

MV-pile



System characteristics

A steel pile using internal and/or external grout injection.

Construction

Description:

1. The MV PILE consists of a traditional steel profile provided with a pyramid-shaped foot; the steel foot is open to the top. The shaft consists of a steel cylindrical profile with a separate injection lance welded to the flanges. Steel HE profiles are mainly used, with a box around 50 mm wide welded to the outside of each flange at around 200 mm from the point. Each tube has a steel foot, open to the top. A steel tube may be used if necessary. Where a tube is used, grout is generally supplied via plastic pipes along the outside of the steel tube. The steel tube is usually driven to depth by means of a drop hammer. The steel tube method is often applied by Terracon for foundations for high voltage electricity pylons.
2. A thin grout is injected via the pile shaft or an injection lance during driving, emerging just above the foot. As the foot is driven further, compressing the ground, the space above the pile base is immediately filled with grout under pressure.
3. Once the correct pile tip level has been reached the pile head is finished and may be included in the structure.

Materials

1. Details of pile-driving frame:
 - a. Types used: Junttan PM 25, PM 30, IHC F3500, CX 700 GLS, Woltman 900 HPDR and Sennebogen S6100XLR.
 - b. Heaviest component: around 0.30 to 1.25 MN.
 - c. Method of transport to site: low loader.
 - d. Additional equipment required: pump installation.
 - e. Method of transport on site: self-propelled piling machine.
 - f. Maximal accessible gradient: 1:7.
2. Capacity of driving equipment
A variety of diesel or hydraulic drop hammers may be used.
3. Vibration levels
Depending on ground conditions.
4. Noise levels
Around 100 to 107 dB(A) at 10 m¹, partly dependent on the weight of the driving block.

Characteristics

1. Diameters

The steel point may be rectangular, square or round. Standard diameters range from 220 mm to 400 mm. Larger dimensions are possible with steel tubes in particular: circa Ø 406 mm to Ø 1200 mm



The core steel shaft can in principle be manufactured from any of the profiles in general use. The required dimensions are determined on an individual project basis.

2. Available pile lengths

Pile lengths up to around 40 m¹ are available depending on the situation and the pile dimensions.

3. Standard reinforcement

No additional reinforcement is usually required. A reinforcement cage may be used if necessary with tubular steel piles.

Load bearing capacity/deformation behaviour

1. Geotechnical load bearing capacity

a. This piling system is not explicitly described in the classification in NEN 9997-1. The following piling classification factors should therefore be regarded as indicative only.

Piling classification factors:

- Pile tip: $\alpha_p = 0,7$ $\beta = 1.0$.
- Skin friction: $\alpha_s = 0.014$.

b. Supplementary requirements for load bearing calculations: not applicable

c. Deformation under load: similar to type 1 in NEN 9997-1.

d. Loading spectrum: the calculated value of the geotechnical load bearing capacity at tensions from 500 to 2000 kN.

2. What is regarded as the pile tip level?

Level of the greatest diameter of the pile tip.

3. Methods of increasing geotechnical load bearing capacity
A larger pile foot can be obtained by increasing the size of the injection collar.

4. Methods to reduce negative skin friction

Supplementary measures will allow the space between the shaft and the ground to be filled with bentonite in weak soil strata.

Potential applications

1a. Application with large variation in ground conditions.

Adaptation is possible using variable pile length. Checks on the nature and solidity of the foundation strata can be carried out by means of measurements during driving.

1b. Application in weak ground The presence of weak soil strata does not present problems with this pile type.

2. Possible rake

Up to 1:1 (e.g. for quay walls).

3. Application in restricted space

Not possible.

4. Minimum centres for insertion

Around twice the diameter of the pile tip where the adjacent piles are at least one day old.

5. Minimal distance between adjacent piles for purposes of insertion

Minimum of around 1.0 m¹ depending on the situation, the dimensions of the pile and the material.

6. Installation in open water

Possible.

7. Suitable for use as tension piles

This piling system is ideally suited to taking up high tensile loadings.

8. Supplementary requirements/observations

- Penetration of extremely solid soil strata does not generally throw up problems with this piling system. The system is also often still feasible where there are obstacles in the ground.
- In special cases it may be possible to drive the pile below ground or water level using a pile cap.
- The maximal bending moment taken up depends on the steel profile or tube selected and can be extremely large.

Quality and safety

Terracon have in place a certificated quality and safety system to NEN-EN-ISO 9001:2015 and SCC Petrochemical and Safety Awareness Certificate 3".

Internal installation guidelines are used. The piles are manufactured in accordance with the project-specific quality and safety plan, which includes an inspection plan.

