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NATIONAL EVALUATION REPORT

Report No. NER- 433

Re-Issued June 1, 2002

DIVISION 03 – CONCRETE

Section 03240 – Fibrous Reinforcing

REPORT HOLDER:

**HONEYWELL
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EVALUATION SUBJECT:

CAPROLAN - RC® FIBERS

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NES
Product Evaluation Listing

1.0 SUBJECT

**2.0 PROPERTY FOR WHICH
EVALUATION IS SOUGHT**

3.0 DESCRIPTION

4.0 INSTALLATION

5.0 IDENTIFICATION

6.0 EVIDENCE SUBMITTED

7.0 CONDITIONS OF USE

1.0 SUBJECT

CAPROLAN-RC® Fibers.

2.0 PROPERTIES FOR WHICH EVALUATION IS SOUGHT

- 2.1** Reduction of plastic shrinkage cracking in concrete.
- 2.2** Reduction of shrinkage and temperature cracking in plain concrete slabs on grade.
- 2.3** Fire-resistance

3.0 DESCRIPTION

CAPROLAN- RC® Fibers are made from 100 percent virgin Nylon 6. The fibers are 3/4 in. (19 mm) in length and are supplied in small bundles of filaments which have been individually extruded and drawn.

The fibers are used as a concrete fiber admixture in concrete to assist in controlling plastic shrinkage cracking and to increase the impact resistance of the concrete. Proper location and spacing of concrete joints shall be required in accordance with the applicable *Code*.

Fibers are used in plain concrete slabs on grade to reduce shrinkage and temperature cracking in hardened concrete. Structural plain concrete is defined in Section 22 of ACI 318-95 and -99. Use of the fibers shall not reduce the requirements for contraction or isolation joints. Contraction or isolation joints shall be provided in accordance with Section 22.3 of ACI 318-95 and -99.

4.0 INSTALLATION

4.1 General

The fibers are blended into normal-weight and lightweight concrete according to the manufacturer's instructions.

The fibers shall be used in dosage rates of either 1 pound (0.43 kg) for each cubic yard of concrete or 3/4 pound (0.32 kg) for each cubic yard of concrete. The fibers are introduced into the mixer before, during, or after the charging operations at the plant or in the truck mixer at the job site. The fibers are uniformly distributed throughout the concrete after mixing in accordance with the manufacturer's installation instructions. Over mixing will not affect the performance of CAPROLAN-RC® Fibers.

4.2 Fire-resistance Rated Construction

The use of CAPROLAN-RC® Fibers is permitted in fire-resistance rated construction as described in **Figure 1** of this report.

5.0 IDENTIFICATION

Each bag of CAPROLAN-RC® shall be identified as Nylon 6 fibers and shall bear the manufacturer's name and trademark, address, net fiber weight and NER-433 for field identification.

6.0 EVIDENCE SUBMITTED

- 6.1** Manufacturer's descriptive literature.
- 6.2** Test reports for normal-weight and lightweight concrete, prepared by Dr. Perumalsamy Naidu Balaguru at Rutgers University dated December 4, 1989 and February 25, 1991. The following tests were performed:
 - ASTM C39, Compressive Strength
 - ASTM C78, Flexural Strength
 - ACI 544.2R, Impact Resistance
 - ACI 544.2R, Shrinkage Cracking Resistance
 - ASTM C496, Splitting Tensile Strength
- 6.3** Test report for long-term durability, 4 in. x 4 in. x 14 in. (102 x 102 x 356 mm) specimens were subjected to a lime-saturated bath and subjected to third point flexural loading under ASTM C1018, prepared by Dr. Perumalsamy

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Naidu Balaguru at Rutgers University dated April 25, 1990.

- 6.4** Test report on freeze-thaw durability, an independent evaluation of an in-place slab, over one year old exposed to weathering, prepared by Progressive Engineering, Inc., dated March 5, 1990, signed and sealed by Ned C. Myers, P.E. Letter on mix design prepared by Fidler, Inc., Dated April 23, 1990, signed by Tom Atkins.
- 6.5** Results of field inspections conducted on slabs in place approximately three to five years, to verify freeze-thaw durability, prepared by Fink Roberts and Petrie, Inc., dated April 20, 1994, signed by David L. Ostendorf, P.E.
- 6.6** Results of tests on fiber compatibility with concrete dated June 2, 1994, conducted by Froehling & Robertson, Inc., and signed by Geologist, James Crenshaw.
- 6.7** Test report to determine the effect of fibers on the bond behavior of concrete to steel, conducted in accordance with ASTM C234 by Rutgers University Department of Civil Engineering. Report prepared by Dr. P. Balaguru, professor of civil engineering.
- 6.8** Letter dated January 12, 1993, signed by Sadek W. Mansour, Staff Engineer, and Nestor G. Sanchez, Engineering Group Leader, of Underwriters Laboratory Inc., regarding an investigation of the use of CAP-ROLAN-RC® Fibers within fire-resistance rated assemblies.
- 6.9** Underwriters Laboratories Inc., Project 91NK20776/File R14530, dated July 16, 1993, signed by S. W Mansour, Staff Engineer, and Nestor G. Sanchez, Engineering Group Leader, containing results of fire testing in accordance with ASTM E119.
- 6.10** Underwriters Laboratories, Inc., Follow-Up Service Procedure, File R14530, Issued 07/15/1993, Revised 05/02/2001, signed by J. J. Ritchie. Plant located in Columbia, SC.

