

عنوان مقاله:

Evaluating the Impact of Material Selections, Mixing Techniques, and On-site Practices on Performance of Concrete Mixtures

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نویسندگان:

Fadoua Hattani

Bruce Menu

Driss Allaoui

Mustapha Mouflih

Hassan Zanzoun

Hassan Hannache

Bouchaib Manoun

خلاصه مقاله:

This paper aims to evaluate the influence of sand quality, water-to-cement ratio, binder properties, mix design methods, and mixing techniques on the fresh and hardened properties of concrete. The physicochemical characteristics of coarse aggregates, sands, and binders were analyzed. The experimental results show that the binders and coarse aggregates met standard specifications. However, none of the sands meet construction standards. Corrections were necessary for the dune sands to meet construction standards in terms of grain size distribution and fineness modulus. The results also show that the concretes formulated using the Dreux-Gorisse method exhibited higher quality than the locally formulated concretes. Furthermore, it was found that hand mixing resulted in inadequate mixing, material wastage, lower strength, and increased porosity, whereas machine mixing produced concretes with a more homogeneous microstructure, uniform particle distribution, lower porosity, and higher strength. The batch variability and compressive strength of the hand-mixed concretes were also found to be influenced by the expertise level of the batch mixer and the number of successive hand batches. It was also found that both the soluble silica and the inert methods are reliable for determining binder content in machine-mixed concrete. However, the soluble silica method occasionally exhibited significant variations in hand-mixed concrete compared to the inert method. A combined approach utilizing the average of both methods enhances the overall reliability of the binder content values. Observations on construction sites revealed widespread deviations from recommended guidelines. Issues such as lack of material inspection, proper stockpiling, ingredient contamination, and inadequate batch mixing contributed to variations in concrete workability, porosity, and compressive strength. Doi: 10.28991/CEJ-2024-01002-016 Full Text: PDF

کلمات کلیدی:

.Sand Quality; Dreux-Gorisse Method; Corrected Sand; Hand Mixing; Machine Mixing; Construction Site

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