Steam separator 6

The saturated vapor leaves a liquid - steam separator at a mass flow rate of 270 kg/s. The quality of the mixture in the liquid – steam separator is 90%.

What is the mass flow rate of the saturated mixture entering the liquid – steam separator?

Answer: 300 kg/s

Explanation: A quality of 90%, $x = 0.90$ means that 90% of the mass of the mixture is a saturated vapor and 10% a saturated liquid. The mass flow rate of the saturated vapor is: $\dot{m}_{sat.vapor} = x \cdot \dot{m}_{mix}$ kg/s. From this follows for the mass flow rate of the saturated mixture entering the liquid-s team separator: $\dot{m}_{mix} = \frac{dotm_{sat.vapor}}{x} = \frac{270}{0.9} =$ 300 kg/s