Production of Lightweight Aggregates from Coal Gasification Fly Ash and Slag

Mónica Aineto[1], Anselmo Acosta[1], Jesús Mª Rincón[2], Maximina Romero[2],

[1]Universidad de Castilla La Mancha, Laboratorio de Mineralogía Aplicada, 13071 Ciudad Real (Spain) [2]Instituto Eduardo Torroja de Ciencias de la Construcción CSIC. Group of Glassy and Ceramic Materials, c/ Serrano Galvache 4, 28033 Madrid, SPAIN

KEYWORDS: Lightweight aggregates, IGCC power plant wastes, gasification products fly ash, slag,

ABSTRACT

Fly ash and slag generated in the integrated gasification in combined cycle (IGCC) power plants has been proved to be recycled as lightweight aggregates (LWA). The research here reported has established the ability and conditions for fly ash from the Spanish IGCC power plant of ELCOGAS S.A. to produce high quality lightweight aggregates.

The principle is based on taking advantage of the singular behavior of the IGCC fly ash at high temperatures, with release of gases and subsequent bubble formation and expansion caused by these bubbles.

The work is focused on searching for the best conditions of temperature, water content and time of heating to obtain a suitable material using high percentage of fly ash and milled slag. Characterization of final products according the specifications of the European standard EN-13055 and comparative tests to commercial LWA are also reported.

Tests using 100% fly ash, heating temperatures up from 1150ºC for short times (5-10 min), give rise to high quality porous lightweight aggregates, with values of bulk density, water absorption, freeze resistance and mechanical properties similar to commercial products, having also a good internal and external appearance. Tests with mixtures of slag and fly ash result in better values of water absorption.

Submitted for consideration in the 2005 World of Coal Ash, April 11-15, 2005, Lexington, Kentucky, USA.