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Utilization of waste expanded perlite as new effective supplementary cementitious material

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Abstract

Expanded perlite is a valuable lightweight material for building materials industry as well as for agriculture, horticulture etc. Unfortunately during both production as well as processing of expanded perlite, some fine grained waste perlite is being formed. Due to its extremely low bulk density waste expanded perlite is difficult to handle, utilize and causes dust formation. Paper presents method of utilization of waste expanded perlite as a valuable, high performance pozzolanic supplementary cementitious material. Waste expanded perlite was ground in ball mill in order to destroy cellular microstructure of waste expanded perlite. It resulted in significant increase in specific surface area of material. Results of strength tests showed, that addition of ground waste expanded perlite may result in strength gain up to 50% (for 35% addition in respect to cement mass). Due to its high activity ground waste expanded perlite can be used as both cement substitute as well as cement additive depending on desired properties of final material. Investigations showed, that ground waste expanded perlite is material of pozzolanic activity. Except strength test, pozzolanic activity was investigated by solubility test according to ASTM C379-65T. Direct measurements of calcium hydroxide content in hydrating alite pastes confirmed that ground expanded perlite reacts with calcium hydroxide what results in reduction of calcium hydroxide content in alite paste. Pozzolanic activity of ground waste expanded perlite was compared with commonly used commercial pozzolanas. Obtained results allow to classify ground waste expanded perlite as material of pozzolanic properties. It can be valuable supplementary cementitious material mainly for

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