Institute for Geotechnical Engineering
Univ.-Prof. Dr.-Ing. Conrad Boley

Faculty for Civil and Environmental Engineering

Bundeswehr University Munich · D-85577 Neubiberg · Germany

der Bundeswehr
Universität München

Phone +49 89 6004-3401
Fax +49 89 6004-4559
E-Mail conrad.boley@unibw.de
URL www.unibw.de/geotechnik
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„Bearing capacity of helical piles unser static and dynamic loads“

Abstract

Client:

Deutsches Institut für Bautechnik
Postfach 620229
10792 Berlin

Ground screws are prefabricated foundation elements manufactured of steel. They are wound into the ground and derive tensile and compressive forces in the ground. Compared to conventional shallow foundations ground screws are mounted quickly and without excavation. The costs for the site equipment are low, which often results in economic benefits. At the Institute of Soil Mechanics and Foundation of the *"Universität der Bundeswehr München"* basic research for load-bearing and deformation behavior of helical piles under axial load have been performed to evaluate structural engineering usability of ground screws and derive basic requirements for the construction.

With the help of small-scale model tests and using the PIV method fracture mechanisms were visualized in the soil and the relevant influences were identified. The load capacity of compressive load ground screws depends mainly on the diameter and the embedment. Tensile forces lead to another structural behavior. The diameter of the examined embedment depths only a minor influence on the resistance. The embedment itself has a great impact on the maximum pull-out resistance, this increases disproportionately. The use of multiple plates leads to an increase of the achievable bearing capacity. Currently in the literature existing analytical methods of calculation cannot take into account all relevant factors adequately. They lead to inadequate predictions of bearing capacity.

The large-scale experiments have highlighted the results from the small-scale model tests. The structural behavior in nature can barely adequate be predicted with analytical models. Influences such as compaction and loosening of the soil, eg. during installation, cannot be considered with these models. Overall, the situation is similar, as well as in piles or anchors. The currently best way to determine the bearing capacity represents load tests. In order to achieve consistent and comparable results, a possible load test method was developed. Furthermore, the assessment on the basis of past experience, similar to piles, and correlations between torque and bearing capacity is promising. However, with the experience and correlations is a strong influence of the geometry to be expected, so here each of the concrete manufacturers has to develop knowledge.