

2019

[A4]

1) 「円管の外壁温度は内壁温度と異なる」として

$$Q = hA\Delta T = 8.7 \times \pi \times 0.0486 \times (120 - 25) = \underline{126 \text{ W}}$$

$$\frac{0.126 \text{ kW/s} \times 3600 \text{ s/h}}{2.2 \times 10^3 \text{ kJ/kWh}} = \underline{0.206 \text{ kWh}}$$

全体の熱抵抗は $R_{\text{tot}} = \frac{l}{kA_{\text{ext}}} + \frac{1}{hA_{\text{int}}}$

$$A_{\text{ext}} = \frac{\pi(d_{\text{out}} - d_{\text{in}})L}{2} = 0.1414L$$

$$\frac{1}{hA_{\text{int}}} = 0.753L, \quad \frac{l}{kA_{\text{ext}}} = 1.48 \times 10^{-3}$$

$$\therefore \frac{1.48 \times 10^{-3}L}{0.7545L} \times 100 = \underline{0.2\%}$$

$$2) \frac{l'}{kA_{\text{ext}'}} = 2.73L, \quad \frac{1}{hA_{\text{int}'}} = 0.798L$$

$$\therefore Q = \frac{\Delta T}{R} = \frac{95}{2.73 + 0.798} = \underline{26.9 \text{ W}}$$

断熱材の抵抗は全体の

$$\frac{2.73L}{2.73L + 0.798L} \times 100 = \underline{77\%}$$

$$\Delta T = Q \cdot R = 27 \times 0.798 = 21.5$$

$$\therefore \text{断熱材外壁温度は } \underline{46.5^\circ\text{C}}$$