JEPCO NEWS

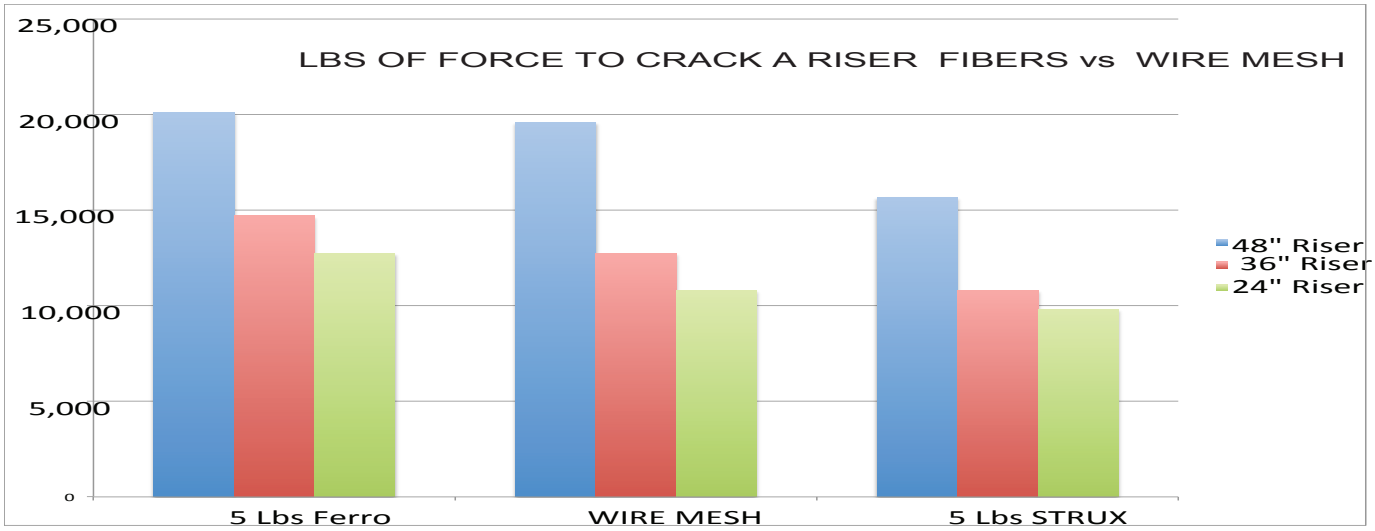
JANUARY by Ed Pennypacker 2016

MACRO FIBERS OR STEEL?

In every single instance that I know about, precast concrete reinforced with Forta Ferro MACROFibers meets or exceeds the performance of steel reinforcement.

Whether septic tanks tested by vacuum, manholes broken in a pipe test rig, sound-walls broken by simulating hurricane winds, test beams broken by hydraulic rams, or floor slabs measured for flatness and cracking; Equal or Better performance from FORTA Ferro macrofibers in every case.

The purpose of reinforcement is to hold concrete together in the event of a crack. Steel reinforcement MUST be in the right place to get any benefit. Thin walled structures like burial vaults and septic tanks are a nightmare for designers. Ideally, the steel will be held in the exact plane by spacers, wheels or chairs. In the real world, that does not happen. If you can see the "shadow" of mesh on the side walls of a tank, that means the steel is too close to the surface. Not only is it not helping, it is hurting the tank. Fibers, on the other hand, are everywhere. Break a test cylinder with fibers in the mix, and it stays together after the test. Crack manholes in a test rig, and they stay together. During the testing of manholes with fiber reinforcement, the cracked precast was speared with the forks of a loader and carried away like donuts on a stick. New Hampshire requires fiber manufacturers to test fiber reinforced manholes, head-to-head, against those conventionally reinforced with steel. The test was witnessed and monitored by a third party engineer. At that time, NH had already approved Grace Strux which had passed the test earlier. Forta Ferro beat both the steel and the Strux handily. Others have tried to pass the test, but none have succeeded. To this day, only Ferro and Strux are approved in New Hampshire. Not all fibers are created equal.



Clumps of fibers?