7.0 CONDITIONS OF USE

The National Evaluation Service Committee finds that CAPROLAN-RC™ Fibers as described in this report complies with or is a suitable alternate to that described in the *2000 International Building Code with 2002 Accumulative Supplement*, the *BOCA National Building Code/1999*, the *1999 Standard Building Code*, the *1997 Uniform Building Code*, the *2000 International Residential Code for One- and Two-Family Dwellings with the 2002 Accumulative Supplement*, and the *1998 International One and Two Family Dwelling Code* subject to the following conditions:

- 7.1** Fibers shall not be used as a replacement for any reinforcement required for structural purposes.
- 7.2** Structural design of the concrete shall comply with the applicable *Code*.
- 7.3** Fibers shall be blended into the concrete mix in accordance with Section 4.0 of this report.
- 7.4** The use of CAPROLAN-RC® Fibers within fire-resistance rated assemblies shall be limited to the construction described in Figure 1 of this report.
- 7.5** Contraction or isolation joints shall be provided in accordance with Section 22.3 of ACI 318-95 and -99.
- 7.6** The scope of this evaluation is limited to the properties stated in Section 2.0 of this report.
- 7.7** This report is subject to periodic re-examination. For information on the current status of this report, consult the [NES Product Evaluation Listing](#) or contact the [NES](#).

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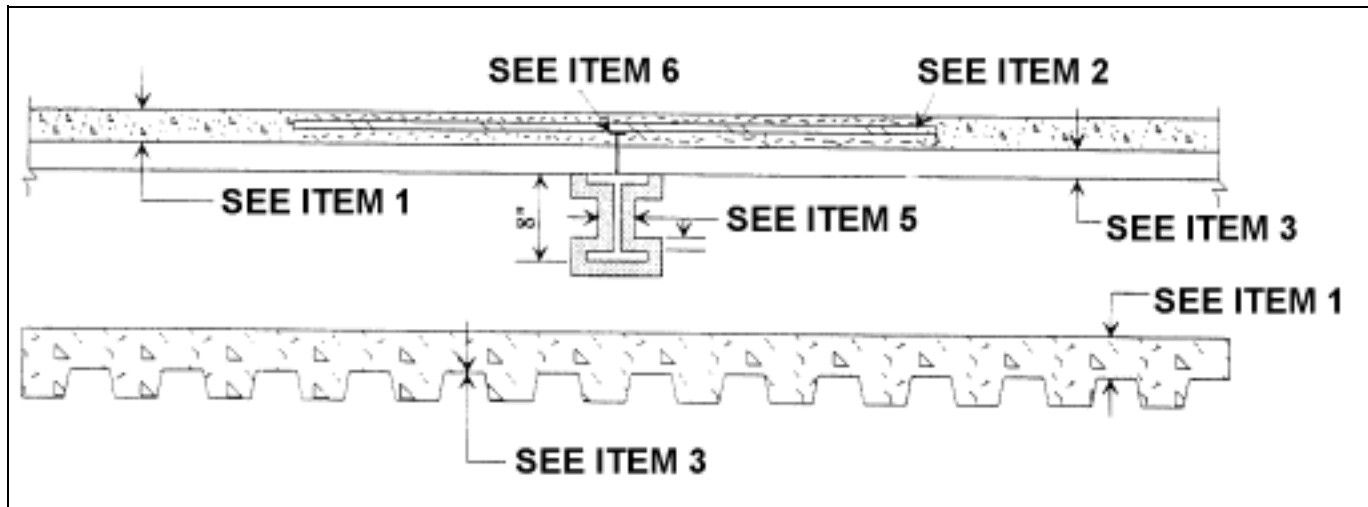


Figure 1* — Three-Hour Restrained Fire resistance Rated Assembly

Notes to Figure 1*

1. Five in. (127 mm) thick normal weight carbonate concrete with a density of 142 to 148 pcf (2275 to 2371 kg/m³) and a compressive strength of 4500 psi (30 824 kPa).
2. Negative reinforcement designed to resist the imposed loads in accordance with American Concrete Institute, ACI 318 and the applicable code.
3. Two in. (51 mm) deep corrugated 0.059 in. (1.2 mm) thick steel decking.
4. CAPROLAN-RC® fiber reinforcement (not shown) added to the concrete at a rate of 1 lb (0.43 kg) of fiber for each cubic yard of concrete.
5. Isolatek International Type D-C/F spray applied fiber coating with a minimum untamped density of 11 pcf (176 kg/m³), applied to a final untamped thickness of 15/16 in (24 mm), except at the tips of the bottom flange, the thickness is 1/2 in (12.7 mm).
6. Steel shear connector studs designed and installed in accordance with the applicable code.

*THIS DRAWING IS FOR ILLUSTRATION PURPOSES ONLY. IT IS NOT INTENDED FOR USE AS A CONSTRUCTION DOCUMENT FOR THE PURPOSE OF DESIGN, FABRICATION OR ERECTION.

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