a.p. van den berg
The CPT factory

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Demonstration Piezocone

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Consequenses of not doing not enough CPT

A.P. van den Berg CPT equipment

The standard in offshore CPT equipment

Ever since the eighties, the engineers of A.P. van den Berg have been making cone penetration testing technology available for seabed soil investigation. The first developed device was the ROSON, a wheel drive unit that establishes the seabed considerable depth and gathers data continuously.

A.P. van den Berg works on a daily basis on the development of new applications that enhance the reliability of cone penetration testing. As a result, the water depth for offshore activities has increased to up to 4000 meter. Also the CPT depths have increased the last few years. A.P. van den Berg is a global player, having earned its spurs in the world of cone penetration testing, which is once again proven by the deep water sampler that was developed in cooperation with NGI. The A.P. van den Berg equipment is widely used by many geotechnical survey companies that care strongly about service and reliability.

Various CPT thrust systems are available: wheel drive systems and wire line systems.

A.P. van den Berg offshore CPT equipment

A.P. van den Berg CPT equipment

- Advanced onshore CPT equipment

In the early 1960s the Goudse Machinefabriek (GMF) put a machine into production that was entirely the brainchild of mechanical engineer A.P. van den Berg, founder of the engineering bureau A.P. van den Berg. It was the first hydraulic 10-tonnes soil testing system in the world.

Nowadays the cone penetration test units of A.P. van den Berg for onshore CPT range from 10 kN to 260 kN. A.P. van den Berg delivers the units as they are, mounted on frame, trailer, tracked vehicle, Truck or Track-Truck. The available types are the HYSON-LW (lightweight), HYSON (medium/heavy), COSON (continuous), AUTOHYSON (automatic) and AUTOCOSON (automatic/continuous).

A.P. van den Berg onshore CPT equipment

Cone Penetration Test (CPT)

Cone penetration tests are especially suited to determine the presence of clay, peat or sand in the subsoil strata. The test method consists of pushing a tool with a conical tip vertically into the ground. The resistance on the tip, called cone resistance, is measured during pushing. Very often the friction of the soil on the sleeve (called local friction) is measured at the same time. With these two parameters the in-situ soil type can be determined. An inclinometer on the cone is absolutely indispensible for checking the slope angle. Optionally, the slope gauge can be executed as an X-Y inclinometer allowing also measurement of directional and linear displacement besides the angle. A cone penetration test is done in accordance with the international standard ISO 22476.

<u>When is it necessary to do a CPT test?</u>
To build anywhere, the designer or builder needs to prepare the groundwork and needs to know if the soil contains soft layers. In case of soft soil the construction must be built on piles that transfer the weight to a sand layer deeper in the ground. If a firm stratum can be found directly underneath the ground surface, the builder can choose another foundation.

In general a cone penetration test is used for:

- determination of the subsoil stratification and homogeneity of the in-situ ground
- depth of the firm strata and analysis of variation in the subsoil
- recognition of the type of the soil
- properties of the mechanics of the different strata
- direct prediction of the bearing capacity of piles

A cone penetration test is usually performed using a specially outfitted truck. If necessary, this truck can be fitted with tracks to obtain a bearing area large enough to drive on often bad terrain. Equipment in the truck cabin is used to push a CPT cone into the ground with the aid of steel rods with a diameter of 36 mm. This is done with a constant speed of 2,0 cm/sec. Also in the cabin is a measuring system to measure the soil parameters. A CPT rig often weighs between 10 and 25 tonnes. This weight is necessary as reactive force.

A reactive force can also be obtained by using ground anchors, which is often done in places that are difficult to reach. In that case a stand-alone CPT rig is used.

All measuring instruments are sensitive to change calibration values, because the sensor will become overloaded, dirty or damaged (because of overloading). Cones must be returned regularly to the manufacturer, who will check the performance and will calibrate the cone again. Besides that, it is advised that the operator checks the cone on a daily basis for performance and precision.

A.P. van den berg Icone en seismic module

A.P. van den berg CPT Track-Truck

Piezocone

In the case you will find the demonstration 10 cm² Piezocone of A.P. van den Berg. It is used for the Piezocone test (CPTU).

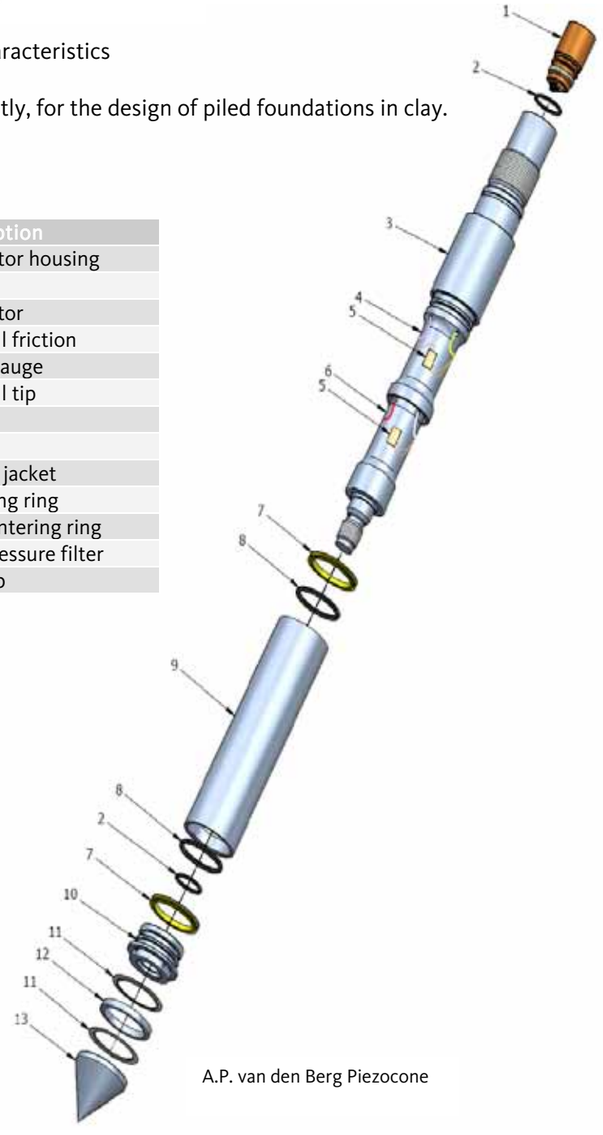
The Piezocone test (CPTU) is a cone penetration test (CPT) with additional measurement of the pore water pressure on the penetrometer surface.

