

The present technology is generally directed to horizontal heat recovery and non-heat recovery coke ovens having monolith crowns. In some embodiments, an HHR coke oven includes a monolith crown that spans the width of the oven between opposing oven side walls. The monolith expands upon heating and contracts upon cooling as a single structure. In further embodiments, the crown comprises a thermally-volume-stable material. The crown may be an oven crown, an upcommer arch, a downcommer arch, a J-piece, a single sole flue arch or multiple sole flue arches, a downcommer cleanout, curvilinear corner sections, and/or combined portions of any of the above sections. In some embodiments, the crown is formed at least in part with a thermally-volume-stable material. In further embodiments, the crown is formed as a monolith (or several monolith segments) spanning between supports such as oven sidewalls. In various embodiments, the monolith and thermally-volume-stable features can be used in combination or alone. These designs can allow the oven to be turned down below traditionally feasible temperatures while maintaining the structural integrity of the crown.