8. Environmentally Considerate Concrete Incorporating Ground Granulated Blast-furnace Slag

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Demand is growing for concrete that generates lower CO_2 emissions and lower environmental load. In efforts to develop an environmentally considerate concrete incorporating ground granulated blast furnace slag, both laboratory and batch plant tests with the concrete thus developed were conducted. We performed laboratory testing to obtain the effect on concrete quality of the usage rate of ground granulated blast-furnace slag. We also performed batching plant tests to confirm changes over time in the properties of fresh concrete and structural strength characteristics.

The resulting mix design and construction manual for this concrete featured ground granulated blast-furnace slag proportions ranging from 10 to 70% relative to the mass of portland cement. We then cast 272 m^3 of concrete consisting of 70% ground granulated blast-furnace slag and featuring 30 N/mm^2 quality strength to form the foundations of an actual structure to demonstrate its applicability. This case resulted in 61% reductions in CO_2 emissions compared to concrete using ordinary portland cement.

Key words: ground granulated blast-furnace slag, environmentally considerate concrete, on-site application