

Caprolan-RC®

A NYLON 6 PRODUCT FROM **Honeywell**

Product Specification Sheet

PRODUCT DESCRIPTION

Basic Use: Caprolan-RC® is used as a secondary reinforcement of concrete flatwork, including slabs on grade, elevated decks, sidewalks, driveways, curbing and patios. Other applications include precast concrete items such as septic tanks, burial vaults and cast stone, swimming pools and poured walls.

The 3-dimensional random reinforcement provided by Caprolan-RC® intercepts plastic shrinkage cracks in the microcrack stage. This process substantially reduces the microcracking inherent in non-fiber reinforced concrete. Caprolan-RC® also increases impact resistance and reduces permeability.

Composition and Materials: Caprolan-RC® is manufactured exclusively from 100% pure nylon 6 fiber supplied by Honeywell. The fibers are engineered specifically for use in concrete reinforcement.

Limitations: Caprolan-RC® is not to be used as a structural element in concrete.

TECHNICAL DATA

Applicable Standards:

American Society for Testing & Materials

- ASTM C39-96 - Compressive Strength of Cylindrical Concrete Specimens
- ASTM C78-94 - Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
- ASTM C234 - Standard Test Method for Comparing Concretes on the Basis of the Bond Developed with Reinforcing Steel
- ASTM C496-96 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
- ASTM C1018-94b - Standard Test Method for Flexural Toughness and First-Crack Strength of Fiber-Reinforced Concrete (Using Beam With Third-Point Loading)
- ASTM C1116-89 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete

Table 1 - Physical Properties of Concrete with Caprolan-RC®	
Property and Test Method	Result
Plastic shrinkage cracking	Plastic shrinkage cracking reduced 69%
Impact resistance per ACI Committee 544	Increased by 55%; blows to failure increased 100%
C1116.89 and ASTM 1018	week interval
Compressive strength, ASTM C39	110% of plain concrete
	110% of plain concrete
Splitting tensile strength, ASTM C496	108% of plain concrete
Concrete bond strength with reinforcing steel, ASTM C234	Bond strength increased 16%

Approvals:

Council of American Building Officials (CABO)
NER-433 Underwriter's Laboratories, Inc. (UL)

- UL Fire Resistance Directory Design No. 924 and two and three hour restrained designs.
- UL Fire Resistance Directory Design Series D700, D800, D900, D924 - approved as substitute, or in addition to WWF for floor / ceiling assemblies.
- UL Building Materials Directory Classifications CBX.

PHYSICAL PROPERTIES

Concrete reinforced with Caprolan-RC® exhibits the properties indicated in Table 1. Caprolan-RC® complies with ASTM C1116 and exhibits the properties shown in Table 2.

Caprolan-RC® is alkali- and corrosion- resistant and anti-magnetic. The ability of nylon fiber to absorb water (4.5% by weight) allows Caprolan-RC® to develop both a chemical and physical bond within the concrete matrix; this level of adhesion is unachievable with synthetic fibers that do not absorb water.

The material selection specimen preparation and testing protocol represented herein were all in accordance with American Concrete Institute (ACI) and ASTM standards unless specified otherwise. Test results indicate the ability of Caprolan-RC® to control plastic shrinkage cracking, increase impact resistance and decrease permeability. Additionally, the long-term durability study demonstrates Caprolan-RC®'s compliance with ASTM C1116-89.

Product testing represented in this product sheet was performed by the following organizations; reports are available from the manufacturer:

- Honeywell Technical Center
- Rutgers University
- STORK Twin Cities Testing
- South Dakota School of Mines and Technology

Plastic Shrinkage Cracking:

The plastic shrinkage crack method was adopted from Kraai, P.P., "A proposed Test to Determine the Cracking Potential Due to Drying Shrinkage of Concrete," Concrete Construction, September, 1985.

Impact Resistance:

Impact resistance testing was conducted using the procedure recommended by ACI Committee 544.

Long-term Durability:

To determine long-term durability and fiber suitability in compliance with ASTM C1116-89, an accelerated aging test adopted from Shah Et. Al., Toughness of Glass Reinforced Concrete Panels Subjected to Accelerated Aging, PCI Journal 9/87, was employed. Fiber contribution was determined by measuring flexural toughness, according to ASTM C1018 at various stages of accelerated aging. Changes in flexural toughness, as measured by the toughness index, provide quantitative estimate of the fiber integrity and its effectiveness as a reinforcement following aging.

The data indicated no reduction in flexural toughness following accelerated aging and, hence, no degradation of the Caprolan-RC®.

Bond Strength of Reinforcing Fibers, Concrete to Steel:

The behavior of Caprolan-RC® reinforced concrete versus an unreinforced control was determined per ASTM C234. The test confirmed the addition of 1 lb/cy (.6kg/m³) of Caprolan-RC® to concrete improves the bond strength of concrete to steel by an average of 16%.

INSTALLATION

Caprolan-RC® requires no special handling in the field. The denier and flexibility of Caprolan-RC® allows the concrete to be finished to a smooth, non-hairy surface. If a slump test is required, ACI Committee 544 recommends an Inverted Cone Test to measure the workability of fiber-reinforced concrete. If a conventional slump test must be performed, be advised that, as with any 3-dimensional fiber reinforcement, ¾" - 1½" (19-38mm) slump loss should be anticipated. The loss in slump will not affect workability.

Manual Mixing:

Add Caprolan-RC® at a minimum rate of 1lb/cy (.6 kg/m³) of concrete. Fibers may be added to the aggregate in the weigh hopper, added to the aggregate on the belt or added directly into the truck at the batch plant. Mix for a minimum of 4 minutes.

WARRANTY

Honeywell has no control over the design, manufacture, or testing of the concrete products that incorporate our fiber reinforcing materials. Accordingly, Honeywell does not warrant any of the properties or performance of concrete products incorporating our reinforcing materials.

MAINTANCE

None.

TECHNICAL SERVICES

Honeywell provides field service and technical support throughout the U.S. via Caprolan-RC® distributor network. Visit our Distribution section, or contact Honeywell for a distributor in your area.