



Division of Environmental Health

Terry L. Pierce, Director

State of North Carolina
Michael F. Easley, Governor

Department of Environment and
Natural Resources
William G. Ross, Secretary

MEMORANDUM

To: Precast Concrete Tank Manufacturers

From: Terry L. Pierce, Division Director

Date: April 29, 2008

Subject: Protocol for Approval of Fiber-Reinforced Precast Concrete Tanks

Macro-fibers have been proposed as an alternative reinforcement to six-inch by six-inch No. 10 gage wire for precast concrete tanks approved in North Carolina. Rule 15A NCAC 18A .1954(c) allows prefabricated tanks to be approved with alternative designs when the alternative design has been shown to provide equivalent effectiveness as the designs specified in .1954(a) and (b).

Macro-fibers are approved as an alternative reinforcement schedule to six-inch by six-inch No. 10 gage wire when the following conditions occur:

1. Macro-fibers will only replace the six-inch by six-inch No. 10 gage wire in the sides, end, baffle wall, and bottom of the proposed septic tank or pump tank. The tops of the tanks shall retain six-inch by six-inch No 10 gage wire and steel reinforcement (rebar) per the tank manufacturer's approvals.
2. Manufactures of the Macro-fibers shall provide the following information to the On-site Water Protection Section prior to getting a written macro-fiber approval document.
 - a. Third party engineer or state-certified laboratory reports that specify the following:
 - i. The macro-fibers are a minimum of 1.5 inches in length;
 - ii. The macro-fibers can produce a minimum average residual strength of 175 psi when used in a concrete design mix producing a minimum of 4,000 psi at 28 days when tested in accordance with ATSM C-1399 Test Method for Obtaining Average Residual Strength of Fiber-Reinforced Concrete;
 - iii. A minimum of 4 pounds of the approved macro-fibers will be used per cubic yard of concrete.
 - b. The fiber manufacturer's guidelines for incorporating macro-fibers into the concrete design mix, which will be included in the macro-fiber written approval.
3. Fiber manufacturer's authorized representatives will witness and coordinate initial production of tanks utilizing the approved macro-fibers. Tanks shall be marked for testing.
4. Tank manufacturers applying for reinforcement modification using macro-fibers shall provide the following information to the On-Site Water Protection Section.
 - a. Tanks to be modified using the macro-fibers;
 - b. Approved fiber(s) proposed to be used;
 - c. Method to be used to mix the fibers evenly throughout the concrete;
 - d. Signature indicating they have read and agree to follow the fiber manufacturers guidelines;

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- e. Minimum strength of the tanks using fibers shall be 4000 psi at 28 days;
- f. Tanks utilizing macro-fibers for reinforcement may be removed from the yard at 4000 psi;
- g. Results of initial vacuum test using macro-fibers and tank manufacturers concrete design mix. This includes:
 - i. Names of all present to witness testing, including one approved third-party person and one OSWP Section or county health department staff member present;
 - ii. The largest tank that can be made from each form shall be tested initially. (Two of each tank shall be manufactured and both shall be tested); and
 - iii. Documentation showing that a vacuum of five (5) inches of mercury was pulled on the tanks and that the five inches was held for two minutes, without a loss of > 0.5 inch mercury. Deflection must not be greater than L/240 as measured during the vacuum testing. During the test, the tank manufacturer or their representative can seal the tank if it is found to be leaking. The tank must be brought back up to 5 inches of mercury and held for two minutes.
4. Tank manufacturer(s) and approved macro-fiber manufacturers shall be notified and approvals amended or suspended if subsequent findings show deficiencies in the field.
5. The fiber manufacturer shall provide an annual report to the On-Site Water Protection Section which includes the following information: tank manufacturers visited within the past year and inspected to verify that the tank construction method conforms to the fiber manufacturers guidelines; tank manufacturers that the fiber manufacturer witnessed the initial tank productions; and any other information or observations relating to the fiber approval.

Please note that this applies only to tanks constructed in accordance with previously approved plans and specifications plus these approved modifications. If any approved tank is found in noncompliance and can not be brought into compliance with their state-approved plans or state sewage rules (15A NCAC 18A .1900, et seq.), an Operation Permit will not be issued for the installed wastewater system and such tanks may be permanently identified as being unacceptable for use in North Carolina on-site wastewater systems. In accordance with Rule .1954(e), the State shall suspend or revoke product approval upon a finding as follows:

1. The information submitted in the application is falsified,
2. The product has been subsequently altered, or
3. Subsequent experience with fiber reinforced tanks results in altered conclusions about tank performance or design.

Additionally, all tank manufacturers having North Carolina state approval of septic or pump tanks are subject to periodic, unannounced inspections of their tanks by state and local environmental health officials.

Please feel free to contact Tricia Angoli at (919) 715-3272 if you have any questions or if the OSWP staff can be of further assistance to you.