

Efficient Liquid Desiccant Regeneration for Fresh Air Dehumidification Application

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Abstract : Fresh Air Dehumidifier having a capacity of 1 TR has been developed by Heat Pump Laboratory at IITB. This fresh air dehumidifier is based on potassium formate liquid desiccant. The regeneration of the liquid desiccant can be done in two stages. The first stage of liquid desiccant regeneration involves the boiling of liquid desiccant inside the evacuated glass type solar thermal collectors. Further regeneration of liquid desiccant can be achieved using Low Temperature Regenerator, LTR. The coefficient of performance of the fresh air dehumidifier greatly depends on the performance of the major components such as high temperature regenerator, low temperature regenerator, fresh air dehumidifier, and solution heat exchangers. High effectiveness solution heat exchanger has been developed and tested. The solution heat exchanger is based on a patented aluminium extrusion with special passage geometry to enhance the heat transfer rate. Effectiveness up to 90% was achieved. Before final testing of the dehumidifier, major components have been tested individually. Testing of the solar thermal collector as hot water and steam generator reveals that efficiency up to 55% can be achieved. In this paper, the development of 1 TR fresh air dehumidifier with special focus on solution heat exchangers and solar thermal collector performance is presented.

Keywords : solar, liquid desiccant, dehumidification, air conditioning, regeneration, coefficient of performance

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