

Assessment of the aftertreatment quality of concrete

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Abstract

The curing of concrete is extremely important for the durability of a reinforced concrete structure. In practice, due to the complex construction processes, the very limited phases and the lack of control, aftertreatment is often neglected by executing companies. Hence infrastructure operators are therefore very interested in having a robust, simple tool that enables aftertreatment to be easily checked and, as a result, to convey the importance of this process step to the client. In the project presented here, classic and novel test methods are presented and discussed, as well as their suitability for the detection of the aftertreatment quality on laboratory samples and subsequently on some real structures.

Keywords: quality assessment; concrete; aftertreatment; non-destructive testing; probability-based assessment.

1 Introduction

The curing of concrete greatly effects on the quality and durability of concrete structures. To achieve a durable structure and to avoid surface cracks, concrete must be treated and protected. An optimal aftertreatment relies on the processes which take place during the hydration of concrete after its pouring and compaction. Insufficient moisture can stop the hydration process and can create capillary pores near the surface on the surfaces that are exposed to air, which is very detrimental for diffusion and consequently corrosion processes. In particular, the structure in the peripheral zone remains porous. This leads among other things to lower strength, to reduced weather and chemical resistance, and to the

formation of early shrinkage cracks. [1] In order to avoid these detrimental consequences, the young concrete aftertreatment aims to protect it from

- premature drying of the surface,
- strong temperature fluctuations and
- strong cooling or heating.

Extreme weather conditions, such as strong sunlight and wind, intensify the drying effect. [2]

The aim of the aftertreatment is a dense structure and a concrete surface with few cracks, therefore, according to the Austrian standard ÖNORM B4710-1 [3], the concrete must be protected against damaging influences of all kinds until it has hardened sufficiently. The aftertreatment can take place, for example, by keeping the concrete moist,