

TEST RESULTS:

Impact Resistance

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FIBERS

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EXTRAordinary

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Summary: The addition of ABC Fibers in concrete increased the impact resistance by 100% at seven days and 66% after 28 days.

Background: Impact resistance tests were performed on 20 cylinders, 6" diameter by 2-1/2". 10 cylinders were control cylinders and 10 contained ABC Fibers. Five cylinders each from the control and fibers group were tested at 7 and 28 days. The tests were conducted in accordance with ICBO AC32, Appendix G2. The mix design is shown overleaf. Data below represent the average of 5 tests.

Data:

	Control		Fiber	
	1st Crack	Failure	1st Crack	Failure
7 days	3	4	6	8
28 Days	5	6	8	10

Impact Resistance Testing was done by :

Twin City Testing Corporation
662 Cromwell Avenue
St. Paul, MN 55114-1776

Test Supervisor:
Mr. John D. Lee, PE
Senior Staff Engineer
Construction Materials Department.

Testing began on September 27, 1999. The results were published as Project 99-09552 on October 28, 1999. Mr. Lee can be reached at 651.659.7340.

The goal of the Impact Resistance test is to compare samples with and without fibers measuring the energy consumed to fracture a sample and the repeated blows to take the sample to failure. Tests were performed in accordance with ICBO AC-32 Appendix C-2, ASTM D-698, ASTM C-152, and ASTM C-31. The condition of acceptance based on averaging the results of at least three samples is 100% increase at 7 days and 50% increase at 28 days for fiber reinforced concrete.

Twenty cylinders were poured. Ten cylinders were controls and 10 included ABC Fibers added to the mix at the rate of 1.5 pounds per cubic foot of concrete. The samples were cured for 7 days and five samples from the control and fiber group were tested. The tests were continued again at 28 days.

In summary, the testing indicated that the addition of ABC Fibers increased the impact resistance of concrete by 67%.

Materials:

Cement: Type I Portland Cement (ASTM:C150)

Fine Aggregate: Shiely Aggregates Inc. Meeting the grading requirements of ASTM: C494 and C33.

Coarse Aggregate: Shiely Aggregates Inc. Meeting the grading requirements of ASTM:C494 and C33.

Admixtures: DARAVAIR by W.R. Grace (ASTM:C260) ABC Fibers. (Fibers not in control.)

Mix Design:

Mix Number:	1 and 2
Mixture Type	Control and Fiber
Portland Cement, Lb.:	517
Fine Aggregate, Lb.:	1,365
Coarse Aggregate, Lb.:	1,750
Net Water, Lb.:	257
Admixtures:	
DARAVAIR, Oz.	4.1
ABC Fibers, Lb./cu.yd.	1.5 (not in control)

Concrete Test Data:	Control	Fiber
Slump, Inches	3-3/4	2-1/4
Air Content, %	6.5	5.9
Temperature, Deg F.	76	75
Unit Weight, Lb./cf	147.0	147.3

Sample dimensions: 20 cylinders, 6 inch diameter by 2-1/2 inches.

7 days test

Number	Control		Fiber	
	1st Crack	Failure	1st Crack	Failure
1	3	4	5	8
2	2	3	5	8
3	3	4	5	8
4	3	5	7	9
5	4	5	7	9
Average	3	4	6	8

28 days test

Number	Control		Fiber	
	1st Crack	Failure	1st Crack	Failure
6	5	7	9	10
7	4	6	8	11
8	4	6	9	10
9	6	7	8	11
10	4	5	6	9
Average	5	6	8	10