CONSOLIDATED ABSTRACT

Volume 1 is based on experimental 28-day laboratory testing done in 1987 on factory made paving blocks, and the measurement of abrasion-wear in companion blocks after 6-years of traffic. Mix design variables were water content, binder content, and binder type.

Ten different laboratory tests were used, including compression testing, tensile splitting testing, absorption testing, density determinations, and three different abrasion tests.

Abrasion resistance is significantly improved as binder and water content are increased. (Increasing water improves compactability). Binder type plays a lesser role, with fly ash pavers having the lowest 6-year wear.

The MA20 abrasion test appears to be the most suitable, although its inherently high variability has precluded its formal adoption into the national manufacturing standard.

A means of classifying abrasion wear, both quantitatively and visually is proposed. A classification is also proposed stating what ‘degrees of abrasion’ are acceptable in the various applications of cbp.

A mix design chart makes it possible to select a mix with predictable long-term wear.

A method is proposed for establishing local 28-day abrasion limits that correlate to a national 90-day limit, bringing national abrasion testing one step nearer.

Volume 2 commences with a comprehensive literature review on abrasion resistance, covering virtually all the materials/components that make up the concrete system. The impact of subsequent processes and influences are also considered, such as finishing, curing, surface treatments, carbonation, etc.

The conflicting findings in the literature by some authors can often be explained by recognizing that they used different tests, each with its unique characteristics and abrasive processes. This prompted a fundamental study of the various mechanisms of abrasion-wear. Such mechanisms - mostly on a microscopic scale - are generally the result of various types of rolling (resulting in cracking/crushing effects), and/or sliding (resulting in shearing effects), and/or impact (resulting in fracturing effects, crushing and shearing). Sixty six surface/abrasion tests are classified according to several characteristics, and especially by their distinctive abrasion-wear mechanisms.

Finally the many factors governing abrasion resistance and their interdependencies are brought together in a wiring diagram that embodies a simple philosophy – abrasion resistance is primarily a function of hardness and aggregate-paste bond.

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