

Caprolan-RC[®]

A NYLON 6 PRODUCT FROM **Honeywell**

Honeywell

Engineering Data Report #1

- Fiber Properties
- Air Content / Entrainment
- Compressive Strength
- Flexural Strength
- Splitting Tensile Strength
- Impact Strength
- Shrinkage Crack Reduction
- Fiber Distribution



The following technical information is based upon extensive research studies conducted at Rutgers University, South Dakota School of Mines and Technology, and STORK Twin Cities Testing. The material selection, specimen preparation, and testing protocols were all in accordance with ICBO and ASTM standards.

TYPICAL PROPERTIES OF CAPROLAN-RC[®] FIBERS

Material	100% Nylon 6	Acid and Salt Resistance	Good
Filament Diameter	30 Microns	Alkali Resistance	Excellent
Filaments/lb	33 Million	Ultra Violet Resistance	Excellent
Specific Gravity	1.14	Electrical Conductivity	Low
Fiber Length	3/4 inch	Thermal Conductivity	Low
Melting Point	428 °F (220 °C)	Concrete Surface	Non-Hairy
Water Absorption	4.5%	Concrete Air Entrainment	No Effect

CONCRETE MIX PROPORTIONS

PROPERTIES OF PLASTIC CONCRETE

Portland Cement (ASTM Type I)*	517 lb/yd ³
Fine Aggregate (Natural Sand) **	1370 lb/yd ³
Coarse Aggregate (Crushed Stone - 3/4" Max.) **	1800 lb/yd ³
Potable Water	257 lb/yd ³
Air Entraining Admixture	3 oz/yd ³
High Range Water Reducing Admixture	16 oz/yd ³
Water / Cement Ratio	.497

	Control	1 lb. Caprolan-RC®
Slump ⁺	7.00 in.	5.75 in.
Inverted Slump ⁺⁺	n/a	6 sec.
Air Content	5.0%	9.0%
Temperature	74°F	76°F
Unit Wt. - 1lb/ft ³	145.7	140.9

* satisfies ASTM C 150

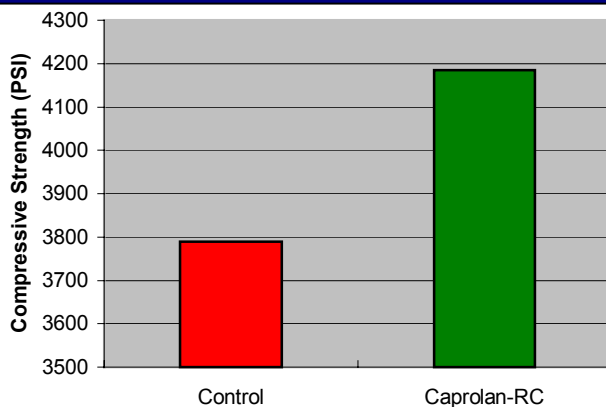
+ satisfies ASTM C 143

** satisfies ASTM C 33

++ satisfies ASTM C 995

Caprolan-RC® fibers were added on the basis of 1 pound of fiber per cubic yard of concrete. The control specimens contained no fibers.

COMPRESSIVE STRENGTH (ASTM C 39, 28 Day Breaks, 6" x 12" Cylinder)



Test Conditions:

- Cylinders were capped using molten sulphur.
- Test done using a million pound capacity Forney machine.

Test Results:

- Compressive strength, f'_c was obtained by the equation

$$f'_c = \frac{P_u}{A_c}$$

where P_u is the maximum load and A_c is the area of the cross section.

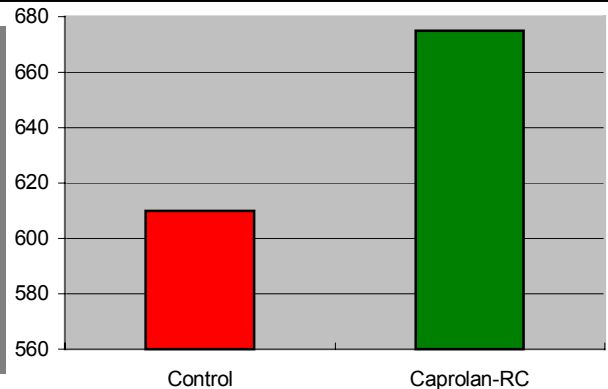
FLEXURAL STRENGTH (ASTM C 1018, 28 Day Breaks, 4" x 4" x 14" Prism)

Test Conditions:

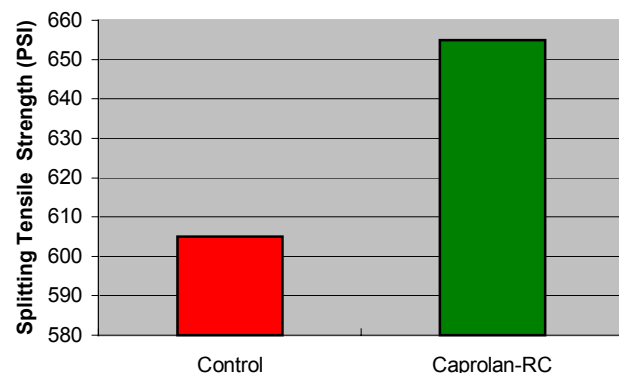
- Flexural strength was obtained using prisms supported over a simply supported span of 12". Loads were applied at the middle third points.

