

Research project:

“Improvement of the practical application of construction standards by pre-normative work – project part 6: geotechnics“

Working group AP4: „Harmonisation of the design approaches in EC7-1“

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(Subproject spread foundations)

Aim of the research project

The Eurocode 7-1 (EC7-1) together with the National Annexes and complementary regulations are used for the geotechnical design in the CEN country members. EC7-1 is based on the partial safety concept and allows three different design approaches (DA). These differ where the partial safety factors are applied: on the actions or their effects and on the ground parameters or the resistances. Furthermore, the EC7-1 suggests partial safety factors and calculation models for geotechnical actions (e.g. earth pressure) as well as for ground resistances (e.g. bearing resistance), these are merely recommendations and do not have a normative character. Hence, each CEN country member can choose which design approach shall be used and can also determine the partial safety factors and the calculation models for the geotechnical design.

The aim of the research is to illustrate the differences between the design approaches of EC7-1 as well as the influence on the design of the partial safety factors and calculation models used by each CEN member. As a result of this study a Europe-wide harmonised design approach is to be proposed.

Approach and results

In the framework of this research project comparative calculations have been carried out for selected geotechnical applications. From these applications, retaining structures, pile foundations and different slope stability scenarios have been analysed by other research partners, while comparative calculations and sensitivity analyses for spread foundations (a column footing and a cantilever retaining wall) have been carried out at the Chair of Geotechnical Engineering (GiB). The evaluation of these calculations has shown that the design approach 2 with factorisation of the actions or their effects and the resistances is appropriate and economic for the design of spread foundations. This is based on the prerequisite that the scatter of the input parameters for the determination of the characteristic values shall be estimated in a realistic manner. Moreover, it has been shown that the partial safety factors and calculation models have a major impact on the design and the safety level in comparison with the choice of the design approach.