Not all fibers mix well, and that is an important thing to know. A recent Concrete Products- showed a Colorado precaster adding steel fibers bit-by-bit. Wearing leather gloves of course, those fibers draw blood! On their steel fiber website they discuss the problem, and suggest a 12 minute mixing time.

It's a rule of thumb: if the fibers fall out of the package in a tangled "bird's nest", you are going to have trouble getting them to mix. Forta Ferro is made in twisted bundles that don't tangle. They mix well, and you don't get fiber balls in the mixer.

How do fibers reinforce the concrete?

All reinforcement works the same way: when a crack starts to form, the reinforcement engages, and the crack is held together. The advantage of fibers is that they are everywhere. Steel bars or mesh are in a single plane. So, for instance, it is common for a floor to crack from the surface down to the steel. If the steel is on the bottom, the crack is small down there, but it gets big at the surface. In flat slabs, it is nearly impossible to keep the mesh or bars where they need to be. Almost always, the steel sinks to the bottom. Asking the crew to "hook" the mesh up to the middle of the pour is a ridiculous task. The guys are standing on the mesh while they pull at it.

It makes a lot more sense to specify a high dosage of Macro Fibers when you pour concrete. That way, you eliminate all of the mesh.

Read the "Chicago Floor Study" in the February 2009 edition of Concrete Construction Magazine, by the Hanley-Wood Group. By using macro fiber reinforced concrete, the contractor eliminated steel, greatly extended saw cut construction joints, and achieved exceptional floor flatness.

Look at my website for articles on fiber reinforced concrete. jepcosales.com/articles/h-20-load-rating-fiber-reinforced-septic-tank to see how Septic Tanks meet H-20 load requirements with no steel in any side wall. The labor savings alone, make the fibers attractive, plus they simply work better. Every time.

MICROBIALLY INDUCED CORROSION (MIC)

Sewage carries Hydrogen Sulfide (H_2S) as a dissolved gas. Agitate it, stir it up, cause some turbulence, and the gas comes out of solution and floats in the air. It smells like rotten eggs. Venting will not stop the reaction. Unless the air is rapidly moving, it cannot carry the Hydrogen Sulfide away. For years, it was the accepted explanation that Sulfurous acid and Carbonic Acid (formed when Carbon dioxide reacts with water) caused the damage seen in septic tanks, distribution boxes, sewer pipes, and manholes. Then somebody discovered Thiobacillus bacteria. These pesky bacteria are aerobic. They require oxygen. They also require Hydrogen Sulfide. They “eat” Hydrogen Sulfide and excrete Sulfuric Acid as a waste. Some of them excrete the acid in greater than 40% strength. Good, solid, concrete is attacked by the acid and crumbles into powder. The worst one, Thiobacillus concretivorium , is named for its appetite for concrete. It does not matter whether it is Type I or Type II (sulfate resistant) cement that makes the concrete. Thiobacilli love the stuff. All they require is air, water, and Hydrogen Sulfide to live.

DISTRIBUTION BOX DESTROYED BY MIC

Force mains, where sewage is pumped into the pipes,are ideal environments for these bacteria. The first two or three manholes downstream from the force main are worst. Damage diminishes as distance from that junction increases. Turbulence is the reason. Force mains are by nature very turbulent, and therefore rich in Hydrogen Sulfide, air and water. Further downstream, the turbulence subsides and the life of Thiobacilli species is

harder to maintain. Ironically, force mains that run FULL of sewage are rarely damaged. There is no free air space above the sewage, and the scouring of the flow actually cleans the surfaces.

Confusing our understanding, is that one section in a system may see severe damage, but other sections seem immune. So far, nobody has the answer. Variations in temperature, flow, humidity, water chemistry, and unknown other factors can be at work. What we do know, is that above 10ppm of Hydrogen Sulfide the bacteria grow. Sewer systems usually vary from 0-80 ppm of Hydrogen Sulfide.

MIC in this pump chamber has gotten past the coatings. Even a tiny missed spot is enough to start the process

Septic tanks without an inlet baffle are turbulent with every flush. They are more susceptible to damage above the water line. Turbulence in drop boxes, distribution boxes and pump chambers in septic systems make them very vulnerable.

