International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 4 Apr 2022, pp: 1364-1366 www.ijaem.net ISSN: 2395-5252

Light Weight Concrete Block Using Old Cloth Fibres

Muhammed Fayiz, Muhammed Farzeen P M, Krishna Shibu, Emmanual Jose, Maya Krishnan, Meenakshi V, Sahimol Eldhose, Anue Marry Mathew

[1,2,3,4,5,6]*Student,* [7]*Assistant Professor, Toc H Institute of Science and Technology, Ernakulam, Kerala*

Submitted: 15-04-2022 Revised: 27-04-2022 Accepted: 30-04-2022

ABSTRACT: This paper deals with lightweight concrete block using old cloth fibres with varying percentage from 0 to 1. To make the concrete lightweight, perlite is used. Old clothes collected from households and tailor shops are converted into fibres. Concrete blocks of dimensions 400 x 200 x 200 mm are casted in 1:3 cement to aggregate ratio and 0.45 water to cement ratio. The blocks are tested for block density and compressive strength.

KEYWORDS: Lightweight concrete, Cloth fibre.

I. INTRODUCTION

Concrete is the most relevant construction material in the entire world. One of the disadvantages of concrete is its high self-weight. Density of normal concrete is between 2200 Kg/m^3 and 2600 Kg/m^3. This high self-weight makes the concrete uneconomical. For non-structural purposes lightweight concrete can be used. Lightweight concrete is a special type of concrete which is lighter than the normal concrete. Any concrete becomes lightweight when the density does not exceed 1600 Kg/m^3. No fines concrete, lightweight aggregate concrete and aerated concrete are the groups of lightweight concrete. This paper is concentrated on one of the type of lightweight aggregate concrete, using expanded perlite.

Expanded perlite is formed from natural volcanic glass which is an amorphous product of rapid cooling of magma. This when crushed and heated at a high temperature expanded like popcorn and the water gets entrapped in it forms expanded perlite.

Deposition of solid material is increasing day by day. Cloths or textiles are fastest growing group of solid waste. Million tonnes of waste cloths are deposited on landfill worldwide. Like plastics its take hundreds of year to decompose. During decomposition process it produce methane gas and toxic chemical dyes into soil and groundwater. So it is necessary to reduce the waste cloth or textile because of it cause global warming by methane gas and contaminate ground water. To reduce wastage it can be used in concrete.

This paper presents the perlite lightweight concrete using waste cloth fibres. In this work an attempt has been made to incorporate cloth piece and perlite in concrete. 40% volume of coarse aggregates is replaced by expanded perlite and cloth fibres are added to concrete by 0.25, 0.5, 0.75 and 1% of volume of fine aggregates. Objective of this are to make the concrete lightweight by replacing coarse aggregates with perlite and to incorporate waste cloth fibres in lightweight concrete. The block density was found to check if the blocks are within density of less than 1600Kg/m^3 and compressive strength of the casted specimens to obtain maximum compressive strength and hence find the optimum percentage of cloth fibres added to lightweight concrete block.

II. MATERIALS

Constituent components of lightweight concrete block (LWCB) are cement, coarse aggregates, fine aggregates, perlite, cloth pieces, water, waterproofing admixtures and starch. Portland pozzolana cement is used. Coarse aggregate used should pass through 10mm IS sieve and should retain on 4.75mm IS sieve. Fine aggregates used should pass through 4.75mm IS sieve. Perlite used is of same size of coarse aggregate. Waste cloth are collected from local tailor shop and cut into small pieces. Figure 1 shows perlite. Water proofing admixture is used to prevent the penetration of water to the hardened concrete. Starch is used for the better binding of cloth fibres and perlite with the concrete. Material properties of perlite and waste cloth pieces are shown in Table 1.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 4 Apr 2022, pp: 1364-1366 www.ijaem.net ISSN: 2395-5252


Fig.1: Expanded perlite


Fig. 2: Lightweight concrete block

Table 1: Properties of materials

Cement	Specific gravity	2.92
Fine aggregate	Specific gravity	2.67
	Water absorption (%)	1.50
Coarse aggregates	Specific gravity	2.80
	Water absorption (%)	0.40
Perlite	Specific gravity	0.33
	Water absorption	30
Cloth fibres	Specific gravity	0.97
	Water absorption (%)	49