Test Results:

- Flexural strength, F_r was computed using the equation: $F_r = \frac{12P}{bd^2} = \frac{3P}{16}$ where P is the maximum load and b and d are cross-section dimensions of 4" each.



SPLITTING TENSILE STRENGTH (ASTM C 496, 28 Day Breaks, 6" x 12" Cylinder)



Test Conditions:

- Splitting tensile strength was obtained by loading a 6" x 12" cylinder diagonally.

Test Results:

- Splitting tensile strength, f_t was obtained using the equation: $f_t = \frac{2P}{\pi d \ell}$ where P is the maximum load, d is the diameter of the cylinder (6 in.) and ℓ is the length of the cylinder (~ 12 in.).

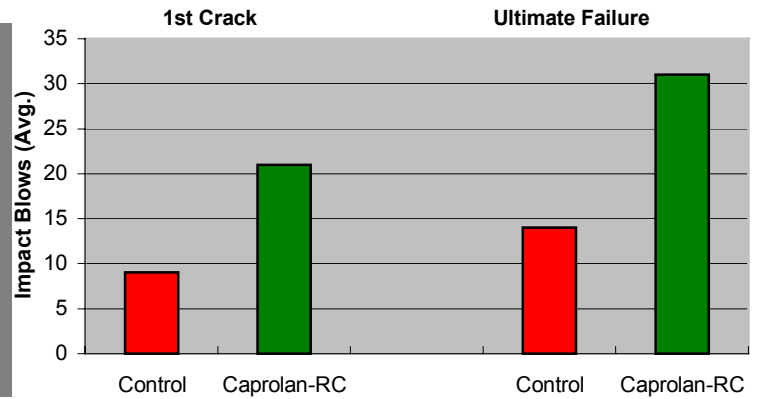
IMPACT STRENGTH (ICBO AC32) (6" x 2.5" DISK, 28 DAY BREAKS)

Test Conditions:

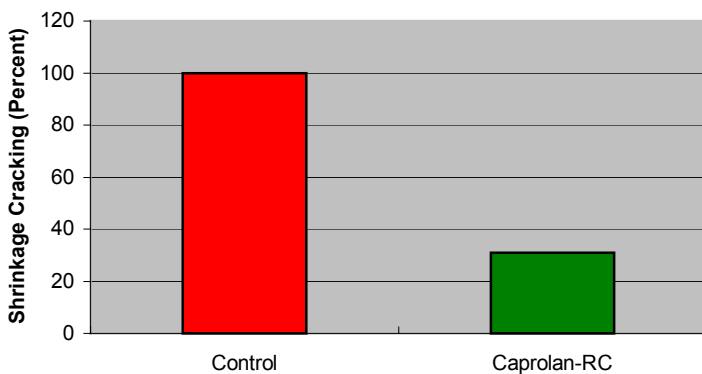
- Impact strength tests were conducted using concrete cylindrical disks subjected to a point impact load of a 10 lb. weight dropped over 18" height.
- The load is transferred to the disk using a hard 2.5" steel ball.
- Specimens were surrounded by four lugs and were whitewashed with lime for easy detection of cracks.

Test Results:

- When a cracked disk touches three of the four lugs, failure is assumed.



SHRINKAGE CRACK REDUCTION (2' x 3' x 2" SLAB - Craii Test Method)



Test Conditions:

- Slabs were placed on a flat surface, with high velocity fans used to create a wind velocity of 12 to 14 mph.
- Crack widths and lengths were measured after 24 hours.

Test Results:

- Weighted crack values were large - 3, medium - 2, small - 1, hairline - 0.5. Respective crack lengths are multiplied by the appropriate weights to compute the total weighted crack area.

Concrete Mix Proportions

Cement:	1000 lb./yd ³
Fine Aggregate:	1000 lbs./yd ³
Coarse Aggregate:	1500 lbs./yd ³
Water:	600 lbs./yd ³
Water / Cement Ratio:	0.6
Test Time:	24 Hours
Wind Velocity:	14 mph



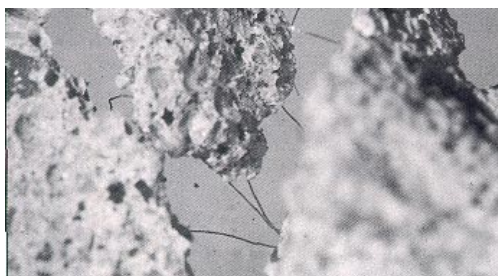
Control - No Fiber



Caprolan-RC[®] at 1 lb./yd³

FIBER DISTRIBUTION @ .75" FIBER LENGTH

33 Million fibers / lb. of Caprolan-RC[®], evenly distributed throughout a cubic yard of concrete.





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