

Question:

a plumber helper is a rubber cup with a 5 inches, what is the maximum suction it can exert on a clogged pipe. How much force is needed on the handle to produce this suction

Solution:

To give a precise answer some dimensions are to be known but for the upper level the following – rather rough – estimation may be taken: the maximum suction F app. equals to the needed force

$f = 0.25\pi D^2 p_A = 0.25 \cdot 3.14 \cdot 25 \cdot 2.54^2 \cdot 10^{-4} \cdot 10^5 = 1.27$ (kN), where p_A - atmospheric pressure, D - plumber helper diameter.

The answer:

$$F \approx f = 1.27 \text{ kN}$$