International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 09 Issue: 08 | Aug 2022 www.irjet.net p-ISSN: 2395-0072

Non structural Light weight concrete using combined mix of expanded polystyrene beads and expanded clay aggregates

SOURRAB SUNIL MAGARE[1], Prof . R.A.THOTE[2]

[1] PG student, Dept. of civil engineering , deogiri Institute of Engineering & Management studies ,Aurangabad Maharastra , India
[2] Professor, Dept. of civil engineering , deogiri Institute of Engineering & Management studies ,Aurangabad Maharastra , India

---

Abstract - *Utilizing the most latest technology to reduce the structural load, light weight concrete (LWC) is the building material used in the construction of buildings. It is possible to limit the destruction or setbacks during a seismic tremor or any ecological effect by reducing one's weight or the dead heap of the structure or kaleidoscopic characteristics. Lightweight cement can be produced by mixing aluminum powder as an air-entraining agent into regular blend concrete, either with or without coarse mud total, or by using light weight earth totals (Pumice stone) or volcanic stone. This study describes a light weight cement of M20 grade that is pretended to be made of extended polystyrene globules and extended soil mud totals mixed with various amounts and water concrete proportions. Concrete, manufactured sand (M-Sand), fly debris (class F), ground granulated blast furnace slag (GGBS), polypropylene strands, EPS, benzoyl alcohol and water, as well as other materials, have all been used. For the reason that it is thinner, CLC is frequently used. In this exploratory investigation, cemented blocks with EPS dabs were subjected to water quality, compressive strength, and thermal conductivity testing. The addition of fly debris and GGBS reduced water interest by reducing hydration and carbon impression, which resulted in a decrease in shrinkage, but it also reduced the blocks' compressive strength by roughly 25 to 50 percent. In general, lightweight cement is referred to be concrete with a thickness of less than 1800 kg/m3. This inquiry focuses on the examination of lightweight cement with expanded polystyrene dots.*

Key Words: **Polystyrene, Destruction, seismic ,globules.**

1. INTRODUCTION

The development industry has enormous importance for lightweight cement. The majority of flow significant research is on high-performance concrete, which is a resourceful material that meets demanding performance requirements like toughness. Lightweight cement is a type of substance that resembles an enlarging agent because it increases the volume of the mixture while supplying other characteristics like lowered excess weight. It is less heavy than regular cement. Lightweight cement is widely used in countries like the United States, the United Kingdom, and Sweden. Today's globe is witnessing the growth of incredibly difficult and demanding structural design concepts. In this study, a comparison between light weight concrete and plain concrete with varying levels of admixtures and soil totals was made. Expanded Clay totals, for example, are 0%, 25%, 50%, 75%, and 100% with coarse dirt total steadily replaced by concrete and water separately. It helps increase cement volume and reduce weight by doing so. Lightweight cement provides preferable thermal protection over regular cement by increasing efficiency and lowering the cost of formwork. Between 300 and 1850 kg/m3 is the thickness range of lightweight cement. The normal cement's excessive thickness causes the segment to expand in the dead heap, which ultimately necessitates the use of more support and renders the segment unprofitable. The substantial thickness of regular cement.

1.1 Objective

1.Using expanded mud totals and extended polystyrene dots to create lightweight concrete.

2. Increasing elasticity with the aid of glass fiber.

3. To prepare a substantial blend strategy for concrete of the M20 grade.

4. Verify the likelihood of the intended use of lightweight concrete as an underlying element.

1.2 Advantages

1. A greater range can be poured unset thanks to a smaller dead heap of wet cement. For each floor, this reduces labor and circle time.

2. Less dead weight, faster assembly times, and cheaper shipping and handling. Specifically for the case of tall constructions, the eight of the structure in terms of the heaps transmitted by the establishments is a significant calculation plan.

3. The use of LWC has occasionally made it possible to carry out the plan, which would have otherwise been abandoned due to severe weight. Utilizing LWC for the development floors, plot, and exterior cladding in outline constructions can result in large cost reserve funds.

