



Thermal Insulation Comparison between C-Lite Light Weight Concrete Block and Normal Brick

Test Procedure

C-Lite light weight concrete blocks and normal bricks were provided by C – LITE Concrete Co., Ltd. for a thermal insulation comparison test. Size of each sample was approximately $6 \times 13 \times 3$ cm as shown in Figure 1. In order to compare the thermal insulation of the samples, a house model was built to simulate the situation. Twelve of each sample was placed on top of the ceiling as shown in Figure 2a. Sport light used as a heat source was directly shined on the samples as shown in Figure 2b. Temperatures were recorded both on top of the ceiling and inside the house using a high speed data logger for 7 minutes; however, samples had been heated for 10 minutes prior to recording. Two-Samples T-Test method was performed at the 95% confidence level for the statistical comparison of different temperatures from top of the ceiling and inside the house. The null hypothesis was set as “An average different temperature of using C-Lite concrete block was equal to that of using normal brick.”

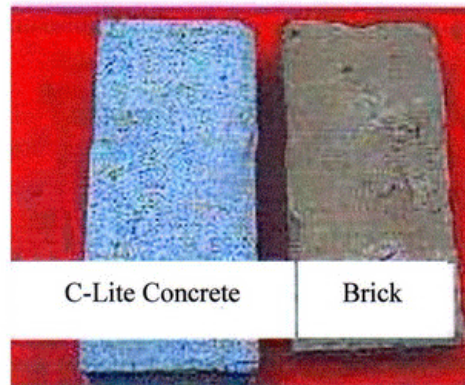


Figure 1. Samples received for testing.

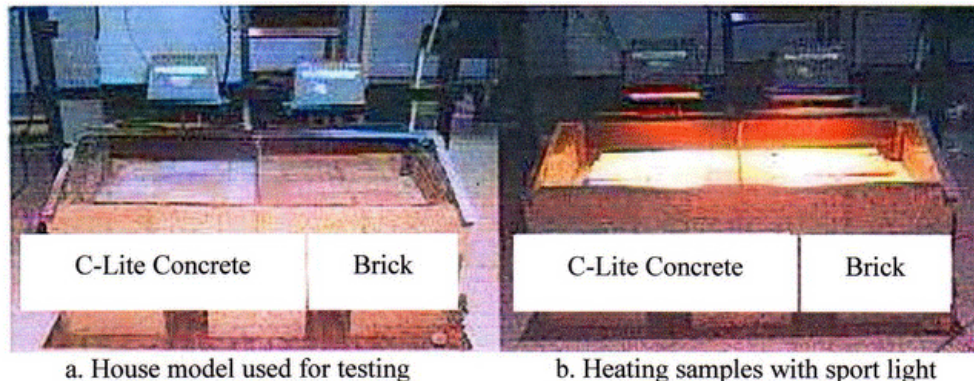


Figure 2. Samples were tested in a simulated situation.



Result

Thermal insulation of C-Lite concrete block and normal brick were analyzed as shown in Table 1.

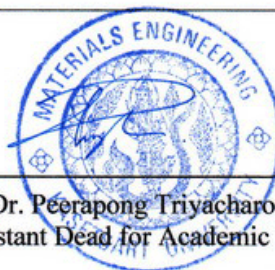
Table 1. Comparison of average temperatures between using C-Lite concrete block and normal brick.

	C-Wall Plus Plate	Normal Concrete Plate
Average temperature of the ceiling	$99.13 \pm 0.01^{\circ}\text{C}$	$75.50 \pm 0.01^{\circ}\text{C}$
Average temperature of the inside of the house	$28.21 \pm 0.01^{\circ}\text{C}$	$34.72 \pm 0.01^{\circ}\text{C}$
Average different temperatures	$70.92 \pm 0.01^{\circ}\text{C}$	$40.78 \pm 0.01^{\circ}\text{C}$
%Reduction of average temperature	71%	54%

From the statistical analysis at 95% confidence level, it shows that the average different temperature of the ceiling and inside the house by using C-Lite concrete block was in the range of $70.89^{\circ}\text{C} - 70.94^{\circ}\text{C}$ and that of by using the normal brick was in the range of $40.75^{\circ}\text{C} - 40.80^{\circ}\text{C}$. From the difference analysis between average different temperatures using Two-Sample T-Test method, it could be concluded that the average different temperature from using C-Lite concrete block was significantly higher than that of from using the normal brick at 95% confidence level, as shown in Table 2. In the other word, C-Lite concrete block is a better thermal insulator than the normal brick.

