ABSTRACT

This study investigates the effect of heat curing on the physical and mechanical properties of Cellular Lightweight Concrete (CLC) with variations in heat-curing duration and fly ash substitution levels. The experimental program involved testing ages of 3, 5, and 7 days, combined with heat-curing durations of 4, 16, and 24 hours, and fly ash substitution levels of 30% and 50% as partial replacements for cement. The physical properties evaluated included specific gravity, bulk density, and moisture content, while the mechanical properties were assessed through compressive strength and modulus of elasticity tests using 50 × 50 × 50 mm specimens. The results indicate that heat curing significantly influences the properties of CLC. The FA 0% mixture exhibited the highest specific gravity, bulk density, compressive strength, and modulus of elasticity. Increasing fly ash content resulted in lower specific gravity and bulk density, indicating increased porosity, with the FA 50% mixture showing the lowest values. The FA 30% mixture consistently demonstrated intermediate physical and mechanical properties between those of the FA 0% and FA 50% mixtures, providing a moderate balance between density reduction and mechanical performance. Moisture content increased with higher fly ash substitution and longer heat-curing durations. Compressive strength results at 7 days showed a decreasing trend with increasing fly ash content, with the lowest values observed in the FA 50% mixtures. Despite these observed trends, none of the CLC mixtures produced in this study met the minimum compressive strength requirement of 2 MPa specified in SNI 8640:2018.

Keywords: heat curing, fly ash substitution, Cellular Lightweight Concrete (CLC), curing duration, physical properties, compressive strength, modulus of elasticity.