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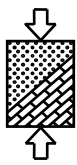
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Abstract

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Research project: „Comparative calculations between DIN 1054 and EC7-1”

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Abstract

DIN EN 1997-1 (German version of Eurocode 7), the German National Annex and the complementary regulations in E DIN 1054-101 implement a new approach to determine the design values taking into account that not all independent actions occur simultaneously with the same probability. This is achieved by reducing the variable actions or their effects by multiplying them with combination factors $\psi_i \leq 1,0$. The current version of DIN 1054:2005-01, which is still used for the geotechnical design, does not consider any combination factors so that higher design values and a design that is safer than one based on the new concept are obtained.

In order to show the influence of the combination factors on the safety level by using the new design concept selected geotechnical examples with various independent variable actions have been chosen. In a first example, a sheet pile quay wall has been designed to resist loads caused by soil self weight, container weight, operating crane, water pressure and bollard pull. In a second example, a foundation of a production hall has been dimensioned to resist loads caused by self weight of the construction, wind, snow and operating cranes.

Within the framework of the research project it was analysed to what extent and in which case the design with the new concept differs from the design with DIN 1054:2005-01. Therefore, the ratios Q_{Tot}/G_{Tot} and Q_A/Q_{Tot} were determined. The first one indicates the ratio of variable to permanent actions, the second one the ratio of accompanying actions to total variable actions. The critical ratios Q_{Tot}/G_{Tot} and Q_A/Q_{Tot} were identified with which considerable differences in the structure's design, i. e. different structural dimensions, were to be expected.

The outcomes of the comparison of the two investigated design concepts are illustrated in diagrams. These show for most of the investigated parameters, i.e. anchoring depth, anchor length and foundation width that the influence of the combination factors on the design results are insignificantly being in single-digit percentage range. Only the influence of the bending moments leads to a variation of the design results of up to 10 %. Although, the influence of the combination factors is not predominant, but in unfavorable situations it can be similar to the safety against material failure ($\gamma_M = 1,1$).