International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075, Volume-8 Issue-12S2, October 2019

Mechanical Behaviour of Light Weight Concrete Panels

E. Prabakaran, G. Krishnaraaju, M. Nithya, D. Narsamma

Abstract— Light weight concrete (LWC) Playing a primary position in lowering the useless weight of the shape as properly as it meets the goals of load-bearing man or woman in some cases. LWC manufacture distinct in keeping with the use and availability of materials offers the freeness in concrete design blend. LWC advanced person including sound insulation, thermal resistivity and power lead for more use of the product. This paper deals LWC research at the partition panels with interlocking gadget to boom shear and flexural conduct compared to normal gypsum board partitions. The LWC gives more desirable energy at 0,050% in every of the aluminum and gypsum addition as compared to zero.0.5% in the cement substitute.

Keywords: LWC (light-weight concrete), sturdiness, each panel, aerated, aluminum.

I. INTRODUCTION

Of studies within the concrete industry, using structural components used are getting extra concrete. In the framed shape, partitions generate greater load equal to the burden value of lifestyles. To reduce the lifeless load, the partition can in lightweight concrete. Prefabrication and simple structural modeling for this factor reduces the time and one economically for quicker creation. Despite the heavy concrete bear minimum electricity of light inside the press, the potential in shear and flexural conduct wishes to enhance inside the partition panel. Lightweight concrete material may be carried out via low density or low density techniques which include by way of using a concrete production light-weight combination, concrete primarily based foam, concrete excessive air, no fines concrete. Fibers utilized in lightweight concrete to maintain the metallic from corrosion to resist towards chlorides and other exposure conditions, to be able to bring about minimum price burden to maintenance3. For stuctural and non-structural concrete dead load is decreased via the usage of lightweight concrete that will increase worlk form design and material discount occurs. Lightweight concrete typically has a density of about three hundred - 1850 kg / m3 and has a thermal and sound insulating properties have been suitable. LWC produce better skid resistance, the capacity of Sound Transmission (forty%), Air permeability2.

Revised Manuscript Received on September 14, 2019.

E. Prabakaran, Assistant Professor, Department of Civil Engineering, Dr.N.G.P. Institute of Technology, Coimbatore, Tamil Nadu, India. (Email: onlinepraba@gmail.com)

G. Krishnaraaju, Assistant Professor, Department of Civil Engineering, Dr.N.G.P. Institute of Technology, Coimbatore, Tamil Nadu, India.

M. Nithya, Professor, Department of Civil Engineering, Siddhartha Institute of Technology and Sciences, Hyderabad, Telangana, India.

D. Narsamma, Assistant Professor, Department of Civil Engineering, Siddhartha Institute of Technology and Sciences, Hyderabad, Telangana, India.

The paper gives is vital to determine the overall performance of light-weight foamed concrete through including numerous chances of aluminum powder as an agent entrapped and determine numerous mechanical electricity and determine the effect of using extraordinary chances of aluminum powder and behavior of each bending mild weight concrete panels. Artificial foam used for the density of beneath 1000 kg / m3 for the low fine concrete foam (Brady & Jones, 2001) 1.

II. INVESTIGATIONS IN LIGHTWEIGHT CONCRETE

Using lightweight panels in buildings has a giant role to lower useless load and seismic load induced. From an economic standpoint, the usage of a lower amount of fabric because of a lower in the dimensions of the structural elements. On the alternative hand, use a lightweight panel with thermal insulation properties, reducing the cost of overall performance, efficiently.

The substances had been taken to supply light-weight concrete have been on the advice of researchers formerly and materials are cement, excellent mixture, chemical additives in (Table 1 - aluminum powder and gypsum in the ratio of zero.0.5%, 0.050% and zero.0.5%) Percentage of the volume of semen taken ,

Figure 1 and Figure 2 show the aluminum powder and gypsum used inside the practise of light-weight concrete. Table 2 and Table three provides the propertiues of aluminum and gypsum and Table four suggests the weight of the pattern unit LWC.

Figure 1 Aluminium powder

Figure 2 Gypsum

Table: 1 Mix Designation for the Specimens:

Mix designation	% replacement of cement wih	
	Aluminium	Gypsum
S	0	0
S_1	0.025%	0.025 %
S_2	0.050%	0.050 %
S_3	0.075%	0.075 %

Table 2 Properties of Aluminum Powder:

Properties	Values
Physical state	Powder
Appearance	Silver gray
Odour	Odourless
pH	not available
Boiling point	2467˚C
Melting point	660˚C
Solubility	Insoluble
Specific gravity	2.7020g/cm^3
Molecular formula	Al
Molecular weight	26.98

Table 3 Properties of Gypsum:

Properties	Values
Physical state	Powder
Appearance	colourless to white
Molecular formula	CaSO4.2H2O
Specific gravity	2.31-2.33
Odour	Odourless
Melting point	1460˚C

III. MIX DESIGN

1:2 has been taken the mix design from the literature assessment with the aid of Dhawal Desai-IIT Bombay (2000)(four). In this have a look at foamed concrete have been organized for four different sorts with various range of density (1600 - 1760 kg/m3). From the Table 4, specimen 2 having low density and shape that the workability take a look at had been taken for diverse w/c ratio and the effects had been shown in Table 5.

