SAHs are classified based on their design and operational characteristics.PCMs absorb and store excess heat during peak sunlight hours and release it when sunlight is unavailable, thereby ensuring a more stable and continuous heat supply.Research has shown that adding roughness elements, such as ribs or baffles, disrupts the laminar sublayer, increasing turbulence and enhancing convective heat transfer (Kumar et al., 2012) [12].Studies suggest that integrating PCMs with SAHs can extend heat retention for several hours, making them suitable for applications requiring sustained thermal energy (Tyagi et al., 2012) [13].Active systems utilize external power sources, such as fans, to enhance airflow and heat transfer, whereas passive systems rely on natural convection for air circulation.Studies indicate that double-pass configurations achieve higher thermal performance compared to single-pass systems due to increased residence time and better heat absorption (Alam & Kim, 2017) [11].The primary classifications include active, passive, and hybrid systems, each with distinct advantages and limitations.