FOR IMMEDIATE RELEASE

Why use extended rather than pure cements?

Negative perceptions about the durability and performance of extended cements, combined with tradition and a conservative approach to new technology have caused resistance to their use, a situation which is gradually changing, according to experts from AfriSam.

"Extended cements are being used increasingly in major projects such as Gautrain, the SANRAL Gauteng Freeway Improvement Project, Melrose Arch and the Koeberg interchange upgrade in Cape Town," Mike McDonald, product manager cement at AfriSam, points out.

For years, adds Amit Dawneerangen, technical manager: product support, AfriSam has been conducting exhaustive tests on different blended materials in aggressive conditions, monitoring performance year on year to test for durability and performance. Using this data, the company works closely with engineers in designing concrete mixes and the amount of cover concrete required for structures in different areas of exposure.

"There are several main elements that cause deleterious effects in concrete," he continues. "These include carbon dioxide, chloride ingress, sulphates, alkali silica reaction, a reaction between the aggregate and the alkalis in cement, and abrasion. On-going research and testing have demonstrated conclusively that blended cements perform better than pure cement in providing impermeability, workability and durability."

AfriSam uses the three durability index tests– the oxygen permeability index, the water sorptivity index and the chloride conductivity index, developed in South Africa by the University of Cape Town – to test the performance of extended cements. "We have one of the few laboratories in the country with the equipment, competences and expertise to do this," McDonald says.

Fly ash and slag, both industrial by-products which would normally be consigned to landfills, are used in extended cements, thus providing an immediate environmental benefit. "Fly ash has a fine particle size which improves the workability of concrete considerably, creating a dense concrete matrix and enhancing impermeability," Dawneerangen explains. "The correct mix design and the use of appropriate chemicals accelerates the strength development process which otherwise would be longer for extended cement. The percentage of fly ash could be varied according to the aggressiveness of the application."

Slag also provides a dense concrete matrix, improving workability and is also known to capture chloride ions, protecting concrete from chloride ingress and prolonging the concrete’s lifecycle. A combination of slag and fly ash provides both chloride-capturing ability and a dense concrete matrix. This combination was used in the Gautrain project where aggressive soil conditions prevailed.

Limestone is also used to extend cement to provide a more cohesive concrete mix which favours excellent finishing with application of proper concrete technology.

Using extended cements, McDonald and Dawneerangen stress, results in improved durability, permeability and workability while benefiting the environment by reducing the carbon footprint, without prejudicing strength, quality and durability.

“The slower gain in early strength development that is normally associated with extended cements can be countered by using appropriate water reducing and activating chemicals. Non-renewable resources such as coal and limestone which are consumed in the cement manufacturing process can be used more responsibly while still complying with specifications and user requirements and producing structures that last the required lifetime,” McDonald states.

"Fortunately, the more enlightened consulting engineers and construction companies are increasingly appreciating the significant benefits which accrue from using extended cements and I am confident that perceptions and traditions will inevitably give way to the concrete proof."

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