

## **Cement Sand Blocks Cast with Rice Husk Ash and Limestone Crusher Plant Dust**

C. Piruthevi, D.De.S. Udakara

*Department of Civil Engineering, University of Peradeniya, Peradeniya, 20400,  
Sri Lanka*

*\*c.piruthevi@gmail.com*

Sri Lanka faces environmental problems due to the over-exploitation of natural resources, like clay and river sand, for construction, leading to a shortage of resources and, thus increased prices. Developing alternative masonry materials using wastes as sand substitutes is a potential solution. This study examines the feasibility of using rice husk ash and limestone crusher plant dust as partial replacements for sand in making cement blocks. Rice husk ash is produced by burning rice husk at high temperatures, while limestone dust is obtained from limestone crusher plants. Cement blocks of 300 mm x 100 mm x 150 mm are made with a predetermined amount of cement and different proportions of sand, rice husk ash, and limestone dust. The control block was prepared with cement and sand with a volume ratio 1:6. Density, compressive strength, and water absorption characteristics of cement blocks were assessed after 28 days for 25 different mix combinations, including the control block. The compressive strength of blocks increased with increased rice husk ash and limestone dust content, but further addition led to weaker blocks. The block's maximum average strength at 28 days was 4.85 N/mm<sup>2</sup>, higher than the ASTM standards (4.14N/mm<sup>2</sup>). The study found that adding of rice husk ash and limestone dust increases water absorption as mix proportions 01-14 were within the allowable limit, while from 15 - 25 exceeded the ASTM C55-11 limit of 240 kg/m<sup>3</sup>. The density decreases from normal to medium weight blocks with increasing rice husk ash and limestone dust. Treatments 01 - 16 fall within the normal density category (>2000kg/m<sup>3</sup>), while 17 - 25 fall within the medium weight category (1680 kg/m<sup>3</sup> - 2000 kg/m<sup>3</sup>) according to ASTM standards. The cost analysis showed that increased use of rice husk ash and limestone dust reduced the unit cost by 20%.

**Keywords:** Rice husk ash, Limestone crusher plant dust, Density, Compressive strength, Water absorption

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