International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 06 | June-2018 www.irjet.net p-ISSN: 2395-0072

STUDY ON COMPRESSED STABILISED EARTH BLOCKS BY USING MASTER CAST AND MASTER EMACO CHEMICALS

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Abstract - *The study investigates the suitability of stabilized laterite soils for the production of compressed earth blocks for low-cost housing construction. The materials which is used for this experiment is red soil and some chemicals. The results of the study revealed that the specific gravity, bulk density, moisture content and plasticity index of the sample showed satisfactory performance. This experimental mainly deals with the manufacture of compressed stabilised earth blocks by using chemicals. The blocks are tested under CTM for compressive strength. The cost comparison with the conventional bricks has revealed that compressed cement stabilised soil block is preferred because it is more economical walling material in itself and permits the use of economical building techniques.*

Key Words: Laterite soil, CSEB by chemicals

1. INTRODUCTION

A compressed earth block also known as pressed earth block or compressed soil block, is a building material made primarily from damp soil compressed at high pressure to form blocks. If the blocks are stabilized with a chemical binder such as Portland cement they are called Compressed stabilized earth block (CSEB) or Stabilized earth block (SEB).Constructed earth blocks are masonry elements, which are small in size and which have a regular and verified characteristic obtained by the static or dynamic compression of earth in a humid State followed by immediate remoulding. Earth construction is very cost effective, energy efficient (excellent thermal properties and low energy input required for production), environmentally friendly, and safe, qualities which are particularly relevant and important with the ever growing need for increased awareness to reduce energy consumption worldwide.

1.1. LITERATURE REVIEW

1.1.1 O.S. Oladeji et al 2013- the two chemical additives namely KS770 and Soda Ash investigated do not alter the aesthetic view of the resultant brick products. The KS770 appears to increase the moisture content of clay thereby preventing early setting and hardening. Conversely, soda ash additive appears to increase the workability, and produces brick blocks with relatively higher compressive strength and lower corresponding density especially when its fired, compared with the bricks without additive as well as those with the KS770 additive. The additive water ratio for achieving optimum enhanced brick workability is 1:27

1.1.2. Marwan Mostafa July 2016 The proposed innovative Banana-Compressed Earth Block (B-CEB) consists of ordinary CEB ingredients plus banana fibers, which will be the focus of this study. Banana fibers are widely available worldwide due to agricultural waste from banana cultivation. Additionally, banana fibers are environmentally friendly and present important attributes, such as low density, light weight, low cost, high tensile strength, as well as being water repellent and fire resistant.

1.1.3. Shivnath Jangid Feb 2017- The Present Study is used to analysis the soil which is better for stabilized earth block. The Engineering behaviour of Compress stabilized earth block (CSEB) such as compression strength, durability, water absorption etc. are depends on the types of soil and stabilized material as binder. Here the soil will be mixed with suitable proportion of stabilized such as lime, fly ash, cement , coir and Chemicals will be compressed manually or mechanically. The Block produced will have more strength than conventional burnt clay brick. Soil tested and regarded as favourable for CSEB on the basis of density index which manufacture by Block Cotton Soil. It Concluded that the soil have more Compressive strength than normal brick but cannot satisfy the Condition of water absorption.

2. MATERIALS AND METHODOLOGY

2.1 MASTER CAST 1162

It is a plasticizer liquid admixture with air entraining properties. Designed for use in no slump concrete, it is ideally suited for block making. It is chloride free may also be used in dry pack, standard and light weight concrete production. It has relative density less than 1.15.

