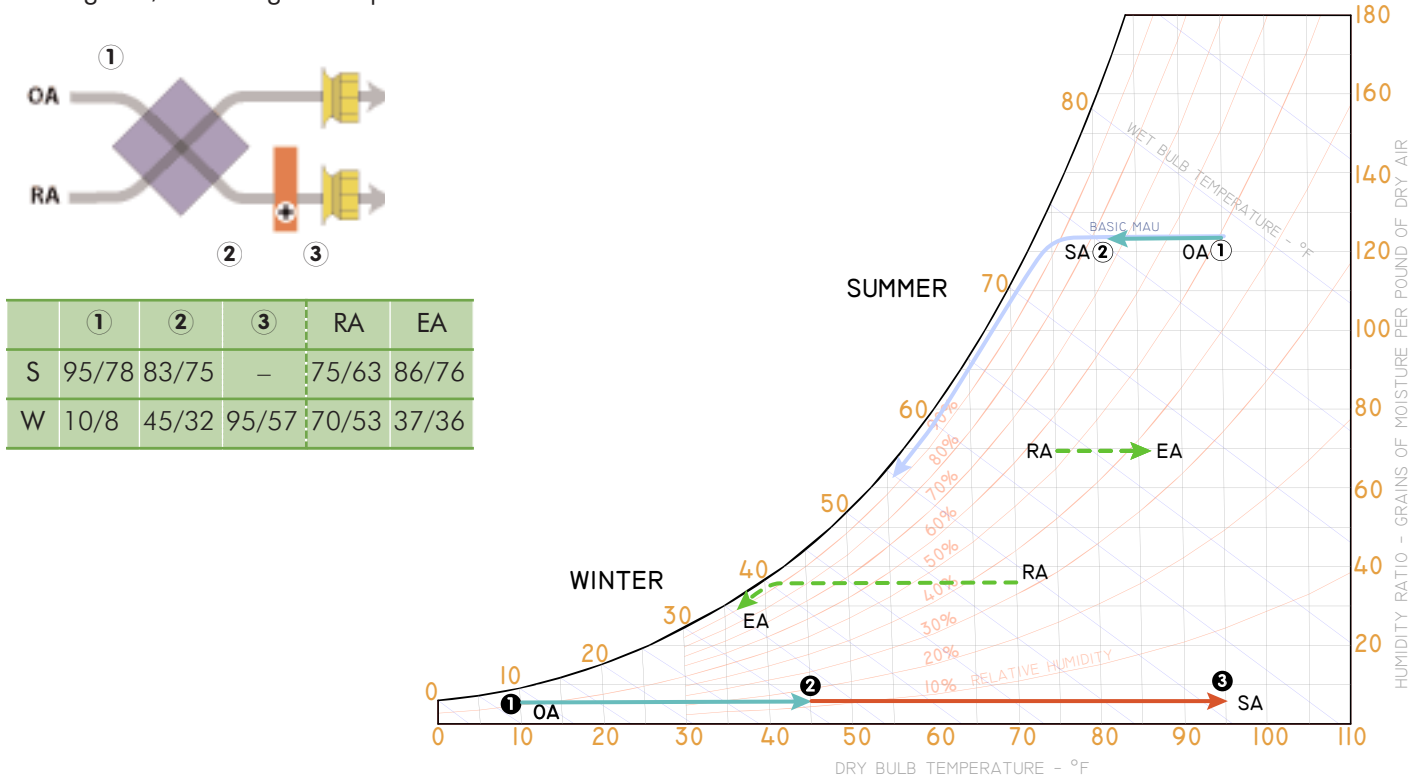


Process Sheet

Fixed Plate unit with heating

This page shows a psychrometric process for a typical 100% outdoor air energy recovery unit under standard design conditions. The numbers indicate different stages in the process where there is a transformation of the incoming air condition. The energy saving is compared to the energy needed to achieve the same supply conditions with a basic heating and/or cooling makeup air unit.



Process Calculation (per 1000 cfm)

Summer Operation

Plate effectiveness 65%

The fixed plate heat exchanger pre-conditions the air reaching the rooftop unit cooling coil by cooling it. The air entering the cooling coil is at a closer temperature to the desired room air, thereby requiring less mechanical cooling. As a result the cooling coil can be downsized compared to a no-recovery process.

①-② pre-cool section

$$Q_t = 4.5 \times 1000 \times (41.7 - 37.4) = 18 \text{ mbh (1.5 tons)}$$

Winter Operation

Plate effectiveness 62%

The fixed plate pre-conditions the air entering the heating coil by heating it. The air entering the heating coil is at a closer temperature to the desired room air, thereby reducing the amount of mechanical heating needed. As a result the heating coil can be downsized compared to a no-recovery process.

①-② pre-heat section

$$Q_s = 1.08 \times 1000 \times (45 - 10) = 37.8 \text{ mbh}$$

②-④ mechanical heating

$$Q_s = 1.08 \times 1000 \times (95 - 45) = 54.0 \text{ mbh}$$

Savings gained by energy recovery

cooling : 1.5 tons/1000 cfm

heating : 37.8 mbh/1000 cfm

Energy required without energy recovery

cooling: 6.8 tons/1000 cfm

heating : 91.8 mbh/1000 cfm

reheat: 16.2 mbh