

Terra-Son-pile



System characteristics

Cast-in-situ, vibration free piling with prefabricated concrete core and reinforced foot in the sand strata.

Constructions

Description:

1. A drilling tube fitted with an auger and a lost drill point is screwed into the ground. The high axial pressure and rotational moment ensure that the drilling tube largely follows the pitch of the auger during drilling. This results in only minor decompression of the sand strata.
2. The prefabricated concrete core is placed in the tube over the drill point.
3. Once the core has been inserted a grout mix (kept under pressure) is poured into the tube.
4. The tube is withdrawn under rightward rotation until the top of the foundational sand stratum is reached, whereupon the space created is filled with grout.
5. Above the load bearing strata the drill tube is rotated leftward, so that the ground between the screw blades remains behind to the greatest extent possible.
6. Once the tube has been withdrawn the piling frame can move on.

Materials

1. Details of pile-driving frame
 - a. Types used: Junttan PM 30, CX 700 GLS and Woltman 900 HPDR and Sennebogen S6100XLR.
 - b. Heaviest component: 0.5 to 0.95 MN.
 - c. Method of transport to site: low loader.
 - d. Additional equipment required: shovel or auxiliary crane for manoeuvring prefab pile cores.
 - e. Method of transport on site: self-propelled piling machine.
 - f. Maximal accessible gradient: 1:7.
2. Capacity of driving equipment
Drill head capacity:
 - Rotational moment: 250 to 450 kNm.
 - Axial force: around 400 kN.
3. Vibration levels
This piling system may be regarded as vibration free.
4. Noise levels
Around 80 to 85 dB(A) at 10 m1.

Properties

1. Diameters

The diameter of the square section prefabricated concrete core is compatible with the dimensions of the drilling tube. Sufficient space needs to be left around the core for a cement grout casing 50-100 mm thick.



The following standard dimensions apply:

- Diameter of prefabricated core (square): 220 mm 250 mm, 290 mm and 320 mm.
- Drilling tube diameter: \varnothing 406 mm, \varnothing 457 mm and \varnothing 508 mm.
- External diameter of auger: \varnothing 550 mm, 600 mm, 650 mm.
- External diameter of pile foot: \varnothing 550 mm, 600 mm, 650 mm.

2. Available pile lengths

Pile length is dependent on installation method, where the slenderness of the prefabricated core must be taken into account. As a general rule the maximal length is around 80 to 90 times the diameter of the prefabricated element.

3. Standard reinforcement

Depending on pile loading Heavy duty head reinforcement from 8 to \varnothing 20 mm is possible, in combination with pre-stressing.

Load bearing capacity/deformation behaviour

1. Geotechnical load bearing capacity

This piling system is not explicitly described in the classification in NEN 9997-1. The piling classification factors below have been established by Terracon during test loading programs, in combination with the best possible incorporation of the piling system within the system in table 7 in NEN 9997-1.

Pile type	Piling classification factors			Deformation under load:
	a_p	β	a_s	
Terra-Son-pile	0,56	1	0,006	Type 1 à 2

2. What is regarded as the pile tip level?

Level of steel drill point

3. Methods of increasing geotechnical load bearing capacity

Complete soil displacing drilling in of the steel auxiliary tube (Terracon pile).

4. Methods to reduce negative skin friction

- Negative skin friction can be reduced by omitting the casing of the prefabricated core in the area of the compressible ground strata.
- Use of a layer of bentonite around the upper area of the core

Potential applications

1a. Application with large variation in ground conditions
Good.

1b. Application with weak soil strata

There is no possibility of a discontinuous pile shaft thanks to the use of a prefab pile core.

2. Possible rake

Supplementary measures will be required with piles with substantial rake, because of the need to centre the core.

3. Application in restricted space

Not possible.

4. Minimum centres for insertion

The rules for cast-in-situ piles apply.

5. Minimal distance between adjacent piles for purposes of insertion.

Dependent on the materials used, the situation and the installation method. As a general rule, 0.8 m1 minimum.

6. Installation in open water

This system can in principle be used in open water. The level of the top of the cement grout casing is then at bottom level, while the prefabricated core can be installed at a higher level.

7. Suitability for use as tension piles

Suitable for use as a tension piling as the result of the presence of the pre-stressed core. The Terra-Son piling is ideal for recessed installation, with the prefab pile core provided with internal ribbing to achieve excellent adhesion to submerged concrete.

8. Supplementary requirements/observations

Not applicable.

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 3rd. KOMO product certificates can be provided for the prefabricated concrete elements. The piles are manufactured in accordance with the project-specific quality and safety plan, which includes an inspection plan.



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