2.2 MASTER EMACO SBR2

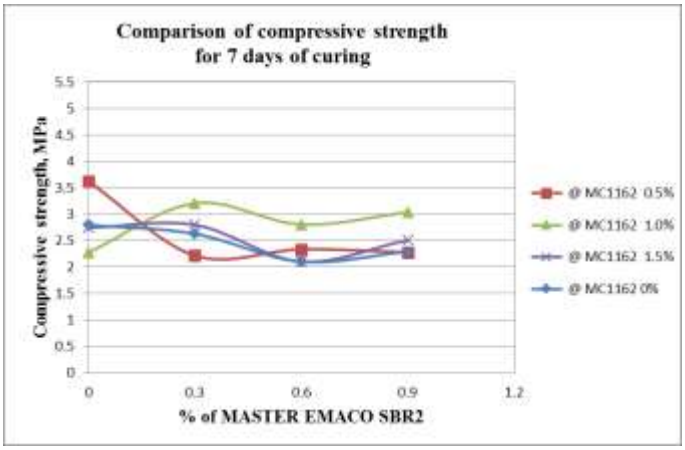
It is milky white, styrene butadiene co-polymer latex liquid produced from styrene and butadiene by high pressure emulsion polymerization with dispersive properties. When used in concrete it reduces mixing time through high dispersion of the polymer and improves water proofing, reduces shrinkage and cracking of mix.

2.3 RED AND LATERITE SOIL

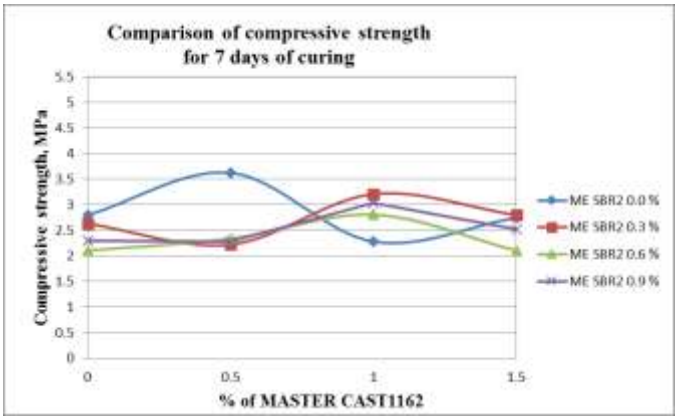
Spread over some 30% land area they occur extensively in eastern Madhya Pradesh , on Bihar plateau , in Orissa and parts of west Bengal, Andhra Pradesh, Karnataka , Kerala and Tamilnadu. Most red soils are shallow that limits their capacity to hold water greatly reducing their agricultural potential.

3. TEST RESULTS AND ANALYSIS ON THE PRODUCED COMPRESSED STABILISED SOIL BLOCK BY USING CHEMICALS

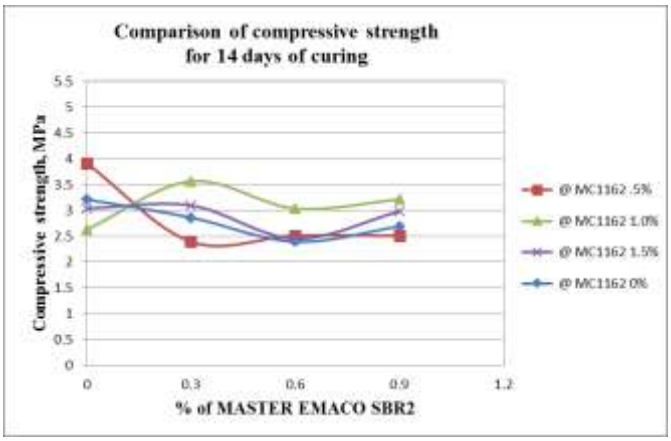
The compressive strength is the most universally accepted value for determining the quality of bricks. Nevertheless, it is intensely related with the soil type and the content of stabilizer. The crushing strengths of the blocks were tested using the universal testing machine. A total of 60 specimens were prepared and crushed at different curing ages of 7, 14 and 28days. Compressive tests were conducted on the blocks at different ages to indicate the rate of strength gain and the strength at a point in time.



