

Through a refinery, fuel ethanol is flowing in a pipe at a velocity of 1 m/s and a pressure of 101300 Pa. The refinery needs the ethanol to be at a pressure of 2 atm (202600 Pa) on a lower level. How far must the pipe drop in height in order to achieve this pressure? Assume the velocity does not change. The density of ethanol is 789 kg/m³ and gravity g is 9.8 m/s².

$$\frac{1}{2}\rho v_1^2 + \rho g h_1 + p_1 = \frac{1}{2}\rho v_2^2 + \rho g h_2 + p_2$$

$$\rho g h_1 + p_1 = \rho g h_2 + p_2$$

$$\Delta h = h_2 - h_1 = \frac{p_1 - p_2}{\rho g} = \frac{101300 - 202600}{789 \times 9.8} = -13.1 \text{ m}$$

