

Project:

Precast septic tanks with
MasterFiber products

Location:

Spokane, WA

Owner/s:

White Block Company

Design Engineer:

Inland Northwest Engineering
Incorporated

Requirements:

Vacuum of 10 inches of mercury

Products Used*:

MasterFiber MAC Matrix
macrosynthetic fiber

MasterGlenium® 7700 high-range
water-reducing admixture

MasterAir® AE 90 air-entraining
admixture

MasterMatrix® VMA 450 viscosity-
modifying admixture

Market Sector:

Precast concrete

Project Profile

MasterFiber® Products

Precast Septic Tanks



The Background

Beginning 2012, the Washington Department of Health (WDOH) will require all precast septic tanks to meet new loading requirements. The White Block Company, a precast manufacturer in Washington State, was faced with two difficult challenges due to this change: an increase in the reinforcement required and the rising cost of steel reinforcement. In order to overcome these challenges, the White Block Company utilized the services of Inland Northwest Engineering Incorporated to review and update the designs of their septic tanks for the current loading as well as the required loading. In order to maintain or increase performance without driving up costs, White Block Company decided to use fiber reinforced concrete as an

Precast Septic Tanks

alternative and contacted BASF for help. BASF was able to review the designs provided by the engineer and provide a synthetic fiber solution that met the specifications of the WDOH and the White Block Company.

The Fiber Solution

BASF recommended the use of MasterFiber MAC Matrix, a macrosynthetic fiber, for this project. MasterFiber MAC Matrix fiber is capable of replacing most of the welded wire reinforcement and No. 3 and No. 4 reinforcing bars used as temperature and shrinkage reinforcement, depending on the application. In addition, MasterFiber MAC Matrix fiber is designed specifically to be used at high dosage rates not only to meet the demands of the projects but also to provide superior finishability. Based on the calculations provided by the design engineer, BASF arrived at a fiber dosage of 6.5 lb/yd³ (3.9 kg/m³) to meet the required loading criteria.

A test tank of 1,000-gallon capacity, with the recommended dosage of MasterFiber MAC Matrix fibers, was cast using self-consolidating concrete (SCC). The tank was cured in a covered structure with temperatures ranging from 30 °F to 60 °F (-1 °C to 16 °C). After 28 days of curing, the tank was subjected to the vacuum test to determine its structural capacity.

Mixture Proportions

Water – cement ratio	0.42
Cement content	630 lb/yd ³ (374 kg/m ³)
Fiber dosage	6.5 lb/yd ³ (3.9 kg/m ³)

Properties of Concrete

- Air content: 5%
- Concrete temperature: 70 °F (21 °C)
- Slump flow: 28 in. (710 mm)
- 28-day compressive strength: 6,610 psi (45.5 MPa)

Testing the Structural Capacity of the Tank

The vacuum test specified in ASTM C 1227 “Standard Specification for Precast Concrete Septic Tanks” is the standard test method used to determine the structural capacity of septic tanks against external pressure. In addition, the vacuum test measures watertightness and the data is reported in terms of “inches of mercury.” The WDOH specifications requires a vacuum (negative air pressure) of 10 inches (250 mm) of mercury. The pictures show the tank being subjected to the vacuum test. Test conducted on the fiber-reinforced concrete septic tank containing MasterFiber MAC Matrix macrosynthetic fiber resulted in a vacuum of 12 inches (305 millimeters) of mercury. Thus, the measured vacuum exceeded the specified value for the tank tested.

More Information

The Master Builders Solutions brand brings all of BASF’s expertise together to create chemical solutions for new construction, maintenance, repair and renovation of structures. Master Builders Solutions is built on the experience gained from more than a century in the construction industry.

The know-how and experience of a global community of BASF construction experts form the core of Master Builders Solutions. We combine the right elements from our portfolio to solve your specific construction challenges. We collaborate across areas of expertise and regions and draw on the experience gained from countless construction projects worldwide. We leverage global BASF technologies, as well as our in-depth knowledge of local building needs, to develop innovations that help make you more successful and drive sustainable construction.

The comprehensive portfolio under the Master Builders Solutions brand encompasses concrete admixtures, cement additives, chemical solutions for underground construction, waterproofing solutions, sealants, concrete repair & protection solutions, performance grouts, performance flooring solutions.



*Effective January 1, 2014, the names of BASF’s Master Builders Solutions brand products have changed: Glenium 7700 became MasterGlenium 7700
MB-AE 90 became MasterAir AE 90
Rheomac VMA 450 became MasterMatrix VMA 450

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