

## **PORE PRESSURE AND SPALLING IN CONCRETE AT HIGH TEMPERATURE**

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### **ABSTRACT**

Explosive spalling, which refers to a sudden and violent breaking away of a surface layer of heated concrete, has been observed in many laboratory tests of HSC specimens [1-6]. This phenomenon has been generally attributed to the inability of HSC, due its low permeability, to successfully mitigate the buildup of internal pressure as free water residing in the concrete pores and chemically-bound water in the concrete matrix undergo transformation from liquid to a gaseous phase, expand in volume, and transport through the concrete with increasing concrete temperature. However, reports on factors affecting explosive spalling have been inconsistent, and a complete understanding of the factors that control explosive spalling in HSC has not had the benefit of quantifiable measurements until recently. Given the many benefits of HSC and its increased use in structural applications, it is essential that the influence of all factors affecting the tendency for explosive spalling of HSC at elevated temperatures be understood. This presentation describes (1) the results of an experimental study conducted at the National Institute of Standards and Technology (NIST) to quantify the effects of several factors, including polypropylene (PP) fibers on the process of pore pressure buildup and

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