CURING THE FURANO-EPOXY REACTIONABLE OLYOGOMERS IN HIGH-ENERGY FIELDS

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Furano-epoxy composites, characterized by high resistance to thermal factors of operation, resistance to the action of physically and chemically aggressive media, strength, adhesion to the surface of metal, concrete and other materials, have found application in various industries. Furano-epoxy reactive oligomers (PCO) are products of thermomechanical combination of a furfural-acetone monomer (FAM) and epoxy oligomers (ED-16, ED-20, ED-22). Compositions based on PCO have a low coefficient of thermal conductivity and the use of external heat sources for their heating does not always satisfy the requirements of manufacturability, product quality, and productivity.

Heating the composition from an external source is slow. An inhomogeneous temperature field is created along the cross-section of the material, leading to different rates of reactions in the structuring of the RSO and the formation of local stress zones, leading to anisotropy of the properties, the appearance of internal stresses, structural defects (pores, channels, cracks, vacuoles) and worsening the properties of composites. Drawbacks can be eliminated when structuring the RSO in high-energy fields (currents of high frequency - HDTV).

Heating is carried out by polarization in the dielectric of "bound" charges. In the presence of an electric field, charged particles tend to orient in the direction of the field. The energy of the electric field is converted into potential energy in the material. If the high-energy field is removed, the charged particles return to their "neutral" position and because of the presence of the "intermolecular" friction composition between the particles of the ingredients, the potential energy is converted into thermal energy. If the dielectric is placed in an alternating electric field, then each field change within the material will result in the generation of some heat. It was experimentally established that maximum structuring was achieved at $2 \cdot 105$ V / m, the temperature was 50 – 60 °C, and the curing time was 3 – 5 min. Sol-gel analysis showed that the degree of structuring of the PCO hardened by the traditional method was 80 – 86 %, and in the HDF field it was 95 – 99 %.

Analysis of the strength parameters of fracture and other characteristics structured by the thermal path and in the high-frequency field showed that the properties were higher when structuring in high-energy fields.