

$$dS = \underbrace{\frac{dQ}{T}} + \underbrace{\frac{dW_{diss}}{T}} \quad dW_{diss} \geq 0$$

dS_g
↓
Entropietransport

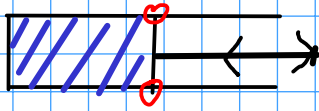
dS_i
↓
Entropierzeugung

Wärme transfer:

$$dS_1 = -\frac{dQ}{T_1} \quad dS_2 = \frac{dQ}{T_2}$$

$$dS = dS_1 + dS_2 = dQ \left(-\frac{1}{T_1} + \frac{1}{T_2} \right) > 0$$

Irreversible Kreisprozesse



$$W_g = W_v + W_{diss}$$

Kompression:

$$W_v > 0, W_{diss} > 0 \rightarrow W_g > W_v$$

Expansion

$$W_v < 0, W_{diss} > 0$$

$$|W_{diss}| < |W_v|$$

$$|W_g| < |W_v|$$

Kreisprozessarbeit

$$W_k = \sum_i W_{g,i}$$

$$|W_k| < \sum_i W_{v,i}$$