LOADTEST
The Automated Incremental Loading Test

LOADTEST provides expert independent service in the field of Maintained Load Testing both for top-down application of load and for bi-directional testing using O-Cell© technology. This information sheet deals specifically with top-load application for static load testing.

The monitoring and quality of static load tests has been significantly enhanced in terms of safety, reliability and accuracy of the results by the automation of:

1. measurement and recording of pile settlement and applied loading

2. control of the applied load

3. controlled change of load subject to preset criteria

Each system consists of load and displacement sensors, a microprocessor based data logger/controller, and a hydraulically operated device for application of load. The equipment is capable of measuring and recording the load automatically during a test at pre-set intervals of typically 1 minute, to a resolution of 1 kN and pile deflection to 0.01 mm respectively.

The system automatically checks for continued safe operation every 2.5 seconds, making any appropriate corrections to the hydraulic pressure in the jack to maintain the load to within very tight tolerances. The equipment is powered by a rechargeable battery and is designed to be easily transportable. A computer can be used to monitor the load and deflection rate for immediate analysis, either locally or remotely, without interrupting the test.

The data may be presented on screen in tabular and graphical forms and printed results can be readily obtained, making reporting easy and fast. Over 3000 computer controlled loads tests have been carried out using this patented system (U.K. Patent No. 2323174).

Figure 1. A 12MN Reaction System

Accurate and sufficient static load test results, such as those provided by the automated equipment, allow the displacement/time data to be modeled according to significant pile/soil characteristics for a specific site. These results are also used to project the final settlement at each load, calculate elastic shortening and determine skin friction and end bearing capacities.

Advantages of automation

Using computers, all actions of load application and recording can be carried out according to any normal specification.

Progress of the test can be supervised remotely and with minimal site attendance, thereby overcoming the frequent requirement of staff remaining on site during the night.

Additionally, the computer equipment is programmed to take appropriate action in the event of a range of potential anomalies, ensuring progress of the test is paused safely awaiting engineering attendance/assessment. These improvements represent an important advance in site safety.

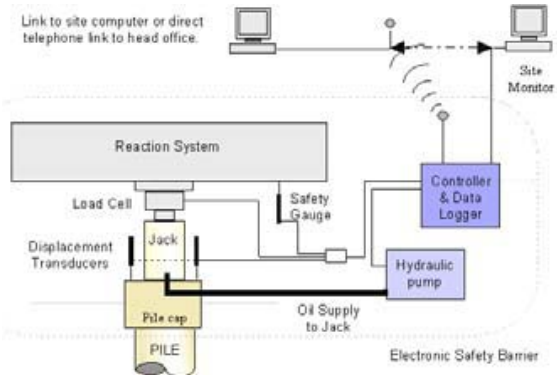

Figure 2. Diagrammatic illustration of the typical testing arrangement

A separate gauge is used to monitor the displacement of the pile head with respect to the underside of the reaction beam. This allows a secondary measurement of pile head movement and load applied, as well as necessary verification of the integrity of the reaction system.

It will be widely appreciated that the quality of load testing is of paramount importance and that inferior methods can lead to incorrect conclusions being drawn.

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The top-down load testing service is suitable for use under kentledge or steel reaction beam systems using anchor pile or ground anchors. The system can be provided for occasions where a client may already have a reaction system or the service can be complemented with a range of reaction systems applicable to loads up to 12 MN.

Illustrated in Figure 1 is an arrangement capable of providing up to 12 MN. It can be placed on anchors on a 4x4m arrangement for maximum capacity or, at a reduced maximum test load capacity, can be used with 4 anchors placed symmetrically within a 7x7m grid.

Ready Assembled Reactions test systems

These reaction systems provide safe and rapid assembly to anchor piles for the load testing of foundations and are available for use in Western Europe.

Anchor piles, suitably located and reinforced, can be pre-prepared with steel connection points for the erection of the reaction frame. Added safety is achieved by minimizing the number of connections between the reaction system and the anchor piles and ensuring that they are at a level that is easily accessible from the ground.

The 2MN arrangements can be connected to 2, 4 or 6 anchors (as shown in Figure 3) arranged on a 4x1.5m and 5m spacing.

Figure 3. 2 MN CRAFT set up on 6 anchors with 6 Dywidag bars

Figure 4 shows a reaction system compatible with a 4 anchor arrangement set on 4x1.5m spacing. The 4MN systems are a very compact reaction solution.

Figure 4. 4 MN CRAFT set up on 4 anchors with 4 Dywidag bars

The 5.5MN arrangement requires 4 anchors arranged on a 4x1.5m or 4x2.5m. The spacing of the secondary beams can be increased to 5 m but with a reduction in maximum capacity.

Figure 5. 5.5 MN CRAFT set up on 4 anchors with 8 Dywidag bars

Where access or space is an issue for the installation of anchor piles and assembly of a suitable reaction system using kentledge or reaction beams, bi-directional load testing using the O-cell method might be more appropriate. This may also hold true for piles with low concrete cut-off levels or those constructed over water. For test loads greater than 10 MN, the O-cell method is safer and more cost-effective.

The Osterberg cell (O-cell) is a sacrificial jack-like device installed within the foundation unit. However, unlike a conventional jack, the O-cell is specifically engineered to offer negligible internal friction even with eccentric movement. The depth of the O-cell within the pile is set according to the test program requirements. A typical level for the O-cell can be determined where there will be equal capacity above and below to maximise the load that can be mobilised in the pile during the test.