

# Wind Turbine Bases

## - using grout bag foundations to suction caissons

### Grout Bag Foundation Infill

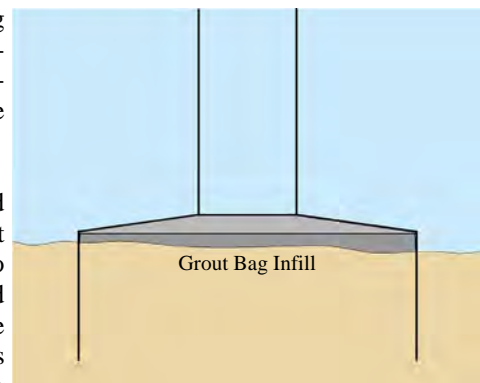
- Overcomes sloping and undulating beds
- Completely infills top voids
- Achieves vertical setting
- Avoids soil migration
- Aids decommissioning by pumping



**Offshore Wind Farm**

Suction caissons are of considerable interest as foundations to wind turbine mast bases due to their construction officially. However, their use as large bases to resist operational overturning movements is a relatively new development and requires methods to ensure complete bearing contact is made to the underside of the caisson cell.

With oscillating action from wind turbine operation, it is important that all voids are completely infilled to avoid water voids, soil migration and associated rotational settlement. The grout bag system achieves this and has many other practical construction benefits as noted above.



### **Fabriform**

#### **Proserve Ltd.**

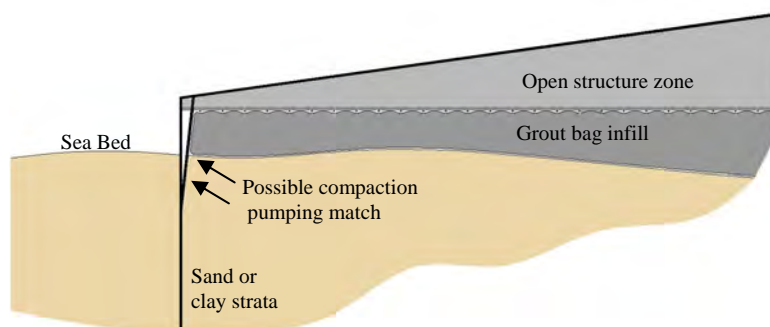
80 Priory Road,  
Kenilworth,  
Warwickshire, CV8 1LQ,  
England

UK: 01926 512222  
Int: 00 44 1926 512222  
office@proserveltd.co.uk  
www.proserveltd.co.uk

The Grout Bag system is prefixed in a condensed form within the caisson along with grout hoses and suction pumping pipes. This allows caisson embedment and foundation grouting to be performed automatically and quickly from the surface. Caisson embedment can be barge controlled for verticality or internal suction cells can be used. Once the caisson has reached its embedment level and vertical trim, the base void is grouted. The system overcomes sloping and unlevel bed issues associated with larger caissons.

Decommissioning extraction is readily achieved by pumping water into the open structure zone above the grout infill layer. This avoids the release problems often encountered when pumping into completely filled caissons and helps avoid the risk of piping. A second phase of suction pumping can be used to compact loose soils. This is particularly useful in loose sands to avoid the risk of liquefaction where relative densities are below approximately 0.72.

In contrast this system has significant advantages over pumped sand infill which is a difficult specialist technique, has difficulty to achieve complete void infill, suffers from compaction of the pumped sand layer and would leave no general base void for controlled decommissioning by pumping.



**Construction Detail**

Proserve's Grout Bag Foundation system has been used for caisson foundations on many major marine projects and is a reliable and proven technique, with many supporting case histories.