Influence of Curing on Physico-mechanical Properties of High Performance Concrete

Jiri Brozovsky
Associate Professor,
Brno University of Technology
Brno, Czech Republic
brozovsky.j@vutbr.cz

Jiri Brozovsky, born 1954, received his Assoc. Professor ship from Brno University of Technology, Czech Republic.

Jiri Zach
Civil Engineer, Doctor
Brno University of Technology
Brno, Czech Republic
zach.j@fce.vutbr.cz

Jiri Zach, born 1977, received his civil engineering and Ph.D. degree from the Brno University of Technology, Czech Republic

Summary

The use of high performance concrete requires also obtaining knowledge about factors influencing physico-mechanical properties of concrete. The paper describes knowledge on selected factors of different types of curing influencing physico-mechanical properties of concrete, these are namely compressive strength, density of hardened concrete and modulus of elasticity obtained by ultrasonic impulse method. Influence of curing was monitored on industrially produced concrete class C80/95. Samples of concrete were placed in 3 different curing environment – standardized curing ($\varphi \geq 95\%$, $t=20\pm2^0C$), laboratory environment ($\varphi=30\text{-}35\%$, $t=20\text{-}25^0C$) and finally at climatological station in winter season (February till April) It was proofed that there is significant influence on all samples but in different rate.

Keywords: physico-mechanical properties; concrete; curing; high performance concrete; high-rise buildings.

1. Introduction

Concrete curing influences not only on physico-mechanical properties of hardened concrete as proved by means of test samples, but also on its properties after building into structures.

In consequence, curing of test samples impact on concrete tests affecting their reproducibility. On that ground, explicit conditions for test sample curing are defined. As to strength tests, these conditions are described in EN 12390-2 [6] as follows:

- storing in a water bath 20 ± 2 °C
- storing in a room under relative humidity of $\varphi \geq 95$ % and 20 ± 2 °C

Curing of structural concrete belongs to one of important phase of concrete and reinforced concrete structures nevertheless, this is mistaken quite frequently in building practice. It must be considered that proper curing such mistakes affect adversely both finished structure and physico-mechanical properties of hardened concrete.

Concrete in its early stage must be cured and protected, mainly because of:

- minimization of plastic shrinkage
- achieving of sufficient surface strength
- achieving of sufficient durability
- protection against frost
- prevention from harmful quakes, strokes, or damages

See P ENV 13670-1, Par. 8.5, and Annex E [5] for procedures as to concrete curing.

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