



POLITECHNIKA ŚLĄSKA

Wydział Inżynierii Środowiska i Energetyki

Katedra Technologii i Urządzeń Zagospodarowania Odpadów

Wydział Budownictwa

Katedra Procesów Budowlanych i Fizyki Budowli

Wspólna Szkoła Doktorska

PRACA DOKTORSKA

mgr inż. Nikolina Poranek

**„Ocena możliwości zagospodarowania odpadów wtórnych z ITPOK w betonie
o zwiększonej szczelności”**

**„Assessment of the possibility of secondary waste from incineration plant utilization
in concrete”**

(Ko)Promotor: prof. dr hab. inż. Krzysztof Pikoń

(Ko)Promotor: dr hab. inż. Beata Łaźniewska-Piekarczyk, prof. PŚ

Nazwa dziedziny nauki: **nauki inżynieryjno-techniczne**

Nazwa dyscypliny naukowej: **Inżynieria Środowiska, Górnictwo i Energetyka**

Inżynieria Lądowa, Geodezja i Transport

Gliwice 2023

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 C₆H₈O₇ 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.