



REVIEW ON PARAMETRIC STUDY ON EFFECT OF EXPANDED POLYSTYRENE BEADS ON PHYSICAL PROPERTIES OF CONCRETE

¹VEDANTI PURAM, ²MILIND NIKHAR,

¹Student in Department of Civil Engineering, Bapurao Deshmukh college of engineering, Wardha, Maharashtra, India,

²Assistant Professor in Department of Civil Engineering, Bapurao Deshmukh college of engineering, Wardha, Maharashtra, India

Abstract: The Structural Lightweight concrete is one of the important materials of the construction. THE Paper presents a technique to one of the crucial building components that is lightweight concrete. Concrete that is both lightweight and sufficiently sustainable and that is combined with steel reinforcement will be a more cost-effective material than traditional concrete. As a result, concrete that is both strong and light will be more advantageous economically. . The use of lightweight aggregate in construction industry will increase in near future since it offers functional and economical advantages to the house building projects particularly. The low density products reduce self weight and construction costs. There are different types of light weight aggregate suitable for construction purposes. They vary in their composition, density, surface texture, porosity and water absorption capacity . Typical concrete has a density of 24-25 kN/m³ which raises the self-weight of the structure and makes it uneconomical. So to reduce the weight of the structure the lightweight concrete is used. One of the methods to produce lightweight concrete is to use Expanded Polystyrene beads as a partial substitute to coarse aggregate. This study's major goals are to produce lightweight concrete and also to figure out the optimum dosage of Expanded Polystyrene Beads.

Index Terms - Expanded polystyrene, Light weight concrete

I. INTRODUCTION

Expanded polystyrene (EPS) concrete, often referred to as EPScrete, EPS concrete, or lightweight concrete, is a type of concrete consisting of cement and EPS that is recognised for its light weight (Expanded Polystyrene).

Prior to 1980, extensive research had been done on EPS as a concrete aggregate.

It is made by substituting small, lightweight EPS balls (also known as Styrofoam) for the crushed stone that is often used in conventional concrete as an aggregate. Although it is not as strong as concrete mixes made from stone, it has additional benefits such better thermal and sound insulation, ease of shaping, and the capacity to be created by hand using sculpting and building equipment. Following extensive research and experimentation, EPS lightweight concrete may now be used for various kinds of architectural structures, including EPS insulating coating, mortar, EPS concrete inner and outer wall panels, etc.

EPS is lightweight, non-biodegradable, hydrophobic and chemically inert. EPS concrete combines the construction ease of concrete with the thermal and hydro insulation properties of EPS and can be used for a very wide range of application where lighter loads or thermal insulation or both are desired.

II. OBJECTIVE

1. To evaluate the utility of expanded polystyrene beads as partial replacement of coarse aggregate in concrete
2. To make the concrete lightweight
3. To understand the effectiveness of expanded polystyrene beads in strength enhancement
4. To compare light weight concrete with conventional concrete.

III. LITERATURE REVIEWS

1) Experimental study on replacement of coarse aggregate by EPS beads in concrete to achieve lightweight concrete (2018) by JAYANT M P

In this paper author tried to explain that expanded polystyrene beads can be used as it is non-biodegradable waste material from packaging industry. Strength properties of concrete with expanded polystyrene beads are studied. The expanded polystyrene beads are replaced with natural coarse aggregates. It shows that with increasing amount of eps beads the strength of concrete will decrease. The density of concrete is decrease and therefore dead weight of structure is decreased.

2) Particle size effect on EPS lightweight concrete compressive strength: experimental investigation and modeling (2007) Miled K, le Roy R, Sab K

It is seen that the Particle size impact of the polystyrene beads on the compressive strength of EPScrete. It was watched that smaller the size of EPS beads, increases the concrete compressive quality for a similar concrete porosity.

3) E.M.Mbadike and N.N.Osadebe

They made a study for the assessment of concrete manufactured from polystyrene beads. It was also found that the strength development of polystyrene concrete increases with increase in hydration period.

4) Daneti saradhi babu, K ganesh babu, Wee Tiong Huan (2005)

It is seen that the particle size of polystyrene beads impacts the compressive strength of concrete. If the size of EPS beads are small, the compressive strength increases.

