

46. The first law requires that $Q_H = W + Q_L$, while the second law requires that

$$\varepsilon = \frac{W}{Q_H} \leq 1 - \frac{T_L}{T_H} .$$

Thus, we see that the first law is violated in engine A; both laws are violated in B; the second law is violated in C; and, neither of the laws is violated in D.