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Abstract Form

Field: Material Science/Engineering Materials

Title: Effect of moisture treatment on flexural properties of perlite composite foam and their sandwich structure.

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Abstract: Expanded perlite composite foams and their sandwich structures were investigated for flexural properties before and after moisture treatment. The composite foams were manufactured using expanded perlite particles and sodium silicate solution (water glass) by varying compaction ratio ($c_p = 2.0, 2.5,$ and 3.0) and sodium silicate content ($R_{pbd} = 0.1, 0.2,$ and 0.3). The sandwich structures were fabricated using the manufactured composite foams and brown papers as skin. Two sets (three specimens each) of specimens from composite foam and sandwich were manufactured for each combination of compaction ratio and binder content. Specimens of each combination were tested for flexural properties by three point bending test before and after moisture treatment. Moisture treatment was conducted on conditioned specimens in an incubator at a temperature of 37°C with a relative humidity of 90% for 21 days. Flexural strength of composite core and core shear strength of the manufactured sandwich was found to decrease after the moisture treatment. Crack initiation of the composite core under three point loading, though, was found to appear at the bottom surface of core, and subsequent cracking was found to propagate towards the top surface loading point for composite foam in both before and after moisture treatment. However, cracking in the sandwich structure was found to initiate at mid plane located under the loading point, and subsequent crack was found to propagate towards top and bottom surfaces in both before and after moisture treatment. Crack propagation angle in the sandwich structure appeared to vary dependent on combination of binder content and compaction ratio irrespective of moisture treatment.

Key words: Expanded perlite, Composite, Foam, Sandwich, Moisture treatment, Flexural strength, Shear strength