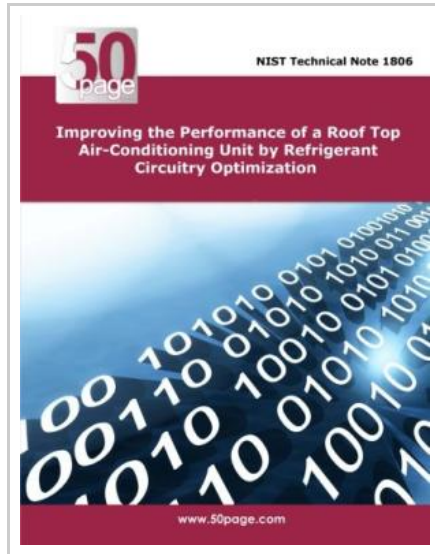




Improving the Performance of a Roof Top Air-Conditioning Unit by Refrigerant Circuitry Optimization

By NIST

CreateSpace Independent Publishing Platform. Paperback. Book Condition: New. This item is printed on demand. Paperback. 74 pages. Dimensions: 11.0in. x 8.5in. x 0.2in. This study demonstrates the performance improvement of an air-to-air roof top unit (RTU) achieved by optimizing an evaporators refrigerant circuitry using evolutionary algorithms. The subject of this study is a unit with a cooling capacity of 7.5 Tons (26.4 kW). The RTU employs two separate refrigerant cycles having separate compressors, condensers, and thermostatic expansion valves (TXV) but using a single evaporator slab in which two separate refrigerant circuits are implemented. We modified the RTU by replacing the refrigerant-to-air condensers with water cooled brazed plate heat exchangers in order to facilitate testing. Performance tests were conducted in a conditioned environmental chamber in line with AHRI standard 340360; in order to accomplish this, we maintained the liquid line saturation pressure and subcooling from the manufacturers test data by adjusting the condenser water flow rate and temperature. We also measured the in-situ air velocity profile using Particle Image Velocimetry (PIV), a non-intrusive, laser-based technique. The measurements showed that the range of air velocities passing through the heat exchanger varied from 0.5 ms⁻¹ to 3.0 ms⁻¹, with the...



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