

DIN EN 14199:2012-01 (E)

Execution of special geotechnical works - Micropiles

Contents		Page
Foreword		4
1	Scope	5
2	Normative references	6
3	Terms and definitions	7
4	Information needed for the execution of the works	11
4.1	General	11
4.2	Special features for micropiles:	11
4.3	List of activities	12
5	Geotechnical investigation	12
5.1	General	12
5.2	Specific requirements	13
6	Materials and products	14
6.1	General	14
6.2	Reinforcement and load bearing elements	14
6.2.1	Steel for reinforcement cage elements	14
6.2.2	Steel for load bearing elements	14
6.2.3	Other materials for reinforcement and load bearing elements	14
6.3	Materials for grout, mortar and concrete	14
6.3.1	Cement	14
6.3.2	Aggregates	15
6.3.3	Water	15
6.3.4	Additions and admixtures	15
6.4	Cement grout	15
6.4.8	Quality control	16
6.5	Mortar and Concrete	16
6.5.1	Mortar and concrete in situ	16
6.5.2	Other concrete	17
6.6	Spacers, centralizers and other components	17
6.7	Coatings and corrosion protection compounds	17
7	Considerations related to design	17
7.1	General	17
7.2	Geometrical construction tolerances	18
7.3	Installation	18
7.4	Reinforcement	19
7.5	Connecting elements	19
7.6	Corrosion protection of steel elements	19
7.7	Spacers and centralizers	20
7.8	Micropile enlargement	20
7.9	Connections to the superstructure	21
7.10	Spacing of micropiles	21
7.11	Special requirements for micropiles installed through very weak soils	21
7.12	Micropile shoe	21
8	Execution	21
8.1	General	21

8.2	Site preparation	22
8.3	Sequence of installation	22
8.4	Drilling	22
8.4.1	General	22
8.4.2	Use of flushing	23
8.4.3	Boreholes supported by casings	24
8.4.4	Drilling with continuous flight augers	24
8.5	Driving	24
8.6	Enlargements	24
8.7	Reinforcement and load bearing elements	25
8.7.1	Handling and storing	25
8.7.2	Joints	25
8.7.3	Spacers and centralizers	25
8.7.4	Installation	25
8.8	Grouting	26
8.8.1	General	26
8.8.2	Grout preparation	26
8.8.3	Borehole testing and pregrouting	27
8.8.4	Filling the borehole with grout	27
8.8.5	Single step grouting through a temporary casing	27
8.8.6	Single step grouting through a load bearing element	27
8.8.7	Grouting and filling during driving	28
8.8.8	Grouting during drilling	28
8.8.9	Multi-stage grouting	28
8.9	Concreting	28
8.10	Trimming of micropiles	28
9	Supervision, testing and monitoring	29
9.1	Supervision	29
9.2	Monitoring of micropile construction	29
9.3	Micropile testing	29
9.3.1	General	29
9.3.2	Static load tests	30
9.3.3	Dynamic load tests and integrity tests	31
10	Records	31
10.1	General	31
10.2	Records for the execution of construction micropiles	31
10.3	Records for micropile tests	33
11	Special requirements	34
Annex A (informative) Execution methods of micropiles		40
A.1	Drilled micropiles	40
A.2	Displacement micropiles	41
Annex B (informative) Guidance on geometrical construction tolerances		42
Annex C (informative) Minimum cover (in mm) for reinforcement and bearing element of low strength steel for cast in place micropiles taking into account exposure classes related to environmental actions as defined in EN 206-1		43
Annex D (informative) Guidance on corrosion rates		44
Annex E (informative) Borehole testing and pregrouting		45
Annex F (informative) Guideline for the preparation of a record for several drilled micropiles		46
Annex G (informative) Guideline for the preparation of a record for several driven micropiles		47
Bibliography		48