# Carbonation of filler typed self-compacting concrete and its impact on the microstructure by utilization of 100% CO2 accelerating techniques

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Via the use of accelerated carbonation techniques with 100% CO2 concentration, an experimental programme was performed to investigate the carbonation and associated microstructural changes of three different self-compacting concrete (SCC) in which some of the cement had been replaced by limestone powder, fly ash and/or silica fume. Accelerated carbonation tests were conducted on these ‘‘filler-typed’’ SCCs after 28 days water curing. Approximately 33% of the total binder (450 kg/m3) was replaced by limestone powder, fly ash or a fly ash–silica fume blend. The results revealed that the replacement of limestone powder (LP) increased the depth of carbonation during the accelerated test relative to the effect of the fly ash (FA) or the combination of the fly ash and the silica fume (FA + SF) replacements. However, the modelling of the normal pressure accelerated carbonation tests with 100% CO2 showed all the SCCs studied have no risk of carbonation induced corrosion in the natural environment. Overall, the research suggests that carbonation of filler typed SCC may not be chemically controlled, rather, the internal pore structure may play an important role. Furthermore, the effect of carbonation on the internal pore structure and the chemistry of the concrete matrices were more noticeable in SCC containing FA + SF than in those with LP and FA replacements.