2. MIX DESIGN

Mix	Cement	Sand	Coarse Aggregate	Water
Ratio	1	1.735	2.433	0.45
Quantity	4334kg/m3	758.8 kg/m3	1079.59 kg/m3	172.5 kg/m3

FIG: Mix Design

3. PERFORMANCE ANALYSIS

i) The average 7 Days Compressive Strength of concrete sample is found to be 22.78.

ii) The average 28 Days Compressive Strength of concrete sample is found to be 36.19.

iii) The average 7 Days Modulus of Rupture of concrete sample is found to be 3.02 mpa.

iv) The average 28 Days Modulus of Rupture of concrete sample is found to be 4.69 mpa.

v) The average 7 Days Tensile Strength of concrete sample is found to be 26.85.

vi) The average 28 Days Tensile Strength of concrete sample is found to be 42.19.

3. CONCLUSIONS

The advantages of EPS concrete include its low thickness, thermal protection, and excellent seismic performance. Therefore, it is crucial to investigate existing underlying materials and employ helpful designing to discover new substantial materials.

1) The polystyrene has a smooth surface, which makes it easier for the polystyrene globules to adhere to the concrete adhesive. It can be seen that the polystyrene particles may be easily removed from the solid shapes' ruptured surfaces. Due to this regrettable bond trademark, disappointment occurs at a considerably lower level of anxiety through the concrete glue-polystyrene interface.

2) Based on these findings, it is generally assumed that the link between the EPS, dirt total, and concrete glue was weaker than the mud total's disappointment strength.

3) For optimal measurement of Expanded Polystyrene globules compared with conventional concrete, the cement thickness has been reduced by 20%.

4) To reduce the weight of the design, lightweight concrete placed using Expanded Polystyrene dots can be used in parcel walls and the upper floors of elevated structures.

ACKNOWLEDGEMENT

It is obvious that the development of project needs the support of many people. Getting idea of analyzing a project, finalizing it as best one for us and above all, developing it successfully has always been our priority. We have always been grateful for the support that we got from all our surroundings with respect to knowledge. We sincerely acknowledge to our project guide PROF.R.A.THOTE whose continuous encouragement and support enabled the project to materialized and contributed to its success.

REFERENCES

1. Ningombam Thoiba Singh

2. Light weight concrete {partial replacement of coarse clay aggregate using polystyrene beads} janani .c, kathiravan .p, dr. G. Dhanalakshmi

3.Structural Concrete using Expanded Clay Clay aggregate: A Review R. Vijayalakshmiand S. Ramanagopal Light weight concrete using expanded polystyrene beads and aluminum powder

4.Effective replacement of fine clay aggregates by expanded polystyrene beads in concrete Suhad M Abd1, Dhamya Gh.1, Maan Hattem1* and Dunya Khalil

5.Partial replacement of coarse clay aggregates by expanded polystyrene beads in concrete thomas Tamut1 , Rajendra Prabhu2 , Katta Venkataramana3 , Subhash C Yaragal4

6. Durability of light weight expanded clay aggregate concrete

7.Structural Concrete using Expanded Clay Clay aggregate: A Review R. Vijayalakshmi *, S. Ramanagopal.

8. Study of light weight concrete t. Divya bhavana

9. Experimental Study on Lightweight Clay aggregate Concrete P. Sundar Kumar, M.J .Ratna Kanth Babu

10.Study on Strength Properties of Lightweight Expanded Clay Clay aggregate Concrete Kunchala Ashok*, Tangudu Manoj

11.Materials, properties and application review of Lightweight concrete Jihad Hamad Mohammed Ali Jihad Hamad

12. Ardakani A and Yazdani M The relation between particle density and static elastic moduli of lightweight expanded clay aggregates Applied Clay Science 93–94 28–34

13.Wu T, Wei H, Liu X and Xing G 2016 Factor Influencing the mechanical properties of lightweight aggregates concrete Indian Journal of Engineering and Material Sciences 23 301–11

14.Caldeira L M M S and Neves E M das 2015 Mechanical Characterization of Lightweight Expanded Clay Aggregate Materials for Modeling Their Geotechnical Behavior Journal of Materials in Civil Engineering 27 04015027

15. Valsangkar A . and Holm T A 1987 M o d e l Tests on Peat - Geotextile - L i g h t w e i g h t Aggregate S y s t e m Geotextiles and Geomembranes 5 251–60

16.Sim, J.; Yang, K.; Kim, H.; Choi, B. Size and shape effects on compressive strength of lightweight concrete. Constr. Build. Mater. **2013**, 38, 854–864.