ERODIBILITY OF EPOXY COMPOSITES WITH HARD FILLERS

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Erodibility of epoxy composites with hard fillers – artificial corundum, porcelain powder and sodium glass powder – was experimentally investigated. The erosion rate as a function of the epoxy matrix characteristics, depending on the type and content of the hardener and thermoplastic modifiers, filler particle sizes and content, was examined.

The fillers with particle size from 10 to 200 μm at a content up to 40 vol.% were used. The polyethylenepolyamine hardener content was varied from 10 to 20 weight parts on 100 weight parts of resin. Thermoplastic modifiers – polycarbonate (PC), acrylonitrylebutadiene-styrene copolymer (ABS), and styrene-acrylonitryle blockpolymer (SAN) – up to 10 weight parts on 100 weight parts of resin were used. The drum-type installation tests were conducted for 30 hours using granules in the form of a straight cone with the diameter of the basis and height of 18 mm. Erodibility of the specimen surface was tested by the weight method, which is appropriate for measuring small erosion levels – several μm in thickness.

It was found that the erosion rate is a power function of the filler content. For all the values of the filler content, independently on the filler nature, an identical linear relation between the erosion rate and the size of filler particles was observed – increasing the particle size the erosion rate decreased. Thermoplastic modifiers ABS and SAN in the epoxy matrix decreased the erodibility by 30-50%. In accordance with the erodibility values, as well as the values of the impact strength, the composites can be arranged in the following line: PC, epoxy without modifiers, ABS, and SAN.

The erodibility as a function of the filler content and particle size was analysed using a simple geometric model of the composite structure.