

8. Application of High-Durability Low-Shrinkage Concrete for Slab Base Material

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In a project for disassembling and rebuilding the East Pagoda of Yakushiji Temple, a historical structure in Japan, it was decided to construct a new concrete slab base. The design specifications required that the design service life of the concrete to be used for the slab base is 500 years and its drying shrinkage strain is not greater than 300×10^{-6} . To determine a mix proportion for high-durability low-shrinkage concrete that meets those specifications, a series of mix proportion experiments parameterizing the shrinkage-reducing admixture content, expansive admixture content and their combinations was conducted. As a result, it was confirmed that concrete that satisfies the drying shrinkage strain of not greater than 300×10^{-6} and the design service life of 500 years at a water-cement ratio of 42 percent can be obtained if crushed limestone is used as coarse aggregate and both a shrinkage-reducing admixture and an expansive admixture are used or if a shrinkage-reducing admixture is added in a quantity corresponding to 6 percent of the mass of the cement used. On the basis of the experiment results, high-durability low-shrinkage concrete having a shrinkage reducer content of 3 percent and containing 20 kg/m^3 of expansive admixture was applied for slab base material.

Key words: high durability, low shrinkage, concrete, expansive admixture, shrinkage-reducing admixture