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Bonding Strength of Adhesive Scarf Joints Improved by Nano-Silica Subjected to Humidity

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Abstract : In this study, the effects of the modified adhesive including different concentrations of Nano-silica are surveyed on the bonding strength of the adhesive scarf joints. The nanoparticles are added in two different concentrations, to an epoxy-based two-component structural adhesive, Araldite 2011, to survey the influences of the nanoparticle weight percentage on the failure load of the joints compared to that of the joints manufactured by the neat adhesive. The effects of being exposure to a moist ambience on the joint strength are also investigated for the joints produced of both neat and modified adhesives. For this purpose, an ageing process was carried out on the joints of both neat and improved kinds with variable immersion periods (20, 40 and 60 days). All the specimens were tested under a quasi-static tensile loading of 2 mm/min speed so as to find the quantities of the failure loads. Outcomes indicate that the failure loads of the joints with modified adhesives are measurably higher than that of the joint with neat adhesive, even while being put for a while under a moist condition. Another result points out that humidity lessens the bonding strength of all the joints of both types as the exposure time increases, which can be attributed to the change in the failure mode.

Keywords : bonding strength, humidity, nano-silica, scarf joint
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