## TORQUE CAPACITY CONVERSION AND DESIGN EXAMPLE

## $Q_u$ x k = T

**Pressure:** The application of continuous force by one body on another that is touching in compression.

**Q :** Ultimate capacity of a Helical Pile or Tension Anchor, LBS

**Torque :** The force required to turn something times the distance the force acts from the point of rotation. The force applied to a helical pier by a gear motor that causes the pier to rotate and advance into the soil.

**"K" Torque Conversion Multiplier :** Each anchor motor has a torque conversion chart which is the relationship between the differential pressure measured across the hydraulic ports on the motor and the torque output of the motor, the applied multiplier will give finial capacity reading.

**Factor of Safety :** A mathematical calculation used by engineers to develop a margin of safety when calculating capacities. ( Torque to Capacity Ratio ) Live Loads/Ultimate Loads

### Design Example

What is the final installation torque on a Helical Anchor that was just installed ? A Pengo Model RS-7 hydraulic torque motor was used to install the anchor 2 7/8" The finial pressure across the inlet and outlet ports were 2,200 psi and 300 psi.

The finial torque transmitted to the Anchor shaft is calculated as follows:

**High Pressure (**inlet**)     Low Pressure (**outlet**)**

11' depth= 1100 psi    11' depth= 250 psi

12' depth= 1400 psi    12' depth= 250 psi

13' depth= 1750 psi    13' depth= 300 psi

14' depth= 2200 psi    14' depth= 300 psi   **Spiked**

**\* Important \*** It is imperative that the motor outlet pressure be subtracted from the inlet pressure. Failure to subtract the "backpressure" will result in over estimating the output torque and could lead to insufficient installed capacity of the anchor.

(**P**)  Example:  2,200 – 300 = 1,900 psi actual working pressure.

(**K**) 1,900 psi. Reference Torque Chart per anchor drive motor.

1,900 psi = 5709 (ft/lbs)

Torque conversion multiplier:

( **Q** )   5709 ft/lbs x  safety factor = Torque to Capacity Ratio.

**Engineer Calculation Chart :** Shaft Size/OD.    1 ½" TO 1 ¾"  Square Bar x 10

2 7/8" OD. X 9

3 ½"   OD. X 7

4 ½"   OD. X 5

Larger sizes x 2

Finial Capacity Reading =  51,381 a 50 kip pier.  25 Ton capacity.

Take accurate readings during installation to transfer onto finial inspection record sheet.

Helical Piles and Tension Anchors are installed to torque, not depth. This means they find the soils that match the required pier capacity as they are installed.