

GEOPOLYMERS INCLUDING CDW FOR APPLICATIONS AS A BUILDING MATERIAL

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The assessment of metakaolin-slag-potassium-silicate geopolymer mixtures containing concrete and fired clay aggregates from Construction and Demolition Waste (CDW) was carried out within the framework of the H2020 European Project InnoWEE (Innovative pre-fabricated components including different waste construction materials reducing building energy and minimizing environmental impacts). The research aimed at obtaining materials with recycled CDW adequate for applications in building components, i.e. energy-efficient and sustainable prefabricated panels for external insulation, ventilated façades and radiant ceilings.

The potential of those mixtures as a building material, and their suitability for the production at industrial level, were explored through an extensive mechanical and physical characterization. The investigated properties included compressive and indirect tensile strength, drying shrinkage, open porosity and water absorption, leaching of water soluble salts, preliminary freeze-thaw resistance and open time.

Although further investigations are needed, the main parameters affecting the performance were identified. The obtained results showed that geopolymers with CDW can have adequate properties for use in building elements even with 50% and more of aggregates in weight.

According to recipe and aggregates type and amount, the compressive strength at 28 days approximately ranged between 40-90 N/mm², with apparent dry density comprised between 1700-2000 kg/m³, open porosity between 10-30% of volume and water absorption between 10-30% of dry weight. Drying shrinkage approximately varied 0.8-3‰ and 1-4‰ after 7 and 28 days, respectively.



Figure 1 – Samples of tested mixtures



Figure 2 – Prototype panel for external insulation

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