

## Effect of SSA and Borax Micro-Particles on the Flexural Strength of GFRP Adhesive Bonding Joints

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### **Abstract:**

In the present work, the inclusion influence of micro-scale particles of sewage sludge ash (SSA) and borax was experimentally studied on the flexural strength of single-lap joints (SLJs). SSA and borax fillers were utilized as additive reinforcements to the epoxy-based adhesive layer by different weight contents (5, 10, 15, 20, 25% wt.). Substrates of glass fiber reinforced polymer (GFRP) were used to produce the test samples. Ten layers of glass woven fabric were used to produce the GFRP laminates. SLJ samples were exposed to three-point bending loading to assess the flexural strength of the joints. The findings showed that SSA and borax fillers have a significant influence on the flexural strength of SLJs. For instance, an increase of 18% was obtained in the flexural strength of SLJs with the addition of SSA. The maximum flexural strength was recorded for SLJs made of epoxy with the inclusion of 15% wt. borax and SSA. More addition of filler content than 15% resulted in decreased flexural strength. Compared to SLJs of pure epoxy, SSA/epoxy and borax/epoxy joints showed higher flexural strength.

### **Keywords:**

Borax, Epoxy, Flexural Strength, GFRP, SLJs, SSA.