

Title: Redefining Cement Characteristics for Sulfate-Resistant Portland Cement

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Abstract: Experimental research was performed to relate specific cement characteristics to expansion due to sulfate attack. Twenty-one North American cement of statistically diverse chemical composition were used in the study. ASTM 1012 “Standard Test Method for Length Change of Hydraulic Cement Mortars Exposed to a Sulfate Solution” was performed using mortars prepared with each of the cement. Firstorder and multivariate relationships between cement characteristics and sulfate expansion were correlated at different ages. Analysis revealed that while tricalcium aluminate (C3A) has typically been targeted as the chief contributor to sulfate attack, iron oxide (Fe₂O₃) or tetracalcium aluminoferrite (C4AF) content, combined with total equivalent alkalis, showed a much stronger negative correlation with expansions at all ages. These results are in agreement with a broad spectrum of sulfate expansion theories and can provide a better means of specifying sulfate-resistant cement. D 2002 Elsevier Science Ltd. All rights reserved.