"Obtaining the ICC-ES report for our new product has been very valuable for our business. Our report gives credibility to the product when working with engineers and designers."

TRICIA LADELY,
NOVA CHEMICALS TECHNICAL DEVELOPMENT LEADER

Innovative Additive Provides New Option in Reduced Weight Concrete

Concrete has been used in construction for centuries, but it is a product that has evolved greatly in modern times. Chemical additives can be used to accelerate or slow the hardening of concrete while other materials can change the product's color. And a new polymer additive from SYNTHEON, a NOVA Chemical, Inc., subsidiary focused on the building and construction industry, is making structural concrete lighter.

Composed of innovative polymeric spheres that have been specially engineered for use in concrete, Elemix® concrete additive provides reduced weight for structural concrete. Elemix additive is used to replace a portion of the traditional coarse or fine aggregate in structural concrete mixtures. This innovative product recently received an Evaluation Report (ESR-2574) from ICC Evaluation Service (ICC-ES), providing evidence that the product meets the requirements of the 2006 *International Building Code*® and 2006 *International Residential Code*®.

"Traditionally the industry uses lightweight aggregates or air-based technology to produce lightweight concrete," explains Mrs. Ladely. "Elemix additive is a good alternative, as you can use existing concrete designs and simply replace a portion of the coarse aggregate to produce concrete with reduced unit weight, or lightweight concrete. Since most lightweight aggregates are regional and not available everywhere, they can be cost-prohibitive to ship for lightweight projects. Elemix additive is globally available, more consistent than traditional lightweight aggregates, has negligible water absorbance and is inert."

Because there are no provisions in ACI 318, *Building Code Requirements for Structural Concrete* (referenced in the IBC), for the production of concrete mixtures with lightweight synthetic particles as aggregate replacement, ICC-ES worked with NOVA Chemicals to develop new acceptance criteria (AC408) (Acceptance Criteria for Structural Concrete with Lightweight Synthetic Particles) for Elemix additive. The criteria served as a basis for the issuance of ESR-2574.

Dr. Mahmut Ekenel, ICC-ES Staff Engineer explains "The purpose of this acceptance criteria is to demonstrate that lightweight synthetic particles, in this case polymer spheres, can be added to concrete as a partial replacement for conventional fine or coarse aggregate, to create a reduced-weight structural concrete while maintaining mechanical and durability characteristics as defined by ACI 318 and the *IBC*."

The acceptance criteria, AC408, required a series of tests to determine density; compressive, flexural and splitting tensile strengths; and effect on reinforcement bond strength. This acceptance criteria was also used to address durability issues such as freeze-thaw effect, restrained shrinkage, cracking and evaluation that concrete with lightweight synthetic particles may be considered a noncombustible building material. Once the acceptance criteria was established, ICC-ES was able to examine NOVA Chemicals' product information, test reports, calculations, quality control methods and other factors to ensure that Elemix additive is code-compliant.

Elemix® is a registered trademark of NOVA Chemicals Inc.

Based on the evidence submitted, ESR-2574 states that plain or reinforced concrete systems containing Elemix additive as an aggregate replacement can be safely designed in accordance with the provisions of Chapter 16 and 19 of the IBC and ACI 318-05; however, for structural design purposes, concrete containing Elemix® Type XE concrete additive must be considered as structural lightweight concrete.

To make sure that there is product consistency, third-party follow-up inspections are required for synthetic particles under this report. The inspections must be conducted by an accredited inspection agency. With an ICC-ES Evaluation Report, building officials and the building industry can be confident that Elemix additive meets I-Code requirements. ICC-ES provides an independent, third-party evaluation of this innovative building material based on its physical and mechanical properties, durability and combustibility.

To find out more about this product, view **ESR-2574: Elemix® Type XE and Grey XE Concrete Additive**, issued on September 1, 2009. All ICC-ES Evaluation Reports can be accessed and downloaded free of charge at **www.icc-es.org/evaluation_reports**, and are readily searchable based on attributes such as product type, manufacturer or report number.

** This article is intended to provide information on a new or innovative building product or system for which an ICC-ES Evaluation Report has recently been issued. It should not be construed as a product endorsement or a recommendation for its use.*

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