

# Performance of Carbon Fibre Reinforced Polymer Plate Bonding System Under Various Environmental Conditions

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## Abstract

The use of Carbon Fiber Reinforced Polymer (CFRP) as strengthening material for reinforced concrete and steel has been a focused of many researched around the world. Superior properties of the CFRP plate including lightweight, high tensile strength, and corrosion resistance make it a favorable material in strengthening of existing structures. The CFRP strengthening technique has been known to enhance the structural performance of the strengthened member. However, one of the main drawbacks is the long-term durability of the CFRP bonding system against various environmental conditions. This study evaluates the durability performance of the CFRP plate bonding system exposed to different environments. Experimental work was conducted in which the CFRP plate, adhesive coupons, and CFRP double lap shear samples were prepared and subjected to either continuous or wet-dry cycles in different exposures including plain water, salt water, acidic solution, and outdoor. The exposed samples were tested at different ages. The study found that the CFRP plate was quite durable and the change on the properties was negligible. However, the results indicated that exposure to different environments had affected the adhesive strength properties significantly with exposure to salt water was found to have the most degradation effect on the adhesive.

**Keywords:** CFRP, strengthening, durability, bonding system, environmental conditions