

# LOADTEST

## O-cell® Technology at wind farm projects in Romania



Developer: ENERCON GmbH  
Design engineer: Popp & Asociatii Inginerie Geotehnică S.R.L.  
Foundation Contractor: EDRASIS CONSTRUCT GRUP S.R.L.  
Local LOADTEST office: Fugro Consult Kft in Hungary  
Location: Rahman & Casimcea wind farms Dobrogea, Romania

### Project Description:

Studies place the Eastern part of Romania to be the 2nd best place in Europe to construct wind farms due to its large wind potential. Starting with 3 MW installed capacity in 2008, there was a 982 MW installed by 2011 and the midterm goal is 12 GW.

In 2008, LOADTEST performed the first Osterberg cell (O-cell®) bi-directional load test for wind turbine foundations in Romania. Although many tests have been performed in the region, the O-cell® method for testing the foundation provided numerous advantages over traditional top-down load testing.

### Advantages:

In ground conditions where the end bearing may be comparable or greater than the friction, the O-cell method may be arranged to load directly the end bearing of the pile using the skin friction as a reaction and the test will measure end bearing and friction; directly and independently.

The O-cell method is capable for much greater loads than with traditional top-down loading without the need for expensive anchor piles or reaction beams at the surface or transportation costs of heavy kentledge or reaction beams to remote locations.

The O-cell method is also advantageous in congested construction areas or over water. The O-cell method allows for working test piles to be subsequently integrated into the structure by post-test grouting.

### Bi-directional load test arrangements:

For the foundations for the wind turbines in Romania, two O-cells have been typically installed at a single elevation, close to the bottom of each test pile. The piles have been typically between 10 – 28 m deep depending on the ground conditions. The test results gave direct measurements for end bearing and skin friction; allowing the designer to optimise their design.

### Applications:

The effective mobilised capacity in each of the test piles was carried out to the desired maximum loading of 16 – 24 MN and taken to higher loads on one test to further evaluate the characteristics of the weathered schist. The O-cell method is well suited for any size and capacity drilled shaft or pile, for tests both on land and off-shore.



Tihuta Pass wind turbine, Romania



Assembly of 2x405mm O-cells placed at the bottom of a Ø1000mm pile, mobilising 24MN near Bucharest



Installation near Casimcea, Romania



Typical bi-directional testing setup

