

STN STATNAMIC™ Load Testing



The Statnamic Load Test (STN) has been developed by Profound and Berminghammer Foundation Equipment to meet the construction industry's demand for an accurate and cost-effective method of determining the load bearing capacity of foundation piles.

Static pile load testing without the high costs

Statnamic can be used on any pile type with minimum pile preparation. Pile loading is achieved by launching a reaction mass. This mass is only 5% of the weight needed for a static load test. As a result a Statnamic test can be conducted in a fraction of the time required for a static load test.

Loading is perfectly axial. The slow build up and release of the forces eliminate tensile stresses. The pile and the soil will be compressed as a single unit and the static load-displacement behavior of the pile is obtainable.

Statnamic Load Testing

The figure represents the successive stages of a Statnamic load test. Phase I is the situation just before launching. A cylinder with pressure chamber has been connected to the pile head and the reaction mass has been placed over the piston. In phase II the solid fuel propellant is ignited inside the pressure chamber, generating high-pressure gases and accelerating the reaction mass. At this stage the actual loading of the pile takes place, as an equal and opposite reaction force gently loads the pile. The applied pile force, displacement and acceleration are directly monitored. The upward movement of the reaction mass results in space, which is filled by the gravel (phase III). Gravity causes the gravel to flow over the pile head as a layer, catching the reaction mass and transferring impact forces to the subsoil (phase IV).

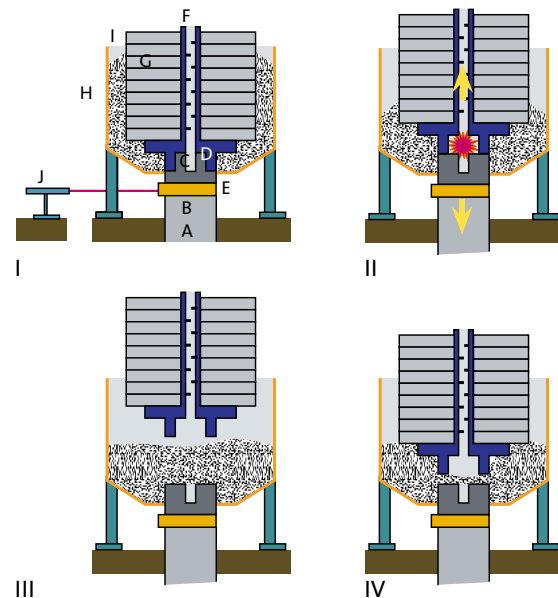
All signals are measured by the Profound data acquisition system whereby the mobilized capacity and static load displacement behavior can immediately be presented in a load-displacement diagram on site.

During the test the reaction mass reaches a height between 2-3 m and then falls back. For high loads of 5-30 MN, gravel is used to catch the reaction mass.

For loads in the range of 1-8 MN, a hydraulic catching system is utilized to arrest the reaction mass. With the latter system a considerable shorter cycle time is achieved, enabling more tests. With a 4 MN hydraulic catching device, 3-4 piles can be tested per day.

Results

The Static load-displacement diagram is derived from the Statnamic measurements. During the entire test a state-of-the-art load cell, an optical system and an accelerometer, act in concert with the Profound data acquisition system. Straightforward methods of analysis are provided through user-friendly software to take into account the damping, inertial effects and loading rate effects. The load-deflection behavior and the capacity of the foundation are clearly presented.



Four stages of a Statnamic test with gravel catch system.

- A = pile to be tested
- B = load cell
- C = cylinder & pressure chamber
- D = piston
- E = platform
- F = silencer
- G = reaction mass
- H = gravel container
- I = gravel chamber
- J = optical measuring system



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Large load range

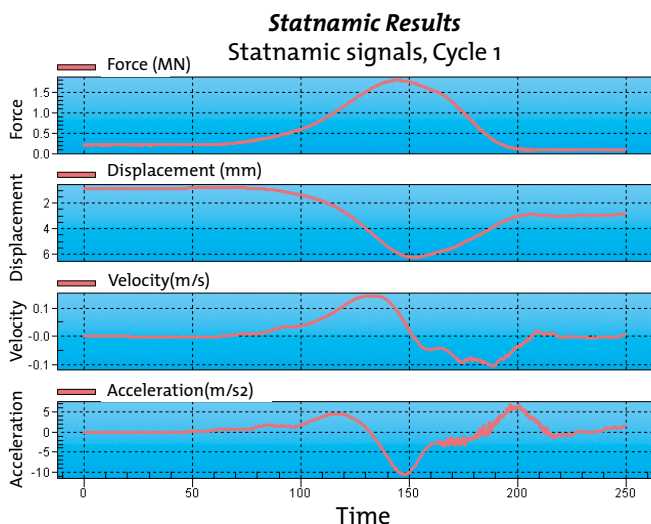
Statnamic devices are available with different maximum loads. Available device loads are 1, 2, 3, 4, 5, 8, 16, 20, 30, and 40 MN. The testing range is between 25% and 100% of the maximum device capacity.

Statnamic devices for rental:

Asia – devices ranging from 4 MN to 40 MN.
North and South America – devices ranging from 1 to 40 MN.
Europe – devices ranging from 1 to 20 MN.
Statnamic devices can be made available worldwide.

Statnamic devices equipped with a hydraulic catch mechanism, can test several piles per day. A gravel catch system may test 0.5 to 2 piles per day. Statnamic has also been used successfully for batter piles and lateral load testing.

The graphs below show the Statnamic signals respectively the final test result. The static load displacement behavior of the pile is derived from the Statnamic signals by eliminating the loading rate effects and the dynamic forces like damping and inertia.

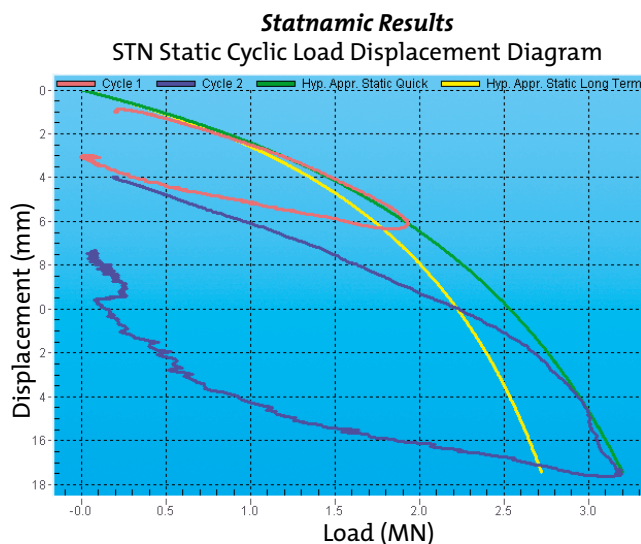


Advantages of Statnamic

Statnamic Load Testing overcomes the technical, economical, and practical difficulties of both static and dynamic load tests. Static Load Testing is expensive, time consuming, and cumbersome, especially for larger loads on deep foundations.

The duration of a Statnamic loading is substantially longer than the load produced by Dynamic Load Testing. With Statnamic Load Testing, a controlled, pre-determined load is applied directly to the pile whereby the longer duration results in no tension forces.

Worldwide, hundreds of tests have been carried out in various soil and field conditions comparing the results of static and dynamic load tests with Statnamic tests. These tests are documented in numerous papers, available for downloading at our Profound websites. These documents justify the worldwide application of Statnamic testing.



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