

Validation of the laboratory trial in accordance with DIN CEN/TS 16637-2 on the release of radicide substances from bitumen roofing membranes

Final report on the DIBt research project

P 52-5- 20.96-2015/17

Summary

Esters of 2-(4-chloro-2-methylphenoxy)-propionic acid ("Mecoprop", MCP) are used in polymer bitumen sealing membranes utilised, for example, for roof sealing purposes in green roofs. When the mecoprop esters come into contact with water, they are washed out of the bitumen layer, and mecoprop is released from the esters by hydrolysis. Through the radicide effect of mecoprop, polymer bitumen membranes on green roofs are protected from root penetration. However, only the (R)-(+)-enantiomer "mecoprop-P", which is mainly present in modern recipes for protection against root penetration, is effective. As the rain water drains off, mecoprop can be released into the environment. The release of mecoprop from construction products into the environment should be taken into account by the construction supervision authorities.

The release of mecoprop from bitumen roofing membranes has already been examined in the research projects P 52-5- 20.88-1497/15 and P 52-5- 20.88.2-1999/16. Among other things, the laboratory test in accordance with DIN CEN/TS 16637-2 ("Horizontal dynamic surface leaching test") was applied. The results of this laboratory procedure should be taken into account in future as input data for the regulatory assessment of the environmental characteristics of products which contain mecoprop esters. For this reason, the robustness of the long-term immersion experiment, which has already been proven for other construction products, was to be tested in two polymer bitumen sealing membranes. Roofing membrane 1 contained mecoprop-P-n-octyl ester and roofing membrane 2 mecoprop-P-2-ethylhexyl ester. 12 cm x 12 cm test pieces of the roofing membrane, which were melted onto glass plates with a heat gun, were used as test samples. For the robustness test, test sample size, test sample design, temperature, humidity and the preservatives for the eluates were kept constant. Only the volume/surface ratios (20 L/m², 25 L/m² and 30 L/m²) were varied. All tests were carried out as double determinations.

For roofing membrane 1, with volume/surface ratios of 20 L/m², 25 L/m² and 30 L/m², cumulative discharges of 9.8 mg/m², 9.8 mg/m² and 8.9 mg/m² were measured; for roofing membrane 2, the cumulative release was 6.3 mg/m², 6.2 mg/m² and 6.2 mg/m². Thus, in roofing membrane 1 with P-n-octyl ester, with the same concentration of 0.3% radicide product in relation to the bitumen proportion of the sealing membranes, higher mecoprop concentrations were measured in the eluates than in roofing membrane 2 with P-2-ethylhexyl ester. In future, the results from the laboratory test in accordance with DIN CEN/TS 16637-2 are to be used as input data for a mathematical model for modelling the environmental impacts of mecoprop. In order to obtain a robust procedure, a detailed regulation for all work steps of the surface leaching test is essential, as this is the only way the reproducibility as well as the best possible comparability of results between laboratories can be achieved.