III. METHODOLOGY

From the trail mix study water cement ratio selected as 0.45. Dimension of the mould is $400\times 200\times 200\text{mm}$. Cement to aggregate ratio is 1:3. Compressive strength and water absorption are tested. Table 2 shows the details of mix proportion. Four different mixtures prepared to study the effect of waste cloths on lightweight concrete block. The different mixtures used including control specimen are follows:

CF0 – cloth fibres 0% (control specimen)
CF25 – cloth fibres 0.25%
CF50 – cloth fibres 0.5%
CF75 – cloth fibres 0.75%
CF100 - cloth fibres 1%

IV. TEST RESULTS

4.1. Block Density

The block density of lightweight concrete specimen should be less than 1600Kg/m^3. The densities obtained at different specimen are shown in Table 2.

Table 2: Block density

Mixtures	Weight (Kg)	Density (Kg/m^3)
CF0	30.5	1906.25
CF25	24.97	1560.63
CF50	25.2	1575.00
CF75	25.5	1593.75
CF100	25.79	1611.88

Density of control specimen obtained was 1906.25Kg/m^3. Densities of specimen CF25, CF50 and CF75 were found to be less than the permissible density of lightweight concrete (1600Kg/m^3), whereas density of CF100 obtained was more than that of permissible value, hence CF100 is not considered as lightweight concrete.

4.2. Compressive Strength

The compressive strength test results at 28 days are shown in Table 3.

Table 3: Compressive Strength

Mixtures	Compressive Strength (N/mm^2)
CF0	9.77
CF25	3.18
CF50	2.00
CF75	1.36
CF100	1.87

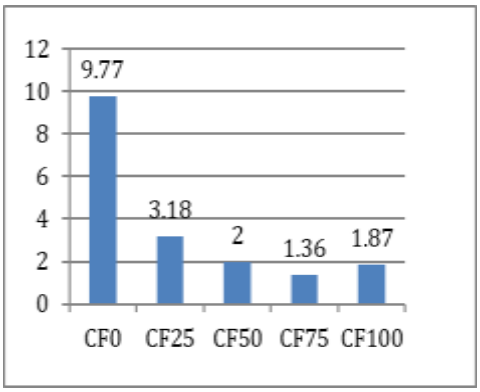

Fig3: Compressive strength

Maximum compressive strength of lightweight concrete obtained was 3.18 N/mm^2 at 0.25% addition of cloth fibres.

With increase in cloth fibres in concrete, the the compressive strength decreased with further introduction of cloth waste.

V. CONCLUSION

CF25 satisfies the condition of being lightweight and has more compressive strength than compared to other mixtures. However it has strength lower than that of normal concrete hence it cannot be used for structures with load bearing purposes. It can be used for non-load bearing walls like partition walls and garden walls.

REFERENCES

[1]. **Hanifi Binicia , Hasan Kaplana, Orhan Aksoganc, Remzi Gemcib (2010),** "Insulation properties of bricks made with cotton and textile ash wastes", International Journal of Materials Research .

[2]. **Khonsari V, Eslami E, Anvari Ah (2010),** "Effects of expanded perlite aggregate (EPA) on the mechanical behavior of lightweight concrete"

[3]. **Muhamad Faqrul Hisham bin Mohd Zulkifeli , Hamidah binti Mohd Saman @Hj Mohamed (2017),** "Compressive and Flexural Strength of Expanded Perlite Aggregate Mortar Subjected To High Temperatures".

[4]. **Muhammad Faizan Ali , Noor Ahmed Memon, Bashir Ahmed Memon, Muneeb Ayoub Memon, Ammaar Noor Memon (2019),** "The Effect of Textile on Compressive Strength of Concrete", Quest Research Journal, Vol. 17, No. 2, Pp. 21–26

[5]. **Yuvaraja R , Palanisamy SP , Annaamalai M.G.L , Sri Ram Gopal K (2014),** "Investigation on Partial Replacement of Fine Aggregate with unexpanded Perilite in Concrete", International Journal of Applied Engineering Research, Vol.9, Pp. 29257-29271

[6]. **Anglade J, Benavente E , Hinostroza A, Rodríguez J (2020),** "Use of Textile Waste as an Addition in the elaboration of an Ecological Concrete Block", IOP Conf. Series: Materials Science and Engineering.

cohesiveness in the concrete has reduced. Hence,