage removal.

"Also taken into consideration is the disturbed area around the plants and quarries where vegetation, which serves as a carbon sink to a lesser or greater degree, had been disturbed. In certain cases, the vegetation loss is compensated by rehabilitation and this is taken into account for complete accuracy. Although the CO₂ values in these three areas – water, sewage and vegetation loss – are of such low significance that they could be left out of the calculations, they are taken into account to arrive at complete sets of figures."

Bouguenon says AfriSam employs a specialist energy-management and carbon-footprinting consulting firm which ensures that it calculates auditable carbon-footprint numbers.

The measured carbon footprint of its cement products is printed on the cement bags. A CO₂ barometer indicating the carbon footprint of the particular cement relative to the world average, 890 g/kg in the case of Eco Cement, is included.

Measuring 'green' cement: an independent view

Bryan Perrie, MD of the Cement & Concrete Institute (C&CI), concedes that, although the C&CI cannot rate the "greenness" of Eco Cement, AfriSam is on the right track in that measuring and defining the product's carbon footprint cover the following three "scopes":

- Scope 1 – direct emissions given off through the cement-making process;
- Scope 2 – emissions from the energy used in the cement-making process; and
- Scope 3 – diesel and explosives used and the energy that they use.

Interrelational

Sustainable construction is not about any one building material or technique being better than another but rather about developing and understanding all the dependencies and interrelationships around a building according to one cement producer.

Perrie says cement producers have come under pressure in terms of the Green Building Council of South Africa's Green Star ratings to produce "green" cement products. He believes legislation, combined with building regulations, for the reduction of the embodied-energy construction material, will exert more pressure on manufacturers and be innovative in terms of green products as well as greater consumer demand for the latter.

A 'green cement' war?

As AfriSam only recently supplied the first batch of Eco Building Cement to retail stores countrywide, McDonald says it is too early to indicate demand. According to McDonald, retail stores have expressed belief that the public is ready for the product.

While AfriSam has branded its CEM III 32,5N product as Eco Building Cement and claims it is the cement product with the lowest carbon footprint in the market, its rival cement manufacturer, Lafarge, also launched Le Classic, which is aimed at the DIY market, in June 2009 – claiming it is "the greenest cement product in its range of extended cements".

Lafarge also claims it is the only cement producer in South Africa with a complete extended-cement product range. This includes Rapidcem, the first CEM II 52,5N to be introduced to the market in 2008 – apparently a significant breakthrough for the pre-cast concrete industry. Lafarge claims its range of environment-friendly extended "green" cements incorporate siliceous fly ash in its formulations and the resulting lower-carbon cements in South Africa have helped to reduce Lafarge South Africa's CO₂ emissions by 150 000 t between 2007 and 2008.

Lafarge Cement claims it has already received positive feedback on the introduction of its green products as customers make responsible green choices. However, Thierry Legrand, CEO of Lafarge Cement, qualifies that

sustainable construction is not about any one building material or technique being better than another but rather about developing, as well as understanding, all the dependencies and interrelationships around a building in order to minimise the environmental footprint of the building through construction.

While Lafarge does not quantify the carbon footprint of its products on the packaging, it says it has succeeded in reducing emissions by 20,7%/t of cement produced globally between 1990 and 2010, and has reduced its impact on the environment by using waste to generate energy, and capturing and reusing waste heat generated in production cycles. "Cement and concrete are the base products required for any construction project," says Legrand. "Lafarge, therefore, has a responsibility to use its resources wisely and in a manner that is as environment-friendly as possible to ensure that it operates sustainably."

According to Lafarge, it has undertaken to reduce its impact on the environment with a commitment to controlling and reducing emissions, encouraging wastewater control on all sites, working towards energy efficiency and reduced energy consumption, reducing the generation of waste, promoting proper disposal of all chemical waste from cement laboratories, recovering and utilising waste energy in production processes, and conducting ongoing environmental audits.

Lafarge claims it has succeeded in reducing its CO₂ emissions in South Africa mainly through reducing the clinker component of its cement from 84% in 1990 to 75% in 2009. The remainder of the improvement in emissions was achieved through the improved specific heat consumption of its plants and greater use of alternative fuels.

Perrie says that all cement producers in South Africa are committed to reducing their carbon footprints and producing extended cements to this end. ■