PIB
Product
Information
Bulletin

EXCALIBUR™

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MacLean Power Systems' Bucket Piles

MacLean Power Systems (MPS) offers a full product line of pressure grouted and displacement bucket piles for high capacity moment and lateral applications. This type of product has been safely and effectively used in a wide range of high moment and lateral resistance applications traditionally occupied by micropiles, augercast piles, driven piles, and similar foundation technologies.

The MPS Excalibur bucket pile system offers the same advantages as Displacement Piles with greater load support than other commonly available systems. Bucket piles's can be safely and effectively installed in areas with limited access where specialized equipment for other deep foundation systems may be required and become less economical. Overhead access, limited site availability, low disturbance installations, shorter overall pile lengths, and projects requiring no guy lines are all situations where the bucket pile can be a valuable tool for your project.

By taking advantage of longer Bucket Pile lead and extension section lengths (up to 40') you can drastically reduce the pile's cost per foot (cost per kip). Reducing the number of pile sections/joints also brings down the overall material handling and jobsite labor hours. These advantages make MacLean EDP's an economic solution to many deep foundation applications.

Bucket Piles can be utilized in a wide variety of soil conditions. They are fabricated of high strength steel and can withstand large amounts of torsional forces, enabling them to penetrate through tough, dense soils. By increasing the number and size of drive plates and the diameter of the steel shaft lead and/or bucket in the pile design, Bucket Piles can generate tremendous axial and lateral resistances even in poor, low consistency soil conditions.

Regardless of your project's specific requirements, the representatives/engineers at MPS will work with you to provide an economical Bucket Pile solution to fit your needs.

Key Components

Steel Shaft Lead

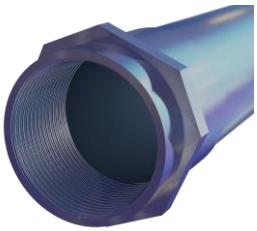
Commonly stocked pile shafts are listed below. Sizes may be selected based on many factors including axial and lateral loading requirements, site and overhead access, among others. All shafts are made of high-grade steel. Each section can be coupled together in the field with ease to reach the required installation depth/torque. The Lead section typically ranges from 4.5” to 7” OD.

Steel Shaft Bucket

Bucket diameters range from 18” to 60”. Sizes may be selected based on many factors including moment and lateral loading requirements, site and overhead access, among others. All shafts are made of high-grade steel. Each section can be coupled together in the field with ease to reach the required installation depth/torque. Often pre-augering a hole to install the bucket extension to the planned depth is required.

Couplers

MPS offers a full range of traditional bolted as well as internally threaded coupler systems. Both systems have been safely and effectively used in pressure grouted and non-grouted type installations.

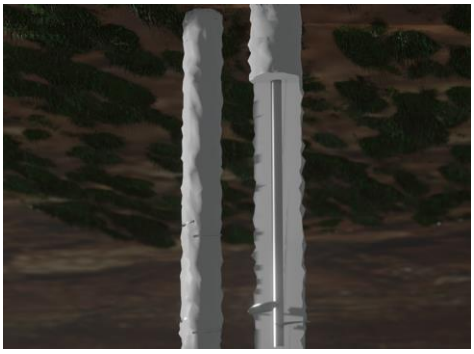


Pile Driver Plate(s)

These plates typically range from 8” to 30” and ½” to ¾” thick with a 6” pitch. They are used to aid in the advancement of the pile through the soil and as end bearing elements. For pressure grouted piles, they are used to displace the soil around the pile and create an annulus for which the grout column to be formed. They do not auger the soil.

Grout

For pressure grouted bucket piles, a grout column is shown below. A neat grout mix of Portland Cement and potable water may be used. Once the pile driver plate is in full contact with the ground, pressure grouting can begin and should continue as the pile is advanced through the soil. As the driver plate displaces the soil, the grout fills the void created and forms a column around the central steel shaft. Grout flow and delivery pressure should be monitored to ensure proper grout distribution is being achieved.



