Abstract of the final report to the DIBt research project:

„Updating the database on punching shear failure of reinforced and prestressed concrete slabs with and without punching shear reinforcement supported by columns“

The main factors involved in the design models for punching shear, for instance the concrete compressive and tensile strength, the longitudinal reinforcement ratio, the effective depth, the column geometry and the efficiency of the punching shear reinforcement, are usually gathered statistically. Distinctions between the influences regarding the consideration in the various models are illustrated by evaluating particular testing series. The extension of the testing databases and the systematic evaluation of all available punching shear tests aims at assessing the existing provisions uniformly and at identifying the decisive influencing factors.

In order to execute this task, reports on punching shear tests of flat slabs on inner and edge columns as well as footings, either with or without punching shear reinforcement, were collected within a comprehensive literature research. In this way, the existing testing databases were checked and expanded by new tests and missing data. Thereby, approximately 600 tests of flat slabs without punching shear reinforcement and 330 tests of flat slabs with punching shear reinforcement on inner columns as well as almost 280 tests on footings without punching shear reinforcement and 24 tests on footings with punching shear reinforcement are now available. In order to check the design provision in case of not uniformly distributed shear forces ahead of the control perimeter, an additional database of edge columns on flat slabs without punching shear reinforcement was amplified up to 112 tests. The database of punching shear tests on prestressed plates includes 154 data sets.

By analysing the tests, the factors involved in codes could be assessed. Also, the prediction accuracy and level of safety of the design equations could be compared. Furthermore, the influence of the amount of reinforcement on the maximum punching shear load capacity could be verified by analysing the databases since a large amount of punching shear reinforcement induces an increase of the maximum punching shear load capacity. Additionally, a lower scattering of the results could be shown by evaluating particular testing series rather than the complete data base.