



Even Greener Concrete: Rapid Set Cement Is Friendly to the Environment

By now, concrete's status as a green building material has been well-established: It's durable and sustainable, enhances energy efficiency and often contains recycled materials. Concrete has been used as the primary building material on a number of LEED-certified buildings around the country, including office buildings, condominiums, schools and hospitals. But one company is making concrete even greener — in their fast-setting, high-strength Rapid Set cement, CTS Cement has amped up the use of recycled materials, reduced the amount of carbon emissions produced during manufacturing and increased durability to create a line of cement products that's better for the environment. Studies show that Rapid Set cement has a carbon footprint that's 32 to 36 percent lower than portland cement.

Cutting Carbon Emissions

The primary green benefit of Rapid Set cement can be found in reduced carbon emissions during the manufacturing process. Cement is made by heating limestone and other materials in a kiln. The resulting hard substance, called "clinker," is ground with a small amount of gypsum to make the cement. During the heating process, the raw materials decompose, releasing carbon dioxide into the atmosphere. The combustion of the fuel used to heat the kiln (usually coal) also produces carbon dioxide, in a similar form to car exhaust.

While the manufacture of Rapid Set cement doesn't completely eliminate these emissions, it does reduce them sharply. The main reason is that the kiln used to produce Rapid Set cement requires less fuel than for portland cement, producing only 0.21 pounds of combustion-based CO₂ per pound of cement. (portland cement produces approximately 0.36 pounds.) Further, because the Rapid Set mix relies on less limestone than portland cement, the material breakdown that happens during production also yields less CO₂. The thermal decarbonation of limestone in Rapid Set produces only 0.40 pounds of CO₂, compared to 0.54 pounds with portland cement.

In addition to reducing CO₂ emissions, Rapid Set also helps conserve energy and materials after firing. Unlike portland cement clinker, Rapid Set clinker doesn't have to be mixed with gypsum before grinding, and the softer, more friable nature of the clinker makes for easier grinding, demanding less energy from the grinding mill.

Reducing Through Recycling

Most traditional concrete mixes contain some recycled material — typically, existing concrete that has been recycled as aggregate. But CTS goes a step further by using by-products from other recycling processes (including aluminum and other industrial byproducts) as raw materials for its Rapid Set cement mix.

Using these by-products has a number of benefits. The recycling process alone prevents raw materials such as bauxite from being removed from the ground, and generates 95 percent less air pollution and 97 percent less water pollution than the creation of new aluminum. The waste generated during aluminum creation, such as red mud, is also eliminated with aluminum recycling.



Life Cycle Considerations

The enhanced green benefits of Rapid Set don't end with the production process, though — the durable, high-strength concrete has an estimated more than twice the life of portland cement, according to tests on the Seattle/Tacoma International Airport's pavement. Because of its rapid-strength formation, lower porosity and subsequent internal self-desiccation, Rapid Set offers greater resistance to common concrete pavement problems like carbonation, freeze-thaw susceptibility and acid rain leaching.

Even the packaging of Rapid Set is green: Small batches of cement sold at stores like Home Depot (which recently selected Rapid Set as one of its Eco Options products) are bagged in 100-percent recyclable paper and plastic, and packed in corrugated cardboard boxes made from 80-percent recycled material.

Case Study: Flagship Store in NYC Eliminates Graywater

When the Molvena, Italy-based Diesel Jeans Company decided to renovate some prime real estate on Fifth Avenue in Manhattan for a new flagship store, the environment weighed in as the design and construction team made decisions regarding materials for the project. The concrete floor's topping, produced with Rapid Set cement, demonstrates another environmental benefit of Rapid Set.

"The owners were looking for an industrial floor that would produce no graywater during maintenance," said Matt Johnson, principal of Green Earth Floors, Tuckahoe N.Y. "The floor we provided – a terrazzo strip design with a half-inch Rapid Set TRU Self Leveling (Topping, Resurfacer, and Underlayment) topping – will only need water and conditioner for its maintenance, which will result in no graywater from bleaches and detergents."

In recent years, graywater has become a concern for many due to dwindling reserves of groundwater and overloaded or costly sewage treatment plants.

"Green Earth Floors focuses on the footprint we will leave for future generations," said Johnson. "We spend a great deal of time researching how to keep each project as green and environmentally friendly as possible by the materials we choose to use and our process. We are also concerned with maintenance. We want all runoff to be free of hardwater contaminants caused by petroleum-based products (wax) required by many other flooring solutions."

Johnson and his crew from Green Earth Floors began work in November of 2008. Green Earth Floors was selected for the project because of its unique ability both to pour and polish a topping, and because of its highly regarded reputation in the industry. The project was completed in two weeks. The scope of work included a total of 6,000 square feet on the building's first and third floors.

Green Earth Floors used Rapid Set Acrylic Primer, set the terrazzo strips to the required elevations, mixed and poured the TRU Self-Leveling to ½ inch depth and let it cure for four hours.

"One of the good things about this project is that they chose Rapid Set TRU Self Leveling as their flooring solution," said Johnson. "With this topping, we have very little wait time on the



cure. We can start our grind and polish within hours after the pour. On the other hand, new concrete requires a minimum of 14 days before the polish process can be started."

The Rapid Set TRU used for the project is self-leveling. According to Johnson, the floor reached a 1/16 of an inch level with a floor flatness of 40. A total of 850 bags of Rapid Set TRU were used.

To color the concrete, Green Earth Floors used three different shades of stain from Scofield to achieve the unique color the owner desired. Next, Green Earth applied a Scofield lithium densifier.

According to Green Earth Floors, a scoff test indicates that the Diesel Jeans store also has very safe floors, in wet or dry conditions. "We don't seal anything, so the floor stays somewhat porous and that helps displace water," said Johnson. "You can walk on it whether it's wet or dry."

The flagship Diesel Jeans Store on Fifth Avenue opened in January of 2009. The owners and design team are very pleased with the outcome of their environmentally friendly, polished concrete floors.

Byline: Ken Vallens, Vice President Product Development, CTS Cement

About CTS Cement:

CTS Cement Manufacturing Corporation manufactures Rapid Set® professional-grade cement products for concrete repairs and new construction projects. Contractors, owners, engineers and architects choose Rapid Set® to eliminate problems they have with other concrete repair materials, to save time and money, when superior durability is required, and results need to be aesthetically pleasing. For more information about CTS Cement and Rapid Set, please visit <http://www.ctscement.com>.

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