

36.46 A condenser water pump is located $5ft$ below the top of the waterline of a cooling tower basin. The leaving water temperature is $75^{\circ}F$. The friction loss on the suction side of the pump is $9ft$ of head. What is the net positive suction head available?

- A. $4ft$
- B. $9ft$
- C. $29ft$
- D. $37ft$

Refer to the first formula in the Reference Handbook for **Net Positive Suction Head Available**. Calculate the **NPSHA** by taking the sum of the atmospheric pressure, h_p , and the height of the fluid column on the suction side of the pump, h_z , minus the vapor pressure, h_{vpa} , and the losses on the suction side, h_f . The vapor pressure is the saturation pressure at the temperature of the water and can be found using the **Properties of Saturated Water and Steam** table by temperature.

$$h_{vpa} = P_{sat@75^{\circ}F} = 0.43psi \left(2.31 \frac{ft}{psi} \right) \approx 1ft$$

$$NPSH_A = h_p + h_z - h_{vpa} - h_f$$

$$NPSH_A = 34ft + 5ft - 1ft - 9ft = 29ft$$

Answer C