5) Experimental Study of Lightweight Expanded Polystyrene Aggregate Concrete Containing Silica Fume and Polypropylene Fibers (2010) by CHEN BING

Fine silica fume and polypropylene (PP) fibers were added to improve mechanical and shrinkage properties of expanded polystyrene concrete finally observe that increase the compressive strength of expanded polystyrene concrete and drying shrinkage properties are significantly improved.

6) Vandale amar Diliprao (2019)

Deals with study of polystyrene foam is thermoplastic material obtain by polymerization of styrene. EPS is versatile durable material and it offers excellent insulation property. EPS are manufactured in various shapes and sizes. Use of EPS beads results in reduction of density of concrete

7) Lightweight Concrete Using EPS Beads and Aluminum Powder (2015) by Abhijitsingh Parmar

Aluminum reacts with water to form hydrogen gas, the hydrogen gas creates air pockets in concrete and lowers the density and make it porous.

IV. MATERIALS

Cement

The binding substance that sets and solidifies after drying and easily binds with other materials called cement.

The materials needed for the production of cement are silica. In modern history, concrete was made from crushed rock with burnt lime as the binder. iron, oxide, alumina, and lime the oxide content that gives cement its different characteristics.

Aggregates

Aggregates are generally classified into two group sizes, coarse and fine. In so many cases two or more actual sizes of material has been used, because of a further subdivision by size of material either present in one or both of the groups.

Water

Water is a one of the important ingredient in the concrete and this will help chemical reaction with cement. The water is added to get required consistency for the suitable workability. Water used for the concrete preparation must be fresh and potable, Ocean water and drainage water should not be used.

Expanded Polystyrene beads

Expanded Polystyrene beads is a plastic formed from hydrocarbon molecules that's small, lightweight and ideal for a variety of applications. From stuffed toys to packaging materials to building insulation, The main advantage of polystyrene beads is their strength, durability and lightweight properties. As well as this, they have thermal properties, are shock absorbent, moisture-resistant and compression-resistant.

V.MECHANICAL PROPERTIES OF EPS BEADS

Specific gravity :- 0.011

Bulk Density :- 6.88 kg per cub meter

Particle Size :- 6-9 mm dia

VI.CONCLUSION

It is concluded by the previous studies and research that partial replacement of aggregate with expanded polystyrene (EPS) beads make the concrete lighter than the conventional normal concrete. It is seen that workability increases with increase in polystyrene beads content.

Increase in the EPS beads content in concrete mixes reduces the compressive Strength of concrete.All the polystyrene concrete without any special bonding agent show good workability and could easily be compacted and finished.

REFERENCES

- 1) Experimental study on replacement of coarse aggregate by EPS beads in concrete to achieve lightweight concrete(2018) by JAYANT M P
- 2) Particle size effect on EPS lightweight concrete compressive strength: experimental investigation and modeling (2007)Miled K,le Roy R,Sab K
- 3) E.M. Mbadike and N.N. Osadebe. Technical note: Effect of Incorporating Expanded Polystyrene aggregate Granules in Concrete Matrix", Nigerian journal of technology (Nijotech) Vol. 31, no. 3, November, 2012, pp. 401-404.
- 4) D. S. Babu, G. K. Babu, and W. Tiong-Huan, —Properties of lightweight expanded polystyrene aggregate concretes containing fly ash,| Cement and Concrete Research, vol. 35, no.6, pp. 1218–1223, 2005
- 5) CHEN Bing, Experimental study of lightweight expanded polystyrene aggregate concrete containing silica fume and polypropylene fibre
- 6) Vandale Amar Diliprao, Dr. V. V. Patil ,et al (2019) “Making of Lightweight Concrete by using EPS Beads as Replacement of Coarse Aggregate” (IJSRDV) Volume : 7, Issue : 3 ISSN 828-832
- 7) Abhijitsinh Parmar, Chahil joshi et al (2015) “Effect of cement and EPS beads ratios on compressive strength and density of lightweight concrete” - Asian International Conference on Science, Engineering & Technology AAICSET ISBN: 9-780993-909238

