

Flexural Bond Strength of Concrete Masonry Prisms Using Portland Cement and Hydrated Lime Mortars

Edwin G. Hedstrom¹, Kassim M. Tarhini², Robert D. Thomas³, V.S. Dubovoy⁴, R.E. Klingner⁵, R.A. Cook⁶

Abstract:

An extensive test program was conducted to determine minimum characteristic values for the flexural bond strength of Type M, S, and N portland cement – lime mortars, using special standardized concrete brick units. The laboratory test program was designed to control materials, prism fabrication, curing, and testing. The mortar materials included four limes (three type S and one type N), eleven portland cements and standard Ottawa silica sand. From each area where a lime predominates, three portland cements were generally selected and included in the study. One cement was common to two areas. This paper describes the test procedure, summarizes the test results, and briefly discusses their significance.

The test program was carried out by the research laboratories of the National Concrete Masonry Association (NCMA) Construction Technology Laboratories, Inc. (CTL), and the University of Texas at Austin (UTA). Twelve different portland cement and hydrated lime combinations for each ASTM C 270 mortar type (M, S and N) were tested at NCMA. CTL and UTA either duplicated or triplicated some of the tests to determine the reproducibility of the test procedures. For each of the mortar mixes, the initial flow, water retention, air content, initial cone penetration, cone penetration at 15-minute intervals, and cube compressive strength at 7 and 28 days were determined. Six prisms, each consisting of six standard concrete bricks and five mortar joints, were fabricated and tested at 28 days for flexural bond strength. The flexural bond strengths of the 30 joints were calculated for each mortar in accordance with UBC Standard No. 24-30 and ASTM C 1072. The mean, standard deviation, and coefficient of variation were then calculated for each material combination and mortar type.

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DOI: 10.70803/001c.141504

¹ Director of Research, National Concrete Masonry Association (NCMA)

² Former Manager of Research, NCMA. Currently Dept. of Civil Engineering, Valparaiso University, Valparaiso, Indiana

³ Manager of Research, NCMA

⁴ Senior Masonry Engineer, Construction Technology Laboratories (CTL)

⁵ Professor, University of Texas at Austin (UTA)

⁶ Former Graduate Assistant, UTA. Currently Dept. of Civil Engineering, University of Florida, Gainesville