

**Effect of environmental conditions on performance of adhesive joints
for infrastructure applications**

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Abstract:

This paper presents results from studies on adhesive bonded joints on static and fatigue behavior under different environmental conditions. Adhesively bonded joints composed of FRP composite laminates are currently used on the composite construction. However, there is lack of research on the performance of such joints under environmental conditions such as temperature and moisture. In the current study, most common adhesives for infrastructure application (Pliogrip Polyurethane 7770, Pliogrip Epoxy 5760B from Ashland Chemicals and Magnabond Epoxy A/B from Magnolia Plastic) are chosen for investigation of joint. Joints were tested on a four point bending test until failure (opening of first crack) at quasi-static and fatigue loading conditions. From the results obtained moisture and temperature both have a direct effect on joints showing degradation in stiffness and failure load. However temperature has more effect than moisture showing an average stiffness reduction of 48% and failure load reduction of 67% compare with a stiffness reduction of 20% and failure load reduction of 21% due to moisture absorption. However stiffness degradation is believed to be mostly caused by the loss of stiffness of composite laminate itself and the reduction of failure load is due to degradation of the adhesive system. Fatigue tests are currently in progress.