

CHAPTER V

DISCUSSION AND CONCLUSION

After completing the research process as seen in Chapter III and IV, the discussion and conclusion can be drawn as described below.

5.1. Discussion

5.1.1. The Room Temperature

Based on the experiment and result of the ambient or room temperature test obtained in Section 4.1 shows that the room temperature was had a significant effect, both the constant temperature test (represented a condition to turn-on the air-conditioner) and the natural temperature test (represented a condition to turn-off the air-conditioner). All curves result of the test specimens are different according to the change of room temperature that this means 10cm exterior wall of EPS foam material, which thermal resistance of $2.82 \text{ }^{\circ}\text{C}\cdot\text{m}^2/\text{W}$

of the four-way hot box tool, released an amount of heat leaking out from all four metering cells. Thus, to save energies and moneys by turning-off the air-conditioner was not possible for the four-way hot box test.

5.1.2. The Starting Ambient Temperature

The analysis of test result in Section 4.2 about varying the starting ambient temperature showed that the resultant curves of the test specimens also varied. This means that the reference curves to approximate thermal resistance of the test materials would be invalid when the starting ambient temperature different from 26.5 °C at which the reference curves was constructed. Therefore, all series of experiments must be conducted at the same starting ambient temperature as the reference charts were constructed.

5.1.3. The Heating Speed

Finding and comparing graphic result of two different heating speed shows that the variable speed of heat source of a light bulb can provide different results of air temperature heat flow from heating cell to the metering cells. Therefore, all specimens testing should be conducted at the same testing speed as the reference chart was constructed.

5.1.4. The Testing Periods

Observation of each graphic result obtained from all experiments in Chapter IV shows that the gap between each curve of the tested samples were not quite different from each other when the heating temperature rising up to a constant temperature of 60 °C. After the heat source heat up to speed limit of constant temperature of 60 °C, which took approximately 90 minutes, those curves start to separate clearly. Therefore, the shortest period of the test may be 120 minutes or 2 hours.

5.2. Conclusion

In conclusion, the shortest period saving time and money to run on the four-way hot box test is possibly 2 hours for each test series. However, the air conditioner must be turned on until reaching the temperature level at which the reference chart was made. Then, the air conditioner unit must be continuously on to keep that temperature level throughout the test.

Suggestions

A series of test should be run with one or two reference specimens to check any error results which can happen accidentally within the four-way hot box test procedure.

Recommendation for Further Research

Using “correcting factors” is another way to run the four-way hot box without using any air conditioner unit to control the environment. Therefore, the next research project to develop this tool is about finding “correcting factors” for uncontrolled environmental temperature.

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