

WORK INSTRUCTIONS FOR ENGINEERS

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**CH-004. SUPERVISION OF MICROPILE
CONSTRUCTION**

4.0 SUPERVISION OF MICROPILE CONSTRUCTION

4.1. INTRODUCTION

A check list for supervision of micropile construction.

4.2. DESK STUDY

Study the following documents and clarify with the Project Engineer :-

- 1) Method Statement on Pile Installation
- 2) Specifications for Materials and Testing (Reinforcement, Grout, Additives, Stabilising Fluid)
- 3) Construction Drawings

Review and comment on the following construction records :

- 1) Boring Record (Borelog with time taken for every m of drilling)
- 2) Grouting Record (Grout mix, Cube Strength, Grout Intake)

4.3. ON SITE CONSTRUCTION SUPERVISION

4.3.1. Check the following items in the submitted records :

4.3.1.1. Boring Record

- 1) Change of Soil/Rock Formation/Karstic features(Cavity, Overhang, Floater, pinnacle)/boulders/Loss of Water/Artesian Water with respect to Depth (preferably in RL).
- 2) Drilling Rate in Soil/Rock (Time taken at convenient intervals but not more than 3m).
- 3) All relevant levels (Working Platform, Top Casing level, Water level, Bedrock level, Socket level, Pile Base level, Connection level, etc).
- 4) Pile Reference Number.
- 5) Starting/Completion Date.
- 6) Drilled hole Diameter, Pile Dimension and Capacity.
- 7) Theoretical Volume and Actual Volume of Grout.

4.3.1.2. Grouting Record

- 1) Grout Mix.
- 2) Strength.
- 3) Additive.
- 4) Grouting Pressure (if any).
- 5) Starting/Completion Time.
- 6) Grout Intake with Time.
- 7) Grout Loss.

Records to be submitted not later than at noon of the next working day after pile has been installed.

~~SUPERVISION OF MICROPILE CONSTRUCTION~~**4.3.1.3. Piles Record**

- 1) Record on each activity such as drilling, installing API pipe, grouting of the individual pile.

4.3.2. Visual Inspection on Materials at site :**4.3.2.1. Conditions of Reinforcement and Pipe**

- 1) Visual Defects (Rusty, Distorted, etc).
- 2) Thread at Connection.
- 3) Coupling Element.
- 4) Protection Coating, Painting or Greasing (inside/outside the API pipe).
- 5) Dimension of Reinforcement (OD, thickness).
- 6) Spacers/Centralisers

4.3.2.2. Cement Grout and Additives

- 1) Expired Date of Cement.
- 2) Expired Date of Additives.

4.3.2.3. Conditions of Casings (Permanent/Temporary)

- 1) Visual Defects (Rusty, Distorted, etc).
- 2) Dimension of Casing. (ID and OD)
- 3) Connection for Welding/Coupling.

4.3.2.4. Water quality for Grouting

- 1) Source of supply. (Portable water)

4.3.3. On Site Supervision on Installation Process :

- (1) Check the deviation of installed micropiles in accordance to specification.
- (2) Make sure both ends of API pipes completely fitted in the coupling element and good contact between two connected ends of the API pipes.
- (3) Check mixing and density of stabilising fluid before grouting and after desilting.
- (4) Make sure no debonding substance on the reinforcements or inside/outside the API pipes and casings. API pipes have been degreased on both sides.
- (5) Check dimension of spacing between the centralisers along the API pipe.
- (6) Confirm the base is clean by depth measurement in the boreholes before grouting.
- (7) Ensure the cleaning of socket by flushing process is effective.
- (8) Collect representative API pipe specimens and grout cube samples for strength testing before installation.
- (9) Check pile installation sequence.
- (10) Measure the length and mark on the tremix hose before inserting in borehole.
- (11) Only allow opening for flow of grout to the annulus at the bottom of the API pipe (not along the pipe)
- (12) Overflow grout should be the same in mixing/density as in the mixer.
- (13) Collect soil/rock samples.

4.3.4. Report of Anomalies :

- (1) Water gushing out of hole.
- (2) Water loss during drilling.
- (3) Sudden loss of grout.
- (4) Collapse of hole.

4.3.5. Testing On Materials :

- (i) API pipe: minimum 3 specimens for each batch of supplied reinforcement or every 40 piles (which ever is larger) or as directed by the Engineer
- (ii) Grout: minimum 9 cubes for each batch of mixing or grout for 7-day, 14-days and 28-day strength testing. For test piles, extra 2 cubes are to be taken for 1-day and 3-day strength testing for early strength for load testing.`

4.3.6. As-built Survey

After the pile as-builts have been submitted and approved by Engineer, Engineering Geologist/Site Engineer to verify the pile deviation with the approved as-built (i.e. check the direction of the pile deviation from pile edge and pile cap formworks) and to notify Engineer and record the measurement of distance from pile edge to pilecap formworks for sections if any significant difference is observed. Engineer to keep Engineering Geologist/Site Engineer in the correspondences loop of pile as-built comments/approval.

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