

Issue 2021/3

Investigation into the structural safety of open parking garages in steel and composite construction under fire exposure from electric vehicles and fuel-powered vehicles AiF No.: 20453N

Summary of the research project AiF No.: 20453N

One of the measures required to combat climate change is to switch from vehicles with combustion engines to vehicles with electric motors (e-vehicles). As a result, you can see a continuous increase the number of electric vehicles can be observed in Germany. In this context, the question arises as to whether and how this development affects fire risks in open, above-ground parking garages. This research project will address this question. The focus was on how the different fire scenarios of electric vehicles compared to vehicles with combustion engines affect the load-bearing behavior and fire risk of steel and steel composite structures in open, above-ground parking garages. This research project determines a methodi-

cal approach for assessing fire risk based on a reliability analysis for the supporting structures of open, above-ground parking garages. The fire risk assessment is based on the heat release rates of vehicles with different drive technologies. Using a reliability analysis, the procedure for assessing the fire risk is presented using exemplary fire scenarios (see Figure 1) for a steel composite girder. As a result of the fire risk analysis, it can be concluded that fire scenarios involving electric vehicles do not pose any higher risks than conventional vehicles with combustion engines and that fire loads from electric vehicles do not reduce the safety level of open, above-ground parking garages.

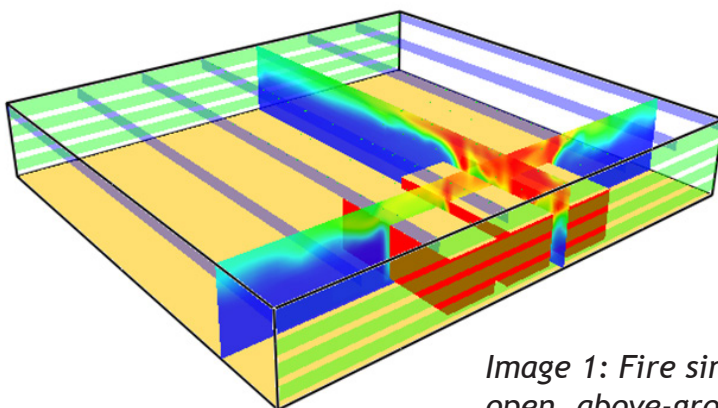


Image 1: Fire simulation to assess the fire risk in an open, above-ground parking garage.

The ICR project “Investigation into the structural safety of open parking garages in steel and composite construction under the effects of fire from electric vehicles and fuel-powered vehicles”, ICR Project No. 20453N, German Committee for Steel Construction e.V. (DAST), Sohnstraße 65, 40237 Düsseldorf, was funded by the Federal Ministry for Economic Affairs and Energy via the AiF within the Program for the Promotion of Collective Industrial Research (ICR) based on a resolution of the German Bundestag. We would like to take this opportunity to thank our sponsors for their support. We would like to thank the members of the project advisory committee for the fruitful discussions in the working group meetings.



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