Concrete moves...

OSLO
June 7 - June 8 2018

Concrete contribution to
a changing world

ERMCO
EUROPEAN READY MIXED CONCRETE ORGANIZATION

ADMIXTURES, ESSENTIAL INGREDIENTS OF 21ST CENTURY

The Sustainability and Rheology of Control Flow Concrete

Nihal Kinnersley

EFCA; European Federation of Concrete Admixtures Associations, Environmental Chair
GCP Applied Technologies; Product Stewardship Manager EMEA

Abstract

Cementitious materials are the world's most widespread manmade material, bringing opportunity to the industry to contribute to a greener future. Concrete admixtures are part of that opportunity, enabling, for example, the use of Control Flow Concrete. Control Flow Concrete has a much lower yield stress than Conventional Concrete, but a higher yield stress than Self Consolidating Concrete. The flowability reduces the amount of energy needed to pump and place the concrete, providing an environmental benefit. Control Flow Concrete uses mix designs similar to Conventional Concrete, with larger aggregates and a lower cement factor. The lower cement loading reduces the CO_2 footprint compared to other easy-to-place concretes such as self-consolidating concrete. (Table 1)

Type of Concrete	Cement factor (kg cement/m^3)	CO_2 footprint (kg CO_2/m^3)
Conventional concrete (180 mm slump)	362	300
Control Flow Concrete (460-560 mm slump-flow)	362	300
Self-Consolidating Concrete (> 640 mm slump-flow)	512	424

Table 1: CO_2 footprint of cement used in three types of concrete

In this paper, we will discuss the rheological properties of Control Flow Concrete, and demonstrate how a more efficient mix design including Control Flow Concrete can decrease amount of CO2 production by 27% compared to conventional concrete and self-consolidating concrete.

Keywords: cementitious materials, concrete admixtures, Control Flow Concrete, yield stress, flowability, reduction in energy consumption, CO_2 footprint reduction, environmental benefit, easy to place concrete, self-consolidating concrete.