10. A Study on Environmentally Conscious High-strength Concrete - Tests of Fly-ash High-strength Concrete Using a Mixer at Concrete Mixing Plant -

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High-strength concrete aimed at reducing environmental burden was developed by controlling the use of Portland cement with high CO_2 emission in the production phase. The concrete with CO_2 emissions reduced by 20 to 30% was manufactured by replacing 20 to 30% of ordinary Portland cement with fly-ash using an actual mixer at concrete mixing plant. Tests were conducted in terms of freshness and compressive strength. Replacement with fly-ash resulted in excellent workability even at a low water-binder ratio in 80-N/mm^2 class concrete. The concrete could be kneaded and placed in simulated columns. Mixing fly-ash increased compressive strength. As a result of strength tests for a core sampled from the simulated column, a structural strength of 100 N/mm^2 was obtained. Based on the test results, concrete mix proportions were designed for concrete with a design strength of 80 N/mm^2 with CO_2 emission reduction by 20 to 30%.

Key words: Environmentally conscious, high-strength concrete, fly-ash, tests using a mixer at concrete mixing plant