

Summary

This doctoral dissertation addresses the modification of epoxy floors with mineral additives derived from the extraction and processing of granitic rocks, as well as the assessment of their influence on the properties of epoxy resins used in flooring applications. The subject of the study aligns with current research trends focused on reducing the consumption of epoxy resins and on the utilization of fine-grained mineral waste in construction. The scientific objective of the dissertation was a comprehensive experimental evaluation of the effect of granite additives on the properties of liquid and cured epoxy resins, while the application-oriented objective was the development of material compositions enabling partial replacement of the resin with mineral additives while maintaining the properties required for epoxy floors, along with verification of their applicability in construction practice. The scope of the research included the determination of the properties of liquid epoxy resins, including density, kinematic and dynamic viscosity, and contact angle, as well as investigations of cured epoxy resins and epoxy floors with respect to density, compressive, flexural and tensile strength, hardness, impact resistance, and pull-off strength. The experimental programme was complemented by numerical analysis of uniaxial tensile behaviour and by an assessment of the influence of concrete substrate surface preparation and morphology on the pull-off strength of epoxy floors. The results demonstrated that fine-grained mineral additives significantly modify the physical, rheological and mechanical properties of epoxy resins, with the nature of the observed changes depending on the type and content of the additive. It was shown that the consumption of epoxy resin can be reduced without loss of the functional performance of the epoxy floor, and that the observed decrease in selected strength parameters does not constitute a significant limitation under service conditions. The conducted economic and toxicological analyses, together with the implementation of the developed solutions under real operating conditions, confirmed the practical potential of the proposed material compositions and the validity of using waste granite additives in epoxy floors.

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