

COOLING LOAD CALCULATIONS/SIMULATION

Roof Material	Concrete	Steel Sheet Roofing
Roof Area	1,000 m ²	1,000 m ²
Temperature	30° C	30° C
Indoor Temperature	27° C	27° C
Calorie Load	250Kcal/h/m ² Load Calorie/ 1kw/h 860Kcal/h 250,000Kcal/h÷860Kcal/h=290.7kw/1,000 m ² Electric Power/1m ² : 0.2907kw	750Kcal/h/m ² Load Calorie/ 1kw/h 860Kcal/h 750,000Kcal/h÷860Kcal/h=872.1kw/1,000 m ² Electric Power/1m ² : 0.8721kw
Economic Effect	Given Energy-saving Effect: 10% 0.2907kw/m ² x 10% = 0.02907kw/m ² Assume air-conditioning cooling time to be: 5 hours/day, 25 days/month, and 3 months /year 0.02907kw/m ² x 5h x 25d x 3months = 10.901kw/m ²	Given Energy-saving Effect: 10% 0.8721kw/m ² x 10% = 0.08721kw/m ² Assume air-conditioning cooling time to be: 5 hours/day, 25 days/month, and 3 months /year 0.08721kw/m ² x 5h x 25d x 3months = 32.704kw/m ²
Cost Savings	Electric Utility Rate: 11Yen/kw 10.901kw/m ² x 11Yen x 1,000m ² = 119,911 Yen	Electric Utility Rate: 11Yen/kw 32.704kw/m ² x 11Yen x 1,000m ² = 359,744 Yen
Amount of CO ₂ Reduction	Given CO ₂ : 0.378kg/kwh 10.901kw/m ² x 0.378kg/kwh x 1,000m ² = 4,121 kg	Given CO ₂ : 0.378kg/kwh 32.704kw/m ² x 0.378kg/kwh x 1,000m ² = 12,362 kg

Surface Temperature Comparison								
Ordinary Paint (oC)	24.6	30	40	50	60	70	80	90
Heat Exchange Paint (oC)	24.6	27.4	31.3	37.3	42.9	48.5	53.9	60.5
Temperature Difference (oC)	0	2.6	8.7	12.7	17.1	21.5	26.1	29.5
Ratio (%)		8.7	21.8	25.4	28.5	30.7	32.6	32.8