Claims

1. A dehumidifier configured for alternately cycling between a first operating configuration and a second operating configuration, the dehumidifier comprising:

a first desiccant bed configured for performing adsorption in the first operating configuration and for performing desorption in the second operating configuration; ~~and~~

a second desiccant bed configured for performing desorption in the first operating configuration and for performing adsorption in the second operating configuration, wherein the first desiccant bed and the second desiccant bed each comprise a heat exchange coil configured for allowing passage of fluid therethrough;

a cooling water supply configured for providing cooling fluid to the heat exchange coil of the first desiccant bed in the first operating configuration and for providing cooling fluid to the heat exchange coil of the second desiccant bed in the second operating configuration; and

a hot fluid supply configured for providing hot fluid to the heat exchange coil of the second desiccant bed in the first operating configuration and for providing hot fluid to the heat exchange coil of the first desiccant bed in the second operating configuration.

2. The dehumidifier of claim 1, further comprising an inflow channel and an outflow channel, wherein the first desiccant bed is disposed in a first flow channel between the inflow channel and the outflow channel, and wherein the second desiccant bed is

disposed in a second flow channel between the inflow channel and the outflow channel.

~~3. The dehumidifier of claim 1 or claim 2, wherein the first desiccant bed and the second desiccant bed each comprise a heat exchange coil configured for allowing passage of fluid therethrough.~~

~~4. The dehumidifier of claim 3, further comprising a cooling water supply configured for providing cooling fluid to the heat exchange coil of the first desiccant bed in the first operating configuration and for providing cooling fluid to the heat exchange coil of the second desiccant bed in the second operating configuration.~~

~~5. The dehumidifier of claim 4, further comprising a hot fluid supply configured for providing hot fluid to the heat exchange coil of the second desiccant bed in the first operating configuration and for providing hot fluid to the heat exchange coil of the first desiccant bed in the second operating configuration.~~

~~6.~~3. The dehumidifier of any preceding claim, wherein the first desiccant bed and the second desiccant bed each comprise a plurality of adsorbent cakes arranged in a zigzag configuration.

~~7.~~4. The dehumidifier of claim 3~~6 when dependent on any one of claims 3 to 5~~, wherein each adsorbent cake comprises a portion of heat exchange coil disposed between

two sheets of wire mesh, and wherein interstitial space around the portion of heat exchange coil defined between the two sheets of wire mesh is filled with silica gel.

~~8.~~5. The dehumidifier of claim 2 or any one of claims 3 ~~to 7~~or 4 when dependent on claim 2, further comprising a first additional heat exchange coil provided between the first desiccant bed and the outflow channel, and further comprising a second additional heat exchange coil provided between the second desiccant bed and the outflow channel.

~~9.~~6. The dehumidifier of claim ~~8~~6, wherein the first additional heat exchange coil is configured for passage of cooling fluid therethrough in the first operating configuration and for passage of hot fluid therethrough in the second operating configuration, and wherein the second additional heat exchange coil is configured for passage of hot fluid therethrough in the first operating configuration and for passage of cooling fluid therethrough in the second operating configuration.

~~10.~~7. The dehumidifier of claim 2 or any one of claims 3 to ~~9~~6 when dependent on claim 2, further comprising a further heat exchange coil provided in the outflow channel for cooling air channeled through the outflow channel to an air handling unit.

~~11.~~8. The dehumidifier of claim 2 or any one of claims 3 to ~~10~~7 when dependent on claim 2, wherein the first flow channel and the second flow channel are in open fluid communication at an upstream end of the outflow channel.

~~12.~~9. A method of dehumidification, the method comprising:

(a) a first desiccant bed of the dehumidifier performing adsorption as an adsorption bed, wherein the first desiccant bed performing adsorption comprises passing cooling fluid through a heat exchange coil of the first desiccant bed and a second desiccant bed of the dehumidifier performing desorption as a desorption bed, wherein the second desiccant bed performing desorption comprises passing hot fluid through a heat exchange coil of the second desiccant bed;

(b) the second desiccant bed performing adsorption as the adsorption bed, wherein the second desiccant bed performing adsorption comprises passing cooling fluid through the heat exchange coil of the second desiccant bed and the first desiccant bed performing desorption as the desorption bed, wherein the first desiccant bed performing desorption comprises passing hot fluid through the heat exchange coil of the first desiccant bed; and

(c) repeating the method from step (a).

~~13.~~10. The method of claim ~~12~~9, wherein the first desiccant bed performing adsorption comprises channeling incoming air from an inflow channel into a first flow channel housing the first desiccant bed, and wherein the second desiccant bed performing adsorption comprises channeling incoming air from an inflow channel into a second flow channel housing the second desiccant bed.

~~14. The method of claim 12 or 13, wherein the first desiccant bed performing adsorption comprises passing cooling fluid through a heat exchange coil of the first desiccant bed, wherein the second desiccant bed performing desorption comprises passing hot~~

~~fluid through a heat exchange coil of the second desiccant bed, wherein the second desiccant bed performing adsorption comprises passing cooling fluid through the heat exchange coil of the second desiccant bed, and wherein the first desiccant bed performing desorption comprises passing hot fluid through the heat exchange coil of the first desiccant bed.~~

~~15.~~11. The method of any one of claims ~~12 to 14~~9 or 10, further comprising additionally cooling air that has passed through the adsorption bed before channeling it to an air handling unit.

~~16.~~12. The method of any one of claims ~~12~~ 9 to ~~15~~11, further comprising additionally heating air that has passed through the adsorption bed before channeling it to the desorption bed.

13. The dehumidifier of claim 2 or any one of claims 3 to 8 when dependent on claim 2, further comprising: a first damper provided in the first flow channel between the inflow channel and first desiccant bed such that opening the first damper allows air to flow from the inflow channel directly into the first flow channel while closing the first damper prevents air from flowing from the inflow channel directly into the first flow channel; and a second damper provided in the second flow channel between the inflow channel and second desiccant bed such that opening the second damper allows air to flow from the inflow channel directly into the second flow channel while closing the second damper prevents air from flowing from the inflow channel directly into the second flow channel.

14. The method of claim 10 or any one of claims 11 or 12 when dependent on claim 10, wherein channeling incoming air from the inflow channel into the first flow channel housing the first desiccant bed comprises opening a first damper provided in the first flow channel between the inflow channel and first desiccant bed and closing a second damper provided in the second flow channel between the inflow channel and second desiccant bed, and wherein channeling incoming air from the inflow channel into a second flow channel housing the second desiccant bed comprises opening the second damper and closing the first damper.