Given: $kJ := 1000J$

R-134a enters the capillary tube of a refrigerator as a saturated liquid at 0.8 MPa and is throttled to a pressure of 0.12 MPa.

$P_1 := 0.8MPa \qquad P_2 := 0.12MPa$

Required:

Determine the quality of the R-134a at its final state and the temperature drop during the process.

Solution:

Going to Table A-12 @ $P_1 = 0.8 \cdot MPa$ & $x = 0$ shows

$$h_1 := 95.48\frac{kJ}{kg} \qquad T_1 := 31.31\,°C$$

For a capillary tube, the enthalpy during the process remains constant so

$$h_2 := h_1 = 95.48 \cdot \frac{kJ}{kg}$$

Going to Table A-12 @ $P_2 = 0.12 \cdot MPa$ & $h_2 = 95.48\frac{kJ}{kg}$ shows that the state is in the two phase mixture region.

$$h_f := 22.47\frac{kJ}{kg} \qquad h_g := 236.99\frac{kJ}{kg} \qquad T_2 := (-22.32)\,°C$$

$$\boxed{x := \frac{h_2 - h_f}{h_g - h_f} = 0.34}$$

The temperature difference across the device is

$$\boxed{\Delta T := T_2 - T_1 = -53.63 \cdot K} \qquad \Delta T = -53.63 \cdot \Delta °C$$