Terminations

Bucket Piles can be terminated in a small concrete pad or left bare. Utilizing a pad to fix the pile head can help increase the its capacity and protect the steel from possible corrosion. We also can supply custom pile caps.

Excalibur Bucket Pile Capacity Chart

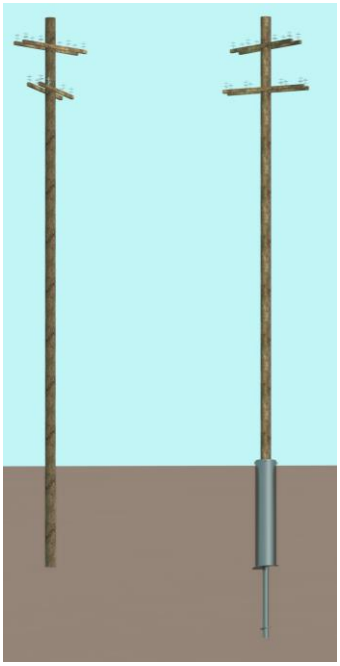
		Soft Clay		Medium Stiff Clay		Loose Sand	
Lead OD (in)	Bucket OD (in)	Moment Resistance (ft-kips)	Lateral Resistance (kips)	Moment Resistance (ft-kips)	Lateral Resistance (kips)	Moment Resistance (ft-kips)	Lateral Resistance (kips)
4.5	20	138.1	19.8	252.0	39.0	400.0	59.0
5.5	24	168.6	22.9	316.8	46.3	569.2	78.4
5.5	30	191.8	25.9	375.9	54.0	866.7	110.8
7	30	220.3	27.7	416.8	56.9	941.7	116.6
7	36	237.5	30.1	457.9	62.9	1,141.7	139.3
7.625	36	258.7	31.4	487.4	64.8	1,200.0	144.1
9.625	42	327.7	36.9	617.1	76.2	1,550.0	177.1
9.625	48	341.7	39.0	656.0	81.6	1,741.7	197.0

This chart was developed by modeling a 10’ Lead and 10’ Bucket (20’ overall), 0.75” allowable pile head deflection, fixed head condition, and an applied 30 kip compressive load. Utilizing grout can increase the moment and lateral resistances of the pile. The listed figures are ultimate resistances. A review of the in-situ soil conditions should be carried out to confirm the pile’s geotechnical capacity.

Applications

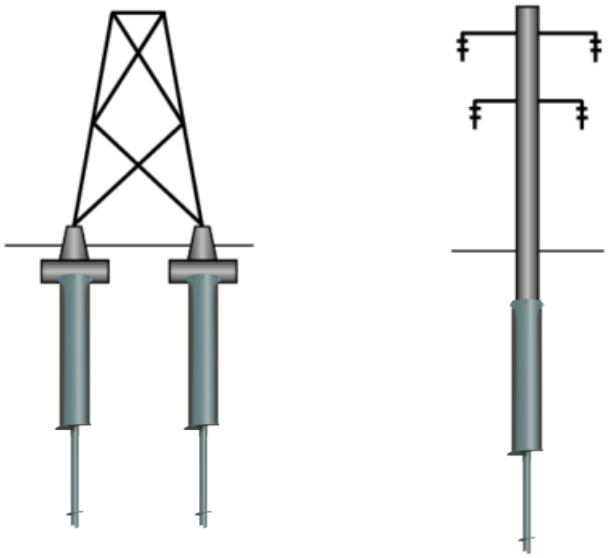
The Bucket Pile has been used successfully to support direct bury power poles. The larger cross-sectional area and higher-grade steel of the Bucket Pile offers much higher lateral and moment capacities as compared to traditional moment piles. Other applications include substation equipment and tower foundation element, as well as many other high moment and lateral load project.

Direct bury power poles:



Wind turbines:

Transmission towers:



For more information on the products shown here please visit
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