

Lighter aerated cement developed using industrial waste

Researchers from Indian Institute of Technology, Delhi (IIT Delhi) have developed aerated concrete with fly ash, a waste from thermal power plants. The aerated concrete developed has more uniform dispersion of air voids and high surface areas than those available in the market making them lighter in weight.

Autoclaved aerated concrete (AAC) is a building material much in demand and the technology developed by Professor Ashok N. Bhaskarwar and his team from IIT Delhi with the support of Waste Management Technologies (WMT) Program of Department Of Science & Technology, Government of India could reduce the cost the manufacturing AAC substantially.

Aerated concrete was prepared in the laboratory with separate systems of cement-sand, cement-fly ash, and cement-GBFS (granulated blast furnace slag) which are industrial solid waste. Each system was aerated with different volumes of colloidal gas aphrons (CGAs) which are micro-bubbles encapsulated by multi-layers of surfactant molecules and hydrogen-bonded water. CGAs are used as an aerating medium.

Due to the small sizes and uniformity of air bubbles (1- 100 μm) in CGAs, CGAs is expected to produce aerated concrete with a more uniform dispersion of air voids and high surface areas. CGAs having higher air holdups (0.75-0.80) help in achieving light- weight aerated concrete. Re-integrated aerated concrete blocks were manufactured by utilizing AAC-solid wastes

AAC is commercially available and sold under different brand names. Air entrainment or aeration is one of the key factors in the manufacture of 'aerated concrete'. The aluminum powder is used for aeration in the manufacturing process costs Rs. 84/m³ and aeration by CGAs costs Rs. 33.31/m³, which shows a huge potential in terms of the difference in the costs of aeration.

The samples properties have been tested and validated as per Indian Standards IS:2185 (part-3 and part-4) and have been granted two patents. The technology is ready for scale-up.

The researchers are further planning to measure some properties like drying shrinkage and thermal conductivity of CGAs-based aerated concrete incorporating the AAC solid-waste in accordance with the Indian standard (IS:2185).