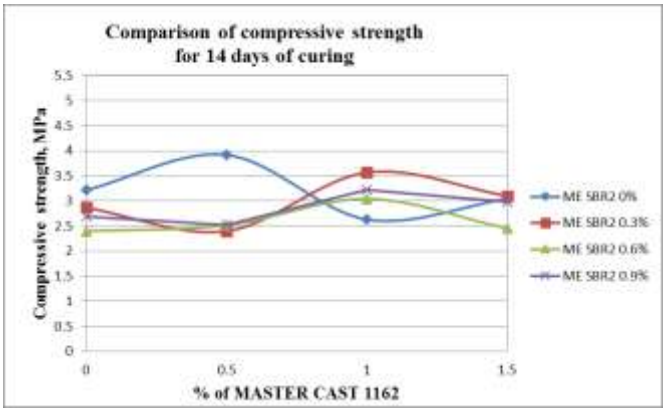
Graph -1: Compressive strength for 7 days cured compressed stabilized earth blocks in different chemical proportions



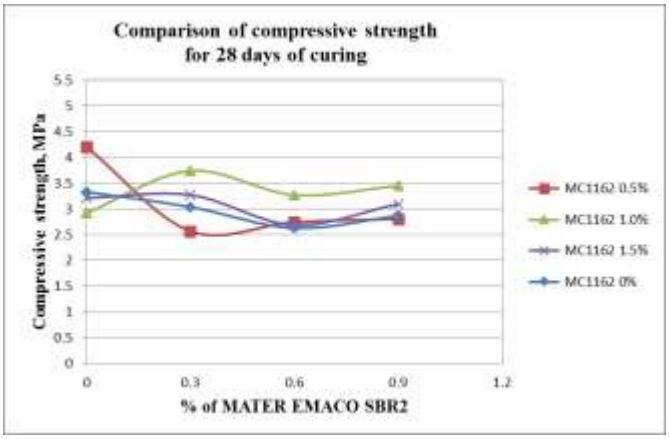
Graph -2: Compressive strength for 7 days cured compressed stabilized earth blocks in different chemical proportions



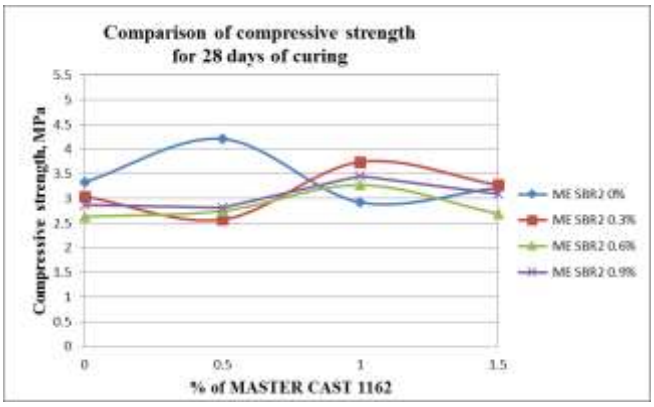
Graph -3: Compressive strength for 14 days cured compressed stabilized earth blocks in different chemical proportions



Graph -4: Compressive strength for 14 days cured compressed stabilized earth blocks in different chemical proportions



Graph -5: Compressive strength for 28 days cured compressed stabilized earth blocks in different chemical proportions



Graph -6: Compressive strength for 28 days cured compressed stabilized earth blocks in different chemical proportions.

The result shows that the highest compressive strength of 4.210 N/mm^2 was obtained from sample at the curing age of 28 days. According to the optimum cement content is in the range of 5%-10%. The strength obtained also compares favorably with the minimum British Standard requirements of 2.8N/mm^2.

4. TOTAL WATER ABSORPTION TEST

Total water absorption test was conducted on all the twenty samples types with different curing periods. The experimental results of the water absorption test show the effect of chemical content on the water absorption capacity of the blocks. The mean water absorption values for the various samples tested range from 21% to 23.14%.

5. CONCLUSIONS

- Stabilized compressed earth blocks include; uniform, sized building components which can result in less waste, faster construction and the possibility of using other pre-made components or modular manufactured building elements.
- Major usage in the world for construction is clay bricks; many researchers are presently looking for newer options because they need low cost materials, which are also environmentally friendly.
- When the soil is stabilized with 10% of cement and Master Cast 1162, Master Emaco SBR2 is of 0.5% & 0.9% respectively, the highest compressive strength of 4.210N/mm^2 and water absorption of 21.6% was achieved.
- The investigation of this thesis has revealed that many different factors are responsible for ensuring a good bond between the cement, chemicals and particles mix together. These requirements not only affect the components of the mixture used, how it prepared, delivered into its final state, but also environmental conditions of the finished product.

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