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INCREASE OF AIR CONTENT OF CONCRETE AFTER MIXING

F. Al-Neshawy ⁽¹⁾, **J. Punkki** ⁽²⁾

(1) D.Sc., Staff Scientist. Department of Civil Engineering, Aalto University, PO Box 12100, FI-00076 AALTO, FINLAND

(2) D.Sc., Professor of Practice. Department of Civil Engineering, Aalto University, PO Box 12100, FI-00076 AALTO, FINLAND

Abstract

Lately, elevated air contents up to 15% have been observed in fresh air-entrained concrete in Finland. To investigate the air content elevation, Robust Air project was established at Aalto University Department of Civil Engineering to secure the stability of the protective pore system.

The main part of the research was made in the laboratory tests which were divided into two parts. In the first part, the concrete properties were altered and the same admixtures were used. In the second part, the concrete properties were kept constant and the admixtures were altered. The main interest of the laboratory tests was to analyse the air content of concrete as function of time. The measurements were carried out immediately after mixing, 30, 60 and 75 min after mixing.

In addition to the laboratory tests, factory tests the Finnish concrete industry made tests in which the air content of concrete was measured after normal mixing time but also after 6 min mixing time.

Based on the experiments, it was observed that the mixing process of the air-entrained concrete is not necessarily effective enough. It is possible that only part of the entrained air is formed during the mixing process and there is a risk for elevated air content when the concrete is mixing in the concrete truck. The phenomenon was explained by Air content potential. Each concrete has an Air content potential (maximum air content) which depends on the admixture combination, concrete composition and the consistency of concrete.

Recommendations are given to minimize the risk for elevated air contents. The recommendations include development actions related to admixtures, concrete mixers, quality control systems and to requirements of frost resistance concrete. The concrete producers need to take the phenomenon better into account in the concrete manufacturing process.

Keywords: Air-entraining, superplasticizer, air content, increase of air content, mixing time.