

PROPERTIES ON THE UTILIZATION OF LIGNITE COMBUSTION RESIDUES FROM THE THERMAL POWER PLAN OF MEGALOPOLIS, IN GREECE

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EXTENDED ABSTRACT

Fly-ash is considered as a fine material which is produced during firing of powdered solid fuels in steam generating plants. It is contained in the output off- gases and collected in the electrostatic filters. In the lignite fired power plants of Public Power Corporation in the regions of Ptolemais-Amynteon and Megalopolis in our days are consumed $65 \cdot 10^6$ t/y of lignite with a corresponding fly ash production of about $13 \cdot 10^6$ t/y. The utilization of fly ash generated in Megalopolis plant ($\sim 3.5 \cdot 10^6$ ton/ year) in cement industry has been investigated by the Laboratory of Metallurgy (METLAB) in collaboration with cement company "TITAN" and the Greek P.P.C. since 1979. The primary target of this research and development work, was to investigate the addition of Megalopolis fly ash in the manufacturing process of cement, in quantities around 10%, replacing the so called Volcanic Rock (Santorini's earth), which was used as a pozzolanic material. Megalopolis fly ash was considered to be unsuitable for use as hydraulic powder due to its high SiO₂ content ($\sim 50\%$), in contrast to Ptolemais-Amynteon fly ash, which contains high percentages of CaO (30-40%). The first results were very encouraging as they proved that addition of blended fly ash could be added up to 50% without considerable reduce of compressive strength of cement. Consequently, exploitation of Megalopolis fly ash by "TITAN" cement industry began in 1982, with the production of Greek type Portland cement that contains 15-20 % of Megalopolis fly ash. The annual consumption of Megalopolis fly ash since 1982 is in the range of 300.000 - 500.000 t/y. In the years following 1983, a systematic investigation of the influence of Megalopolis fly ash addition, up to a content of 80% upon the technological properties of cement and concrete was carried out. The following parameters were investigated:

- Workability
- Compressive strength (2, 7, 28 days)
- Long-term compressive strength (-up to 180 days)
- Concrete strength with fly ash cement in corrosive environment
- Hydration of fly ash cement
- Long-run properties of concrete in 15-20 years range and
- Long-run steel corrosion in armed concrete with fly ash cement.

The percentage of Megalopolis fly ash in high added value products as Greek-type Portland cement covers only 10-20% of total annual fly ash production. However the present use of 300.000 - 500.000 t/y of fly ash in substitution of raw material contributes significantly in the conservation of natural resources, mainly of pozzolans, as well as the landscape and the beauty of the Aegean islands of Santorini, Kimolos and Milos.

Key words: Fly-ash, pozzolana, hydrated volume, workability, blaine, compressive strength