

Torque Calculations

This applies to E-Drives, Flat Plates or any gear system

$$\text{Torque} = \text{Force} \times \text{Distance}$$

In the case of a boatlift, the distance is the radius from the center of rotation to the centerline of the cable. The force is the total weight being lifted.

Example: What is the torque required to lift 3000 pounds with a 1/4" cable wrapped around a 2" pipe? The nominal outside diameter of a 2" pipe is 2.375". The distance in this case would be half the pipe diameter plus half the cable diameter, which equals 1.3125". The force is the cable pull – 3000 pounds. The torque would be 1.3125" x 3000 lbs. = 3937.5 inch pounds.

We realize that the application of Gear drives varies greatly depending on many factors. We would recommend that all applications be calculated based on the example below. The example is using hypothetical numbers which would change according to individual design. Plug the appropriate values into the formula below to determine the torque on each motor.

- 10,000 lb. lift divided by 2 motors equals 5000 lbs per motor
- 5000 lb. motor divided by 2 part line equals 2500 lbs per motor
- 2500 lbs per motor divide by .85 (friction factor) equals 2941 lbs per motor
- 2941 lbs per motor x radius (2.5" cable drum / 2 = 1.25) equals 3676
FORCE x DISTANCE = inch lbs of torque/motor

*Note: Torque is Force times Distance

Radius is Diameter of cable winder plus cable divided by 2

The E-Gear is an enclosed system and besides calculating the torque being applied to each motor, we recommend running a voltage check on each motor under load. This check will indicate what stress is being applied to the gear. If the amps go up and the volts drop this indicates the gear is being stressed by load or low voltage and should be checked.