ABSTRACT

In doctoral thesis was analyzed the possibility of using combustion by-products such as municipal solid waste incineration bottom ash (MSWIBA), fly ash (MSWIFA), and boiler ash in concrete. MSWIFA and boiler ash classified as hazardous waste according to the European Waste Catalog (waste code: 19 01 07*), while MSWIBA is classified as non-hazardous waste (waste code: 19 01 12).

Physicochemical tests and tests of the leachability of pollutants from the MSWIBA, MSWIFA and boiler ash were carried out. Mortars with secondary waste with Portland cement (CEM I 42.5R) and calcium sulphate aluminate cement (CSA), fluidizing and air-entraining admixtures, zeolite and $C_6H_8O_7$ were produced. MSWIFA, MSWIBA and boiler ash as well as cement mortars and concrete mixes were tested in terms of quality and environment by performing contamination leachability, environmental analysis and phytotoxicity

The result of the work is a technology using MSWIBA and MSWIFA in concrete, which contributes to reducing carbon dioxide emissions, reducing the extraction of natural resources and reducing production costs and reducing the amount of waste in landfills.

The paper indicates the parameters (e.g. bulk density, content of sulphur, chlorine, free lime, fineness, etc.) classifying MSWIFA and MSWIBA as an additive to concrete, where MSWIBA is a lightweight aggregate, while MSWIFA is an additive to type II clinker.

The result of the research is the presented technology and composition of the mixture, which has, among others, high water resistance, frost resistance, resistance to sulphate corrosion, etc. The study of the matrix and the internal structure of concrete, in which impurities from the MSWIFA and MSWIBA are embedded, were also presented.