Example Hydraulic system

5-57E. For the fluid power system of Figure 5-40, the following data are given:

cylinder piston diameter = 8 in
cylinder rod diameter = 4 in
extending speed of cylinder = 3 in/s

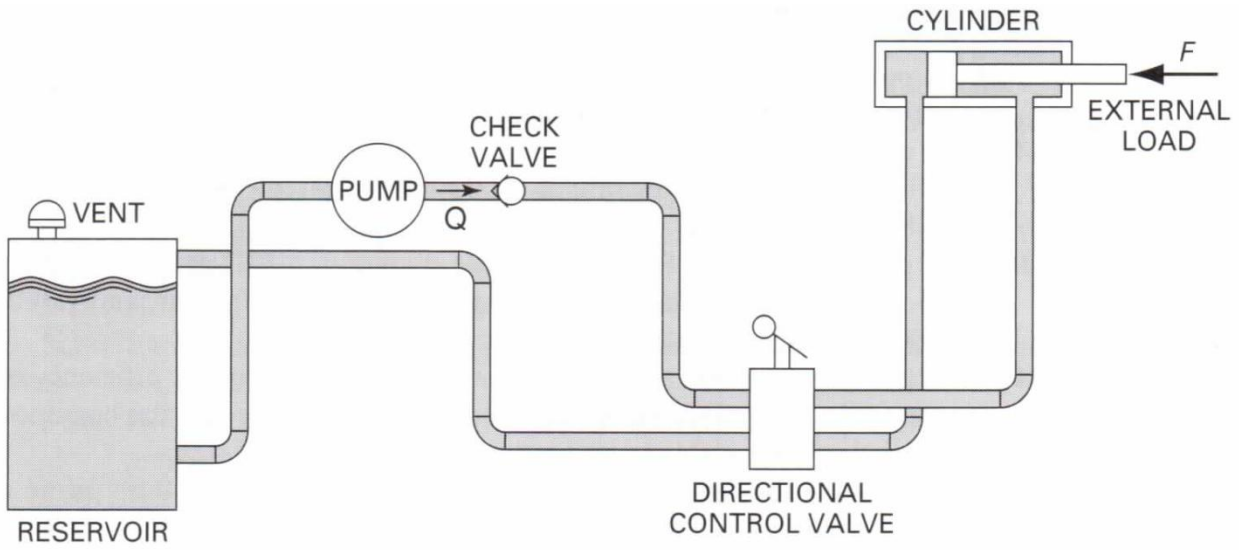

Figure 5-40. System for Exercise 5-57.

external load on cylinder = 40,000 lb
pump volumetric efficiency = 92%
pump mechanical efficiency = 90%
pump speed = 1800 rpm
pump inlet pressure = −4.0 psi

The total pressure drop in the line from the pump discharge port to the blank end of the cylinder is 75 psi. The total pressure drop in the return line from the rod end of the cylinder is 50 psi. Determine the

a. Volumetric displacement of the pump
b. Input HP required to drive the pump
c. Input torque required to drive the pump
d. Percentage of pump input power delivered to the load