Cone penetration tests, with pore water pressure measurements give a more reliable determination of stratification and soil type than a standard CPT. In addition, CPTU provides a better basis for interpreting the results in terms of mechanical soil properties.

Mechanical properties to be evaluated are:
- shear strength parameters
- deformation and consolidation characteristics

The results from a CPTU can be used, directly, for the design of piled foundations in clay.

Part	Description
1	connector housing
2	o-ring
3	connector
4	load cell friction
5	strain gauge
6	load cell tip
7	lip seal
8	o-ring
9	friction jacket
10	centering ring
11	filtercentering ring
12	pore pressure filter
13	cone tip



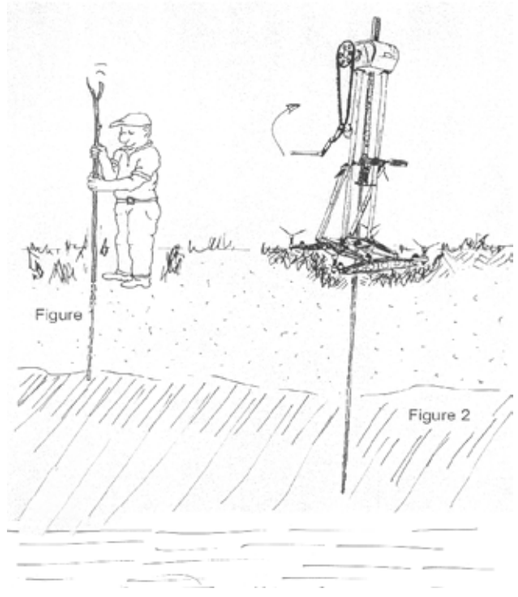
A.P. van den Berg Piezocone

History

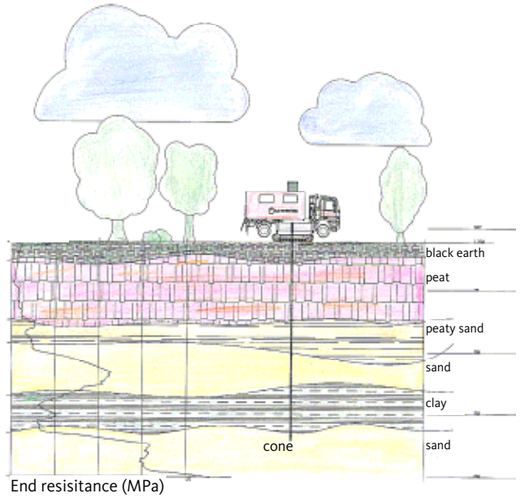
Cone penetration testing (CPT) has been used for over 60 years in the Netherlands for the prediction of pile behaviour under loading conditions of the approximately 1 million foundation piles yearly put into practice. Without these piles it would be virtually impossible to build (lasting) structures in the Netherlands.

For a good understanding of the successful development and application of the CPT method in the Netherlands, some general insight into the geology of this country is indispensable. A schematic cross-section off the country is shown right. These geological conditions made it necessary, even several hundreds of years ago, that pile-foundations were applied on a large scale. In the first instance, timber piles were used exclusively, while the driving depth was determined during the process of pile-driving. Only much later the procedure was improved in such a way that simple pile-driving formulae, based on empirical data, came into use, in order to assess a relation between driving depth and bearing capacity.

Between 1930 and 1935 the CPT method came into use. It was the Dutch Professor Barentsen from the University of Delft, who invented the CPT method. It enabled the pile-length and the bearing capacity to be determined prior to pile installation. This process was also accelerated by the general trend in the building trade to erect larger structures, which were more sensitive to settlements and differential settlements. This required a better and more accurate understanding of the behaviour of their foundations and that of the subsoil. Especially after 1945 the development of the CPT method was remarkable. The method of interpretation of the reading from CPT's in order to predict the bearing capacity of foundation piles replaced the pile-driving formulae entirely, as well as the driving of test-piles. By means of a very large number of load-tests it was proven that by considering the CPT as a model test-pile, a sufficiently accurate prediction of its bearing capacity could be obtained. Nowadays the Dutch generally consider it intolerable to design a pile-foundation without having available sufficient CPT information.



How it all started



How things are going in 2011