

# **The Effect of Water to Cement (W/C) Ratio on Workability of Internal Curing Concrete in the Development of High Strength Concrete with Required Workability and Cement Content (ICBP)**

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## **Abstract**

The escalating demand for highways and other related structure development of any country may lead to the introduction of fast and sustainable construction techniques and materials. Internal curing is an emerging technology in the cement concrete industry, and will outperform in the road construction industry than conventional curing methods, due to it being convenient to use under harsh environmental conditions.

Generally, after the placement of concrete pavements, concrete is subjected to evaporation and hydration, which causes a significant loss of moisture. That will reduce the relative humidity of concrete and increase the internal stresses. This may form micro cracks throughout the concrete, subsequently, cementitious particles may not hydrate properly. As a result of that, the durability and strength of concrete will reduce significantly. Normally, external curing methods such as immersion, ponding, fogging and wet covering are used to provide excess water, to avoid the aforementioned problems. However, those external curing methods will be effective only up to a certain thickness from the concrete surface while internal curing provides water throughout concrete using prewetted aggregates. The water will distribute uniformly throughout the concrete and reduce the humidity drop and hydrate the cement paste. The main problem in internal curing concrete is that the water added through the aggregates will affect the water cement ratio and reduce the compressive strength.

This study was conducted to investigate the effect of the water cement ratio of internal curing concrete on compressive strength and workability. Concrete is cured internally by providing the required amount of water using pre wetted aggregates. These pre wetted aggregate will spread all over the concrete and help to cure the cementitious matters uniformly. Here, pre wetted burnt clay chips (internal curing concrete aggregates) are used as water reservoirs which will provide water for cement hydration. Thus, additional water added through the fine aggregates will increase the expected workability. Results are obtained by adjusting the water content and then workability, and compressive strength values are compared. Results showed that water/cement ratio reduces, and compressive strength increases with ICCA for all grades of concrete, tested in the study.

**Key Words:** (ICCA) internal curing concrete aggregates

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