Pumps – Scaling

Archimedes screws at the SeaWorld Adventure Park
https://www.math.nyu.edu/~crorres/Archimedes/Screw/applications/SeaWorld_screw_big.jpg

How does a centrifugal pump work? https://www.youtube.com/watch?v=Vhc-hEjh12I
Different types of centrifugal pumps: https://www.youtube.com/watch?v=2W4bTrV412A
Different types of positive displacement pumps: https://www.youtube.com/watch?v=4OJTN0M1DBk

Pumps – Scaling

Pump Similarity

$H, \dot{W}, \eta = fcns(\rho, \mu, \omega, D, Q) \Rightarrow \Psi, \Pi, \eta = fcns(\Phi, Re)$

$\Psi = \frac{gH}{\omega^2 D^2}$ $\Pi = \frac{\dot{W}}{\rho\omega^3 D^5}$ $\eta = \frac{\rho Q g H}{\dot{W}}$ $\Phi = \frac{Q}{\omega D^3}$ $\mathrm{Re} = \frac{\rho\omega D^2}{\mu}$

Pumps – Scaling

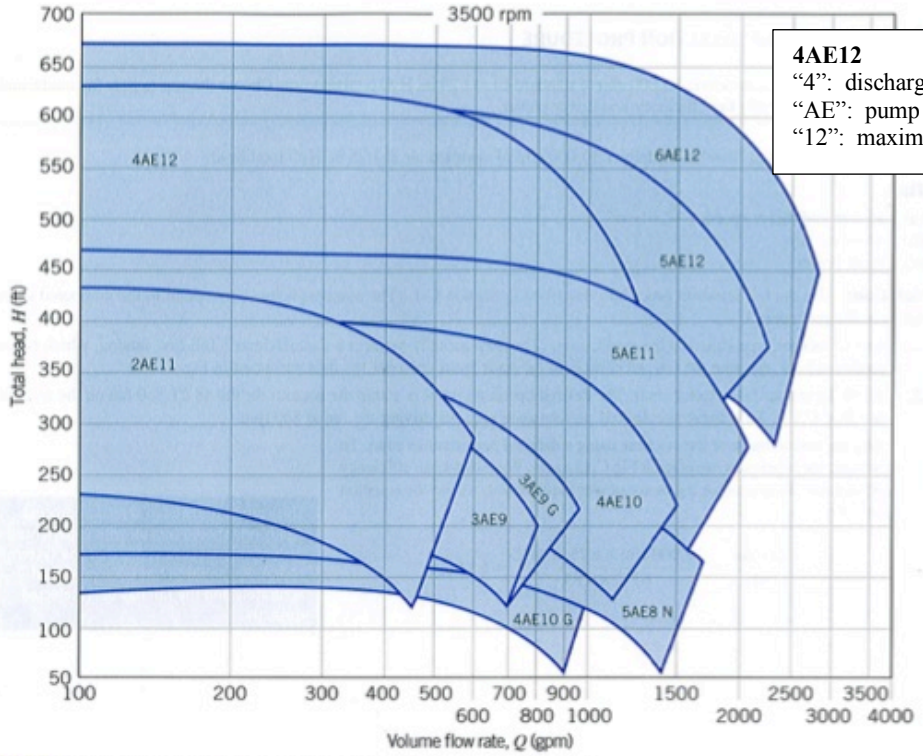
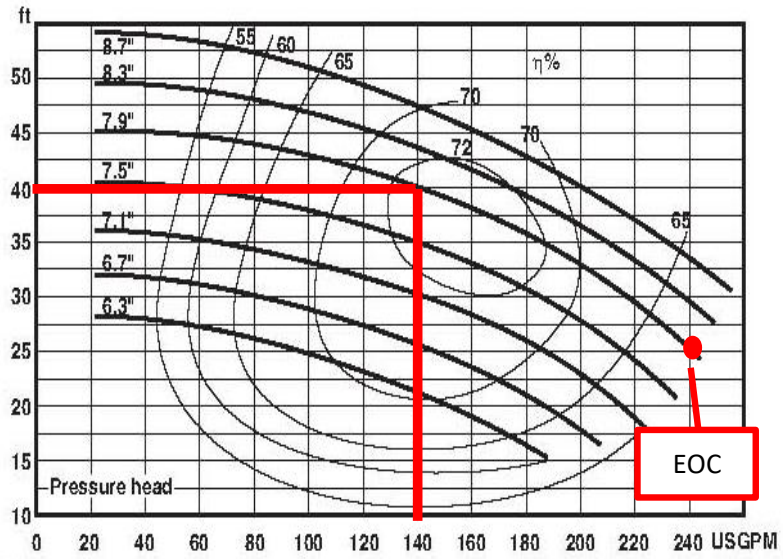
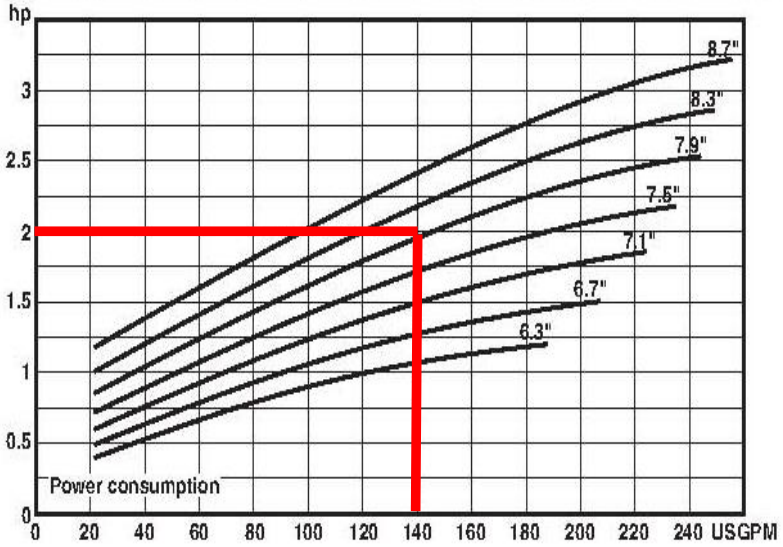


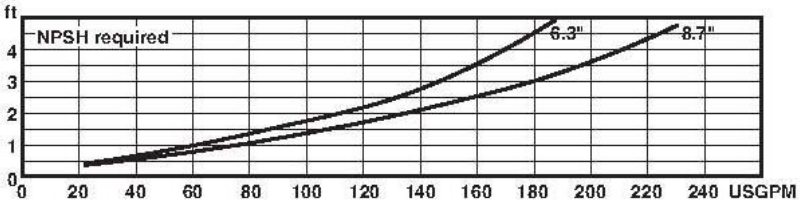
Fig. C.1 Selector chart for Peerless horizontal split case (series AE) pumps at 3500 nominal rpm.

4AE12
"4": discharge line size in inches
"AE": pump model
"12": maximum diameter of impeller, in inches

Pumps – Scaling







https://www.mgnewell.com/wp-content/uploads/2017/07/Understanding-Pump-Curves.pdf