

عنوان مقاله:

DADmax/NADmax Ratio : Criterion for the Production and Selection of Demolition Aggregates with Low-Water Absorption

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خلاصه مقاله:

The use of demolition aggregates (DAs) in second-generation concretes is an important issue, as they often have high water absorption, which affects the workability and durability of the cementitious materials incorporating them. This makes their direct use in structural concrete impossible. Previous studies have focused on downstream interventions aimed at improving the quality of DAs, such as eliminating old mortar (OM) adhered to natural aggregates (NAs) or limiting its absorption capacity. However, these approaches have proven to be expensive, time-consuming, and, for some, have health consequences. Our objective was to produce DAs suitable for use in structural concrete and to develop a simple, economical, and safe technique to generate good-quality DAs. We designed an upstream intervention based on the measurement of water absorption as a quality indicator. Seven ordinary concretes served as parent concretes (PCs), and after ۲۸ days of maturation, the PC specimens were divided with a metal mass and then separated into ten different subfractions using standardized sieves. Three representative samples per subfraction were subjected to a twenty-minute water absorption evaluation, resulting in seventy arithmetic averages over ۲۱۰ trials. Fractions (۳/۸), (۸/۱۶), and (۱۶/۲۵) were produced by clustering DA subfractions while emulating the granular distributions of NAs. The calculation of the DA fractions' water absorption was done based on the individual measurements obtained earlier. In the end, ۲۱ average values were emerged. The maximum diameter of each DA (DADmax) was related to that of the NA of its parent concrete (NADmax), making it easier to distinguish between the most and least absorbent DAs. The ratios of ۰.۸ for the DA sub-fractions and ۱ for the reconstituted DA fractions corresponded to DAs with the lowest water absorption capacity. For the DA sub-fractions, the minimum values are ۱۲% to ۸۲% below the average values and ۲۸% to ۸۹% below the maximum values. Similarly, DA fractions reconstituted from DA sub-fractions of the same PC showed a decrease in minimum values of ۲۱% to ۴۳% compared to average values and ۳۱% to ۵۸% compared to maximum values. Selecting the least absorbent DA sub-fractions without taking the PC into account resulted in a further reduction of ۴% to ۷% compared with the minimum values. The DADmax/NADmax ratio can therefore be used as a production and selection criterion for demolition aggregates.

کلمات کلیدی:

Demolition aggregates, Natural aggregates, Quality indicator, DADmax/NADmax ratio, Water absorption capacity

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