

Abstract of the construction research project P52-5-4.199-1488 / 16:

Used tires as a fire hazard in waste treatment plants

Occasion

The burning behavior of used tires differs significantly from that of other plastics-containing wastes. In addition to a very high calorific value and the resulting high area-related fire load, fires of (used) tires are characterized by a strong heat radiation, large flame lengths and a very strong smoke development. In addition, the water-repellent properties make Fire fighting with water considerably more difficult. In addition, no specific regulation exists in Germany for the storage of used tires. In many cases, the Plastics Storage Guideline (KLR) is used as an orientation.

Aim

Within the scope of the research project, basic characteristics of the combustion of used tires should be determined, which can be used as a basis for fire protection recommendations in order to contribute to the improvement of the fire protection during the storage of used tires.

Work plan and implementation

In addition to an initial literature review, methodological investigations were carried out, in particular laboratory tests for the erosion behavior and the efficacy of extinguishing agents, as well as numerical simulations for the assessment of the spread of fire on the basis of CFD calculation models. Further work has been done to develop recommendations for the storage of used tires, of which some are mentioned below.

Results

Fire behavior: The fire behavior of tires is characterized by the fact that, after ignition, they reach a comparatively high heat release rate and thus also a high temperature within a few minutes. In the laboratory experiments carried out, it was found that, inter alia, the tread and the side walls of the tires show a clearly different fire behavior.

Fire spread: Using fire simulations based on experimentally determined values, it could be shown that a distance of 10 m between different tire stacks makes fire spread very unlikely or nearly impossible even over long periods.

Fire fighting: In general, fire fighting foam is required for the fire-fighting of tire fires, which has a sufficiently good extinguishing effect on the basis of fluorine-free multi-range foaming agents (MBS) or class A foaming agents. Fire fighting alone with water as an extinguishing agent appears rather unsuitable because of the numerous cavities during tire storage and the poor wettability of the tire rubber. The high heat release rate as well as the pollutants released during combustion require, on the one hand, a fire-water supply well above the basic protection. On the other hand, considerations and measures for the retention of fire water are always necessary.

Scope of the KLR: The material requirements of the KLR can be confirmed by laboratory tests and fire simulations even when applied to tire racks. It would be wise to adapt the KLR from the scope of its application to the current terminology in order to provide more clarity and certainty in the choice of the KLR as a relevant benchmark.