HOW CAN MIC BE CONTROLLED?

Fresh concrete starts at pH 12.0-13.5, very alkaline. But in waste water environments, with Carbon Dioxide (CO_2) mixing with water vapor to make Carbonic Acid, and Hydrogen Sulfide reacting with water vapor the pH is lowered dramatically, damaging the concrete. Once the pH drops low enough, the bacteria thrive.

Coatings can protect the concrete. Keeping in mind that 40% solutions of Sulfuric Acid are very strong, the coating selection becomes very important. Don't miss a spot! Even a small missed spot is like an open window in a submarine.

Epoxy coatings, some water based acrylic coatings, like ConSeal's CS-55, and thermoplastic liners are effective barriers to the acid damage from Thiobacilli. The key is to provide an impervious barrier between the bacteria and the concrete

Another strategy is to control the bacteria by incorporating a bactericide into the concrete mix. ConBlock MIC is added at a gallon per yard. That way, every spot is protected.. If you scratch or chip the surface, no problem.

Or, you can make the environment inhospitable to the Thiobacilli. Dilute the ConBlockMIC and spray it on. Spray everything, walls, tops, pumps, steps and pipes. The air, water, and Hydrogen Sulfide are still there in the turbulent environment, but the bacteria cannot establish themselves. Any that try are immediately controlled.

Either way, spraying ConBlockMIC or adding it to the mix, the bacteria are inhibited. The main ingredient was developed by DOW Chemical many years ago. ConSeal is an EPA registered formulator. Other companies use it in paint for surgeries and sports clothing. In the hospital it inhibits any bacteria that land on the paint. In clothing, it stops the bacteria from making a sweating athlete stink.

Since septic tanks are only affected by MIC above the waterline, where there is an aerobic environment, the cost to spray to prevent the damage is limited to a treatment in that area. Plastic liner, coatings, or other treatments, need only be applied to a band around the upper portion at the waterline of the tank and the underside of the top. Distribution boxes are small, the cost to protect them is negligible.

WHO CARES?

The MIC problem is not new. Printed studies date back to 1945. So, why all of a sudden, is there such an interest? In recent years it has been common to

inspect septic systems when a house is sold. The banks require it as part of the deal to issue a mortgage. Now that they look, they find the problem. Now that it is found, they do more looking. Unfortunately, there are many who don't understand. They claim that the industry has recently been producing low quality concrete. "Not like the good old days, when we never had this problem." Further, the plastic industry has leaped on this , and now they promote plastic septic tanks and distribution boxes. True, they are immune to MIC, but they are flimsy in comparison to concrete. Despite that, the standard solution, after the house inspection, is to install plastic components.

Who cares? Precasters care, our business depends on solving the problem.

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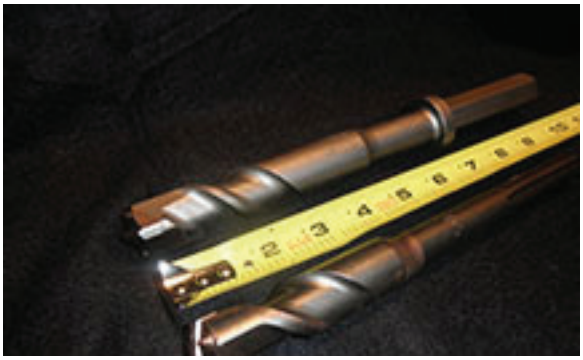
OWN YOUR OWN VACUUM TEST RIG: JEPCO and Plug-it Products offer a test rig to precasters at a very affordable price of $1,975.00. This includes a 30 inch plate, 20 feet of hose, an easy to read 0-10 inch gauge and a venturi pump. Use any compressor, even an air brake compressor on a delivery truck.



DRILL BITS: SDS MAX, Spline &WACKER HEX 1" size $94.00 and New Size: 1 1/4" $145.00
"Shorties"
custom- made to drill step holes to the right depth. Great for step holes in manholes. Each bit has Quad- Carbide tips for durable, fast drilling