



## Abstract research project nr. P 52-5-4.203

### Evaluation of new calculation approaches for local fires in the course of the amendment of EN 1991-1-2 Annex C

DIN EN 1991-1-2 currently contains a method that allows the calculation of thermal effects of structural components in local fires. Based on the considerations of Heskestad and Hasemi, the calculation of temperatures and the net heat flux of components under local fire exposure can be calculated. The models were validated by experimental investigations and have proven themselves in application. In the course of the amendment of EN 1991-1-2 Annex C, the mentioned method shall be extended by new analytical approach. The proposal provides for the calculation of net heat flux of components, which are offset to the flame axis of the local fire. The new approaches are based on the considerations of Heskestad and Hasemi and take into account various influencing variables such as flame height, diameter of the local fire and temperatures in the area of the source of the local fire as well as the structural component. The new approach should make it possible to calculate the thermal influences (temperature/net heat flux) for structural components which are not located in the ceiling area or in the vertical axis of the local fire.

In the context of the present research project, the new calculation equations were examined systematically and evaluated regarding the applicability and the given boundary conditions. Based on a selected range of real local fires the calculation results were verified. In addition, fire simulation calculations were carried out with the Fire Dynamic Simulator (FDS) in order to evaluate the applicability of the new analytical approach.

Compared to the real measured data of the considered pool fires as well as simulation results, the calculation results are mainly on the safe side. Due to the changing flow conditions and radiation, the application of the new approach for walls can be partly on the unsafe side.

Based on the comparison, the statement can be made that the proposed approaches in Annex C to EN 1991-1-2 can be recommended without a change in the previous safety level in Germany. However, due to the small number of fire tests available for evaluation for walls under local fire exposure, further investigations are required.