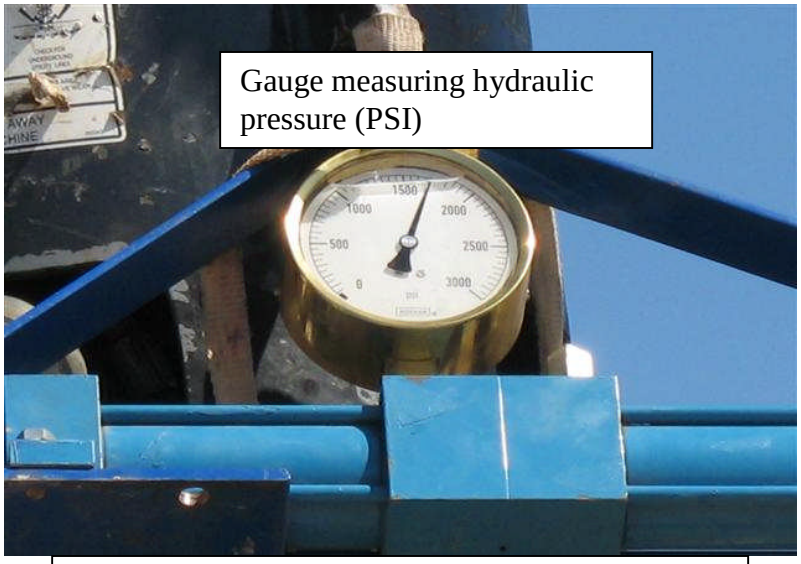
Load Measurement

Pounds per Square Inch (PSI) = Pressure



Gauge measures hydraulic pressure (DP1 shown)

- PSI (pounds per square inch) is the measurement of hydraulic pressure
- Typically a gauge displays the hydraulic pressure that is applied to a cylinder or other device
- PSI or hydraulic pressure is **not** the same as torque
- The hydraulic pressure displayed on the gauge for a drive head (hydraulic torque motor) must be converted to torque as typically helical pile or tension anchors specifications is expressed as torque
- The supplier of the drive head can provide the pressure-to-torque conversion chart
- If the gauge measures the hydraulic pressure applied to the drive head **and** other devices such as outriggers, then it must not be used for torque monitoring
- Note: If the hydraulic gauge is used on a lifting cylinder or jack, then the conversion will be to pounds or tons of lifting or compression force
- The gauge should be calibrated and the conversion chart (psi to ft-lbs) made readily available when installing piles or anchors
- MacLean-Dixie recommends the DP1 that provides a continuous display of hydraulic pressure and the reading is then converted to torque.

MacLean Dixie HFS
Building Solid Foundations

11411 Addison Avenue • Franklin Park, IL 60131
T: (847) 455-0014 F: (847) 455-0029 • www.macleandixie.com

Product Information Bulletin

Load Measurement

FT-LBS (foot-lbs) = Torque

Foot-lbs torque applied by the drive head

- The accepted engineered measurement for torque is expressed as foot–pounds for foundation helical piles and tension anchors
- Torque is the measure of resistance required to rotate the helical pile or tension anchor as it advances through the soil
- The resistance from the soil is the soil displaced by the helix diameter and thickness cutting through the soil and the displacement of the soil from the pile or anchor shaft
- Soil boring logs are typically used to identify the soil present and the expected torque to advance and install the anchor
- Denser soils require greater torque for the same pile
- It is important to determine the anticipated torque required to install the helical pile or anchor so the shaft torque capacity is selected to withstand the applied torque
- Monitoring torque and comparing to the data confirms the load capacity of the pile or anchor

MacLean Dixie HFS
Building Solid Foundations

11411 Addison Avenue • Franklin Park, IL 60131
T: (847) 455-0014 F: (847) 455-0029 • www.macleandixie.com

Product Information Bulletin

Load Measurement

PSI vs. LBS-FORCE

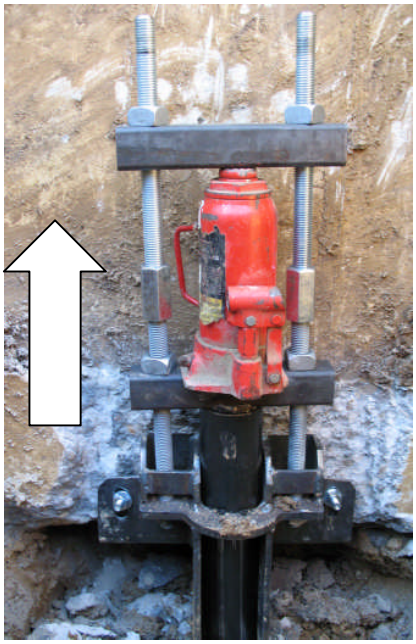
Pounds-force driving a resistance pile

- LBS-FORCE (pounds-force) is the measure for compression or tension loads
- Typically pounds force is used with resistance piles, when applying load to raise or jack up a structure or when testing installed piles
- If a gauge is used to measure the hydraulic pressure, then the pressure must be converted to pounds-force.

MacLean Dixie HFS
Building Solid Foundations

11411 Addison Avenue • Franklin Park, IL 60131
T: (847) 455-0014 F: (847) 455-0029 • www.macleandixie.com

Load Measurement



Pounds-force using a hydraulic cylinder (jack) to lift the structure (tension)

Pounds-force using a hydraulic cylinder to test pile in compression

Examples of conversion tables

PSI vs. TORQUE	
Pressure	Torque
500 psi	3,000 ft-lbs
1,000 psi	6,000 ft-lbs
2,000 psi	9,000 ft-lbs

PSI vs. POUNDS-FORCE	
Pressure	Force
500 psi	5,000 pounds-force
1,000 psi	10,000 pounds-force
2,000 psi	20,000 pounds-force

MacLean Dixie HFS
Building Solid Foundations

11411 Addison Avenue • Franklin Park, IL 60131
T: (847) 455-0014 F: (847) 455-0029 • www.macleandixie.com