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US Grout Ultrafine VX Dominates Sand Column Tests

JULY 2013—Each year, at a Geotechnical Grouting Conference held at the Colorado School of Mines in Golden, Colorado, sand column tests are used to demonstrate the permeation ability of different grouts. The 2013 tests included a newly formulated cementitious grout designed for soil permeation—US Grout Ultrafine VX. This grout features an impressive average particle size of 3 micros and utilizes a flexible liquid Polycarboxylate super-plasticizer as an accelerant and dispersant. Injected into a very fine colloidal silica sand, US Grout Ultrafine VX excelled in the tests. Using a standard 2 to 1 water/grout ratio, US Grout Ultrafine charged up the 60-inch sand-filled column in an unheard-of 80 seconds. The PSI at the pump was only at an eight when the grout hit the top (test allows for up to 10 psi and time allowance is 20 minutes). No other cement grout came close...not even when adjusted to a more favorable grout/water ratio.

The official (properly technical) title of the course is “Grouting Fundamentals and Current Practice.” It’s a annual short course offered by the tech school covering injection grouting as a method to improve soil settlement and strength characteristics with the objective of improving soil and rock strength and to decrease permeability of soil and rock masses. The highlight of the course are public field demonstrations on compaction and permeation grouting, ultrafine cement flow, mixing grout, overburden drilling, grouting rock anchors, and packer use, among others.

The importance of such impressive permeation performance by a cementitious grout is welcome news in the grouting industry. Now, with US Grout Ultrafine VX, expensive, often short-lived chemical grouts have a cementitious brother that can effectively handle the toughest jobs.

The key is this: it is particle size and rheology, not viscosity, that determines a grout’s ability to penetrate and properly disperse in fine, dense soils. The erroneous practice of tweaking the viscosity of a standard cementitious grout to amp injectability results in lower compressive strength and water bleed-off during crystallization, riving the grout seal with porous, interconnected wormholes and resulting in an undesirable density matrix. The remarkable success of US Grout Ultrafine VX in the sand column tests is a direct result of the ultrafine particle size and the rheological properties designed into the grout formulation.

Custom Fit Grout

Designed for job-specific flexibility, US Grout Ultrafine VX, paired with USG-Super (a liquid super p), can work its effective magic in a wide range of soil permeation and stabilization projects. And to help project engineers quickly dial into the grout-plasticizer-soil standard for each project, US Grout provides a testing service that utilizes project-specific soil samples. The returned starting point means less guesswork and quicker completion times.

Impressively Economical

When poor soils need to be stabilized and strengthened, it’s rarely a small job, and the cost of the grout is always a big deal. Cost is one of the areas where cementitious grouts really shine. (The functional performance life of the cured grout, detailed below, is another.) And when a cementitious grout performs in the field like US Grout Ultrafine VX, cost-effective cement grout can be the grout of choice for almost any job.

CONTINUES

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US Grout Ultrafine VX Dominates Sand Column Tests (continued)

Durability and Strength

US Grout has the only pumice-pozzolan charged ultrafine cementitious grout on the market. The pumice provides a second, complimentary reaction—a pozzolanic reaction—that adds an incredible performance boost to the standard water-cement hydraulic reaction that forms the binding concrete paste. Good things happen as the result of the pozzolanic reaction: the lifespan and the effective performance of the grout increases because the pumice (via the reaction it ignites) works to consume and convert the deleterious byproduct compounds that are produced by the cement/water hydration reaction, effectively densifying and welding the cured grout matrix tightly. This virtually impermeable grout can then resist the problems that plague ordinary cementitious grouts: no expansive cracking and failure from within, ultra-resistant to penetrating attacks from water and chemicals without. (show lifespan chart for grout)

The Pozzolanic Charge

You may be wondering...what exactly is going on with this pozzolanic charge? We like to refer to it as a molecular reclamation project. Here's what happens....the primary (hydraulic) reaction between the cement and water that produces the concrete binder—CSH—also spawns CH, which not only does nothing for the strength and life of grout, but actively works against it by introducing a host of unwanted ills. The pumice pozzolan reaction is directly applicable to this problem, claiming and repurposing the trouble-making CH into additional CSH binder, effectively welding and densifying the grout.

A Superior Grout

Ask an engineer to list the characteristics of a superior grout, and you would probably hear the following: resistance to chemical attack, wide range of water-to-cement ratios, little or no bleed, generous injectability window, adjustable rheology and set time, impressive strength, extremely low hydraulic conductivity, volume stability, negligible contraction cracking from heat of hydration. Many would also add things like a ready-to-mix-and-pump product, the availability of custom blends, a stable, competitively-priced supply, stringent quality control to insure uniformity, expert technical support, an international distribution network, and a safe-to-use, non-hazardous product. The US Grout Ultrafine and Microfine grouts deliver all of the above.

Expert Support

As the world-wide distributor for US Grout products, Avanti International (www.avantigrout.com/800-877-2570) provides the customer service, objective professional advice, material estimates, and the caliber of world-class technical support that comes only from 35 years of geotechnical experience. ■