

Integrated ecological assessment of construction products with contact to soil and groundwater

Abstract

Due to increasing regulations for construction products in the environmental field, both nationally and European, this project aims to contribute to a faster classification of the environmental effects of construction products in contact with water and soil. In this project, two different construction products, a silicate injection resin and a reactive sealing, were selected and examined for further ecological evaluation. Sealing materials are used to seal buildings and prevent water from entering. The investigated injection material is used to stabilize substrates and karstic rock areas. Due to the areas of application of the materials, the selected construction products usually come into contact with water and soil. Currently, in particular regulations, aquatic ecotoxicological tests are carried out to assess the effects of building materials, since the aquatic ecological impact tests have shown that they are sometimes more stringent and often easier to carry out than terrestrial tests. However, it can make sense to take the interactions occurring in the soil environment into account in evaluations. Due to the potential release of components from the construction products into the environment, DIN CEN / TS 16637-2 was used in this project to obtain the eluates and those were used to carry out ecotoxicological tests. The selected construction products were also used directly to carry out further ecotoxicological tests. In order to provoke visible effects from the materials and to compare test scenarios, eluates were also used, the concentrations of which are significantly higher than can be expected if they are used properly in practice. Some of the ecotoxicological tests performed include reproductive and survival tests using species from the aquatic and terrestrial environment. In addition, this project considers the ecotoxicological results that express the immune response of the organism at the gene level, i.e. the oxidative stress. Within the scope of the study, current evaluation systems were examined regarding the consideration of ecotoxicological parameters. In order to show the environmental impacts from the production phase, the aquatic and terrestrial results were supplemented by an ecological balance analysis of the selected construction products and relationships between the method of the ecological balance and ecotoxicological assessment approaches were analyzed.