World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:18, No:08, 2024

Evaluation of Thermal Comfort and Energy Consumption in Classroom

Authors : I. Kadek Candra Parmana Wiguna, Wiwik Budiawan, Heru Prastawa

Abstract : Semarang has become not only a metropolitan city but also a centre of government that has experienced significant changes in urban land use. Temperature increases in urban areas result from the expansion of development. The average temperature in Semarang reached 27.10°C to 29.60°C in 2022. The state of thermal sensation is very dependent on the mode of operation; Industrial Engineering building is mostly equipped with an air conditioner (AC). This study aims to analyze the thermal comfort level and energy consumption of air conditioners in classroom of industrial engineering. Participants in this study amounted to 31 students with data collection for 4 weeks. Results of the physical environment are Ta in: 25.52°C, Ta out: 32.71 °C, Rh in: 61.14%, Rh out: 59.43%, and Av in: 0.037 m/s. The results of clothing insulation are 41% of the respondents belonged to the categories 0.31 - 0.5 clo (summer domming) and 0.51 - 0.70 clo (spring clothing). Regarding the predicted mean vote (PMV), the average value is 0.63, and only 14.85% result of the predicted percentage dissatisfied (PPD). The neutral temperature with measurement Griffith's constant 0.5/°C was 27.16°C, but the statistical test results show that the comfort temperature to use TSV ≤ 0 which is 28.55°C. The highest average power (watt) measurement results during week 3, which is 1613.65 watts. It is concluded in this study that the thermal comfort conditions in the classroom are adequate and acceptable to more than 90% of respondents.

Keywords : thermal comfort, PMV/PPD, air conditioner, TSV
Conference Title : ICESD 2024 : International Conference on Environmentally Sustainable Development
Conference Location : Tokyo, Japan
Conference Dates : August 15-16, 2024