

# Effects of expanded vermiculite on the properties of fired bricks from water treatment sludge

- Gencil O.<sup>a</sup>
- Kizinievic O.<sup>b</sup>,
- Sutcu M.<sup>c</sup>,
- Erdogmus E.<sup>d</sup>,
- Velasco P.M.<sup>e, h</sup>
- Eliche-Quesada D.<sup>f</sup>,
- Kizinievic V.<sup>b</sup>,
- Kurmus H.<sup>g</sup>

## Abstract

In the present study, the suitability of using water treatment sludge (WTS) as the main raw material and expanded vermiculite (EV) as aggregate in the production of fired bricks was investigated. Mixtures containing between 75%–100% WTS by weight (wt.) and 5%–25% EV by wt. were prepared at various proportions. The mixtures were compressed under 40 MPa pressure and fired at 1000°C. It was found the incorporation of EV in fired bricks resulted in a decrease in thermal conductivity, compressive strength, and bulk density and an increase in apparent porosity and water absorption. For the addition of 5%–25% EV by wt., bulk density ranged between 2.01 and 1.69 kg/m<sup>3</sup>, compressive strength 19.3 and 8.3 MPa, water absorption 21.1% and 10.1%, and thermal conductivity 0.678 and 0.374 W/m-K, respectively. Based on the promising physical and mechanical properties, fired bricks incorporating WTS and EV can potentially offer an alternative to the traditional production of clay bricks while adhering to the principle of a circular economy. © 2021 The American Ceramic Society

## Author keywords

expanded vermiculite; fired bricks; recycling; thermal conductivity; water treatment sludge