
Development of the New Wet Curing Method for Effects of Improving Durability of Concrete and Its Application for Tunnel Lining Concrete

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Concrete lining is at times adopted as part of the support members for mountain tunnels. In the case of concrete lining for road tunnels in particular, concrete lining with a 30cm width is applied at a standard rate of 10.5m per two days, due to the characteristics of construction work. Because of this the curing time available for the concrete lining is between 15 to 20 hours, which makes securing a favorable quality difficult.

A moisture curing system intended for concrete lining is developed in order to increase the quality with as short a curing period as possible. In this system, air is evacuated from the gap between the curing sheet and the concrete surface to create a close contact, and by supplying water to the space between the contacting surfaces, a water film is formed over the concrete surface. This enables the wet curing of vertical concrete surfaces and interior surfaces of tunnel linings after the formwork has been removed, a process that has to date been difficult.

In this study, the effects of AC (AQUA CURTAIN) wet curing on improving concrete durability were ascertained. The findings from this study are described below.

Compared to sheathing curing, wet curing improved freeze-thaw resistance and carbonation resistance, as well as the durability of the concrete.

By applying wet curing, which provides adequate moisture, the concrete becomes denser and the pore structure becomes the same as that obtained with water curing.

It was found that the AC system can be applied to, and wet curing correctly conducted, even to sections on which it is generally difficult to conduct wet curing, such as vertical walls and arch structures, and that when applied, it exhibits superior practicality.

On the basis of the abovementioned findings, we can state that a dense concrete surface can be achieved and long-term durability can be improved by removing the formwork immediately after a strength sufficient to allow the removal of the formwork has been ensured, and by then conducting AC curing.

[出典] 古川幸則: コンクリートの品質向上のための新しい浸水養生工法の開発とトンネル覆工への適用, 九州大学大学院学位論文, 2013. 7