

Center for By-Products Utilization

PERFORMANCE OF CONCRETE WITH SHRINKAGE- REDUCING ADMIXTURES

**By Tarun R. Naik, Rudolph N. Kraus, Yoon-moon Chun, and
Fethullah Canpolat**

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**Department of Civil Engineering and Mechanics
College of Engineering and Applied Science
UNIVERSITY OF WISCONSIN – MILWAUKEE**

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Tarun R. Naik¹, Rudolph N. Kraus², Yoon-moon Chun³, and Fethullah Canpolat³

ABSTRACT

The objective of this research was to reduce cracking due to shrinkage in concrete and determine the performance of shrinkage-reducing admixtures (SRAs). Three different sources of SRAs were used. Cracking leads to additional costs for repair of the cracks and premature deterioration of the concrete and decreased service life of structures.

Shrinkage in concrete depends upon many different factors: cementitious materials amount, type, and properties; water content; aggregate amount, type, and properties; concrete mixture proportions; temperature; and others related factors. Tests were carried out on concrete with SRAs having air content in the range of $6 \pm 1.5\%$ and slump of 1 to 4 inches, with and without fly ash, using Wisc-DOT concrete mixture proportions. The project data show that replacement of cement with Class C fly ash in concrete helped to reduce early age autogenous shrinkage but did not significantly affect drying shrinkage of the concrete. Concrete at a specified workability with higher cementitious material content exhibited higher autogenous shrinkage and lower drying shrinkage compared to concrete at the same workability with lower cementitious material content.

As a result of this research specifications containing recommendations on the use of dosage rate of shrinkage-reducing admixtures and cementitious materials were developed for reducing shrinkage for concrete mixtures used for highway infrastructures.

Keywords: aggregates, air entrainment, autogenous shrinkage, compressive strength, concretes, drying shrinkage, shrinkage reducing admixtures,.

¹ Academic Program Director and Professor of Structural Engineering, UWM Center for By-Products Utilization, Department of Civil Engineering and Mechanics, College of Engineering and Applied Science, University of Wisconsin – Milwaukee, P. O. Box 784, Milwaukee, WI 53201, USA.
Phone: +414-229-6696; Fax: +414-229-6958; E-Mail: <tarun@uwm.edu>.

² Assistant Director, ³ Postdoctoral Fellow, UWM Center for By-Products Utilization, Univ. of Wisconsin– Milwaukee, P.O. Box 784, Milwaukee, WI 53201, USA.