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WASTE TONER POWDER IN CONCRETE INDUSTRY: AN APPROACH TOWARDS CIRCULAR ECONOMY

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Abstract

Substantial quantities of toner cartridges are produced and used in photocopiers and printers every year. Spent toner cartridges are classified as hazardous waste because they contain toner powder with specific chemical composition, making a recovery of waste toner cartridges a very important issue from the aspect of waste management and environmental protection. Spent toner cartridges are mechanically processed to exploit valuable materials such as metals, plastics and magnets and to separate toner powder as a toxic waste. In this work, the use of waste toner powder as an additive in concrete was studied. The toner powder was mixed with calcium-based additive in ratio 50:50 immediately after the mechanical treatment. The resulting mixture (hereafter: WTP) was added to concrete at different percentages (1%, 3%, 5% and 10%) as a replacement for fine aggregate. All processes were performed on industrial scale. The addition of 1% and 3% of WTP lead to a concrete with the optimal properties. The possible impact on the environment was studied by the means of leaching test using valid regulations for a landfill. The modified concrete with 1%, 3%, 5% WTP can be classified as inert waste.

Key words: circular economy, concrete industry, environmental impact, recycling, waste toner

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