Table 2. Statistical analysis of difference between using C-Lite concrete block and normal brick.

	No. of Data	Average Diff. Temp.	Standard Deviation	Standard Error
C-Lite concrete block	4649	70.92	0.951	0.014
Normal brick	4649	40.78	0.835	0.012
Difference	4649	30.14	1.421	0.021
95% Confidence Intervals for difference = 30.103 – 30.185				



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Thermal Insulation Comparison between Light Weight Concrete and Normal Concrete

Test Procedure

Light weight concrete plates (C-Wall Plus) and normal concrete plates were provided by C – LITE Concrete Co., Ltd. for a thermal insulation comparison test. Each plate was in size of 20×20×1.5 cm. In order to compare the thermal insulation of concrete plates, a house model was built to simulate the situation. Two plates of each concrete type were placed on the ceiling of the house as shown in Figure 1. Sport light used as a heat source was directly shined on the concrete plates. Temperatures were recorded both on top of the ceiling (top of the plates) and inside the house (bottom of the plates) using a high speed data logger for 7 minutes. Two-Samples T-Test method was performed at the 95% confidence level for the statistical comparison of different temperatures from top of the ceiling and inside the house between using C-Wall Plus plates and normal plates. The null hypothesis was set as “An average different temperature of using C-Wall Plus plate was equal to that of using normal concrete plate.”

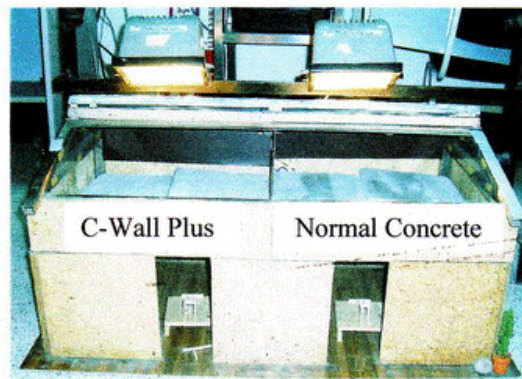


Figure 1. House model using for testing.

Result

Thermal insulation of C-Wall Plus plate and normal concrete plate were analyzed as shown in Table 1.

Table 1. Comparison of average temperatures between using C-Wall Plus plate and normal concrete plate.

	C-Wall Plus Plate	Normal Concrete Plate
Average temperature of the ceiling	34.29 ± 0.01°C	34.29 ± 0.01°C
Average temperature of the inside of the house	23.66 ± 0.01°C	24.31 ± 0.01°C
Average different temperatures	10.87 ± 0.01°C	10.21 ± 0.01°C
%Reduction of average temperature	31%	29%



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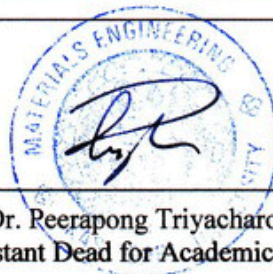
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From the statistical analysis at 95% confidence level, it shows that the average different temperature of the ceiling and inside the house by using C-Wall Plus plate was in the range of 10.86°C – 10.88°C and that of by using the normal concrete plate was in the range of 10.20°C – 10.22°C . From the difference analysis between average different temperatures using Two-Sample T-Test method, it could be concluded that the average different temperature from using C-Wall Plus concrete plate was significantly higher than that of from using the normal plate at 95% confidence level, as shown in Table 2. In the other word, C-Wall Plus plate was a better thermal insulator than the normal concrete plate.

Table 2. Statistical analysis of difference between using two types of concrete plates.

	No. of Data	Average Diff. Temp.	Standard Deviation	Standard Error
C-Wall Plus Plate	4649	10.868	0.351	0.005
Normal Concrete Plate	4649	10.211	0.351	0.005
Difference	4649	0.657	0.149	0.002

95% Confidence Intervals for difference = 0.653 – 0.661



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