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...
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

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Water – cement ratio</td>
<td>0.42</td>
</tr>
<tr>
<td>Cement content</td>
<td>630 lb/yd³ (374 kg/m³)</td>
</tr>
<tr>
<td>Fiber dosage</td>
<td>6.5 lb/yd³ (3.9 kg/m³)</td>
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</tbody>
</table>

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.

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