

# **The Durability Test of Normal and HVFA Concrete Against Chloride and Carbonation Exposure**

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## **ABSTRACT**

Among the many construction materials that are often used, concrete is one of the sufficient materials (even very many) chosen as the main choice in these construction activities. Based on records from the International Energy Agency, the need for cement used for construction activities has increased significantly. This data shows that construction activities involving concrete as the main material for construction are still high. This study aims to obtain the characteristics of concrete with the addition of fly ash as an alternative material to replace cement that is environmentally friendly.

This research is an experimental study with a number of accompanying variables. The free variable in this study was the level of fly ash used. Variables bound to this study include strong insistence, tensile strength, modulus of rupture, sorptivity and chloride penetration. The control variables in this study include cement water factors, condition and type of aggregate, cement type, age of the test object. The data analysis used refers to the applicable ASTM standards.

The results showed that concrete exposed to chloride and carbonation had the ability to withstand such exposure in low levels. This can be seen from the strong values of urgency, sorptivity, split tensile strength, and bending strength. Then, concrete with a high volume fly ash exposed to chloride and carbonation has the ability to withstand such exposure in a better level when compared to normal concrete. This can be seen from the value of chloride intrusion potential into concrete which is relatively lower when compared to normal concrete. However, this must be compensated by a decrease in the strength of urgency, sorptivity, tensile strength and bending strength which will decrease in proportion to the increase in the level of fly ash used in concrete. The durability properties of normal concrete without the addition of fly ash have a potential tendency for chloride intrusion into concrete to be greater. This is indicated by a relatively larger value of chloride intrusion potential when compared to concrete with the addition of fly ash. It is necessary to conduct a study on the comparison between low-quality concrete and higher quality concrete in relation to environmental influences, what levels of chlorine (Cl<sup>-</sup>) are contained in the concrete after testing, and the optimum value of fly ash that can be used for the intended purpose.

Kata Kunci: *concrete, HVFA, durability*