

4. How to calculate capacity

Under the temperatures measurement of the air at the inlet and the outlet of the indoor unit mentioned above, the capacity is calculated by the use of psychrometric chart.

For reference, the example will be shown as follows.

■ How to calculate the capacity of air conditioner

$$\begin{aligned} &\text{Cooling capacity (kcal/h)} \\ &= \{(\text{Enthalpy of inlet air (kcal/kg)}) \\ &\quad - (\text{Enthalpy of outlet air (kcal/kg)}) \\ &\quad \times 1/\text{Specific volume of outlet air (kg/m}^3) \\ &\quad \times \text{Air volume (m}^3/\text{h)} \end{aligned}$$

Example for cooling

Conditions Inlet air: BD temp. 30°C WB temp. 24°C
 Outlet air: BD temp. 20°C WB temp. 18.5°C
 Air volume: 800m³/h

From psychrometric chart,
 Enthalpy of inlet air: 73kJ/kg (17.2kcal/kg)
 Enthalpy of outlet air: 53kJ/kg (12.5kcal/kg)
 Specific volume of outlet air: 0.85m³/kg,
 are found. When these are substituted for the formula mentioned above,

$$\begin{aligned} \text{Cooling capacity in kcal} &= (17.2 - 12.5) \times 1/0.85 \times 800 \\ &\cong 4423(\text{kcal/h}) \\ \text{Cooling capacity in kJ} &= (73 - 53) \times 1/0.85 \times 800 \\ &\cong 18.823(\text{kJ/h}) \end{aligned}$$

$$\begin{aligned} &\text{Heating capacity KJ / h (kcal/h)} \\ &= 1.005 \text{ kJ/kg}\cdot\text{k}(0.24 \text{ kcal/kg}\cdot\text{°C}) \times (\text{Temp. of outlet air (°C)} \\ &\quad - \text{Temp. of inlet air (°C)}) \times \text{Air volume (m}^3/\text{h)} \\ &\quad \times 1/\text{Specific volume (kg/m}^3) \end{aligned}$$

Conditions Inlet air temp.: 15°C
 Outlet air temp.: 45°C
 Air volume: 800m³/h
 Specific volume: 0.91m³/kg

When these are substituted for the formula,

$$\begin{aligned} \text{Heating capacity} &= 1.005(0.24) \times (45 - 15) \times 800 \times 1/0.91 \\ &\cong 26,506 \text{ kJ/h (6330kcal/h)} \end{aligned}$$

