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Performance evaluation of a domestic split-type air conditioner in South Africa, a case study of ALICE

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Abstract content
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Air conditioners (AC) are gaining grounds in the South African community especially in the residential and commercial sectors. Approximately 2.6 million air conditioners were installed by 2010 and an anticipated 73% increase in this number is expected to be installed by 2020. The split-type is more popular than other types of AC and simple to install and maintain. Increase in the utilization of this device without strategic controlled measures implies increase in power and energy consumption, defeating the purpose for which South African Electricity public Utility company initiated the Demand Side Management and Integrated Demand Management programs. Hence, there is a need to ensure that these systems are energy efficient to minimize constraint on the national grid. The paper presents an evaluation of the electrical and thermodynamic performance of a domestic split-type AC by demonstrating how the temperature of the refrigerant at some critical points in both the indoor and outdoor unit, relative humidity and ambient temperature (RH/T) influence the Coefficient of Performance (COP) and power consumption of the system with the aid of a regression model. The split-type AC system was sized for a living room of a residential home in Alice, Eastern Cape Province. A power meter, temperature and RH/T sensors were used to build up the Data Acquisition System. The result obtained revealed that the regression model could be conveniently used to depict the COP and the power consumption of the system since the determination coefficient of COP and Power consumption were 0.98 and 0.97 respectively. It also showed the impact of temperature at critical points in the AC and RH/T on the performance of the system.

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and his / her institution

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