

# Heat Shield Efficiency Simulations

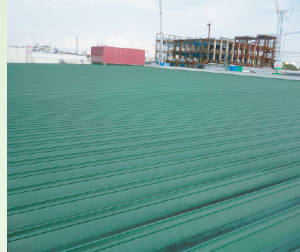
For a power saving efficiency simulation, you need to get information from your client in advance. Reduced electricity and electricity charges, CO2 emission amount etc. are simulated in case of heat shield coating and then the estimated values are calculated.

## (example)

Place: Tokyo  
 Factory: Area 3000m<sup>2</sup>  
 Roof: Folded-plate roof

## (before coating)

Outside temp. 38.7°C  
 Roof surface temp. 72.5°C



## (after coating)

Outside temp. 35.8°C  
 Roof surface temp. 37.0°C



### \* Heat penetration quantity

Heat penetration quantity = heat transmission coefficient rate x outside/inside temperature difference  
 (Roof temp. - Indoor temp.)

	Uncoated	Coated
Roof coating area (m <sup>2</sup> )	3000	
Estimated indoor temp. (°C)	28	
Heat transmission coefficient rate(K)	3.57	3.51
Roof temp. (°C)	55	38
Heat penetration quantity (before coating)	289,170 kcal/h	
Heat penetration quantity (after coating)	105,300 kcal/h	

### \* Reduced heat quantity

Reduced heat quantity = Heat transfer loss (uncoated) - Heat transfer loss (coated)

Reduced heat quantity (heat quantity difference)	183,870 kcal/h
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### \* Equivalent power sum

Reduced heat quantity ÷ 1,720 kcal x summer days x Air conditioner operating hours x sunshine rate

1kw = 860kcal x2	1720
Summer days	101
Air conditioner operating hours (a day)	8.0
Sunshine rate	0.55
Reduced heat quantity	47,507 kwh

### \* Reduced electricity charges

Conversion to electricity charges = reduced electricity x electricity charges (yen/1kwh) x consumption tax

Electricity charges per 1kwh (yen)	19
Reduced electricity charges	902,631 yen

### \* Reduced CO2 emission amount

(official) Reduced electricity amount x emission factor (2010 Tokyo Electric Power Co.: 0.281 kg - CO<sub>2</sub>/kwh)

Emission factor	0.28
Reduced CO2 amount	13,349kg

### Conditions:

- Roof coating area/ 3000 m<sup>2</sup>
- Set indoor temp./ 28°C
- Heat transmission coefficient rate(K)/ calculated in consideration of radiant heat of a building structure
- Roof temp./ actual value by the paint maker
- Air conditioning efficiency/ COP(2)
- Air conditioner operating hour/ 8 hours
- Summer days/ 101 days
- Sunshine rate/ 55% (data: 2011 Tokyo)
- Electricity charges(1kwh)/ 19 yen
- Emission factor/ by Tokyo Electric Power Co.

### (note: by Environmental manager)

The building skin of this object accumulates a lot of heat in summer time. It is assumed that radiant heat going into inside the building occurs for a long time. With heat shield coating, heat accumulation can be avoided. And by reducing the temperature increase, high air conditioning efficiency and lower air conditioning load are possible, thus a lot of power saving can be expected.

<b>Reduced Heat Quantity</b> 183,870 kcal/h	<b>Reduced Electricity</b> 47,509 kwh
<b>REDUCTION EFFICIENCY DURING 4 MONTHS IN SUMMER</b>	
<b>Reduced Electricity Charges</b> about 902,631 yen	<b>Reduced CO2 amount</b> about 13.4 ton