Table 4 Unitweight:

Sample	Unit weight of cube (kg/m^3)
S (ordinary concrete)	2415.60
S_1(LWC1)	1763.46
S_2(LWC2)	1603.45
S_3(LWC3)	1752.29

Table 5 Tests for workability of concrete:

Sample	W/C ratio	Slump (mm)	Vee-Bee (mm)	Compaction factor
S2	0.4	50	56	0.678
S2	0.5	46	46	0.792
S2	0.6	39	23	0.835

The cubes, prism and cylinder specimens were prepared with foamed concrete which consisting of Sand, cement and foaming agent. Concrete and specimens have been used to measure the physical and mechanical home such as the ability to work, Unfold ability checks, electric press, tensile and flexural strength energy. After recovering enough, foam concrete is stripped from its mold.

IV. LIGHT MECHANICAL BEHAVIOR OF CONCRETE & RESULTS

Table 6 shows the press, split tensile and flexural behavior of light weight concrete. Also Tables 7 and 8 show the strength of the effect of the slab and the loading situation for the slab. Table nine shows the deflection plates for a variety of loading conditions..

Table – 6 Mechanical behaviour of Light Weight Concrete:

Sample	Compressive strength, MPa		Split tensile strength, MPa		Flexural strength, MPa	
	14 days	28 days	14 days	28 days	14 days	28 days
S	14.59	21.75	1.45	2.11	2.02	5.26
S_1	3.18	6.74	0.35	0.90	0.72	1.88
S_2	5.40	8.59	0.54	1.22	0.87	3.44
S_3	4.07	8.07	0.40	1.10	0.78	2.59

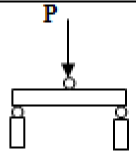
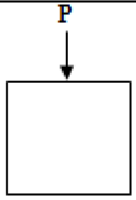
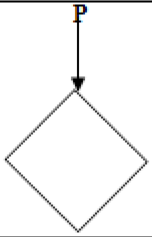
Table 8 Loading condition for slab:

Specimen	Description
S_2T_1	Loadig parallel to specimen
S_2T_2	Loading perpendicular to specimen
S_2T_3	Loading parallel to shear plane of specimen

Table 9 Flexural strength of slabs at 28 days

Retrieval Number: L105510812S219/2019©BEIESP
DOI: 10.35940/ijitee.L1055.10812S219

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

Specimen	Loading condition	Flexural strength of slabs (N\mm²)	Deflection (mm)
S_2T_1		24.284	6
S_2T_2		33.487	9
S_2T_3		27.868	11

From the above test values, we conclude that the specimen S_2 has higher strength than other two specimens.

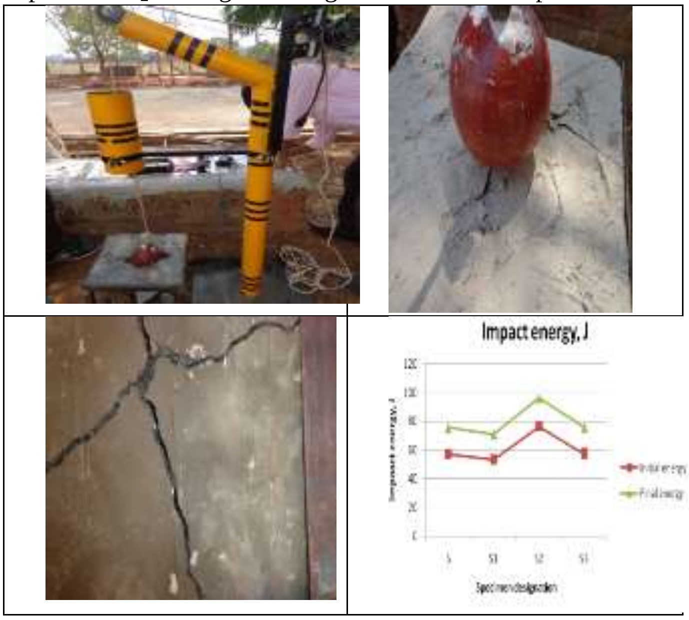


Figure - 7 Impact energy of slabs, J

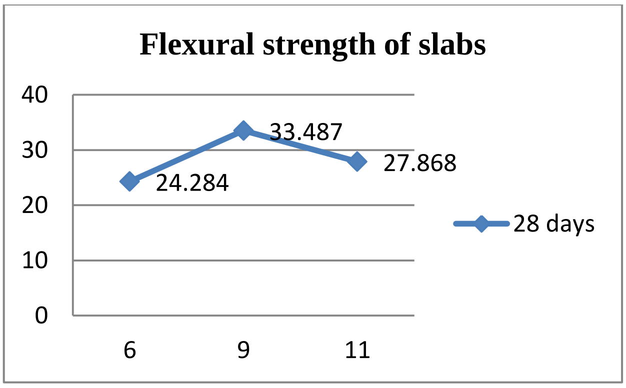


Figure 8 Flexural strength of slabs

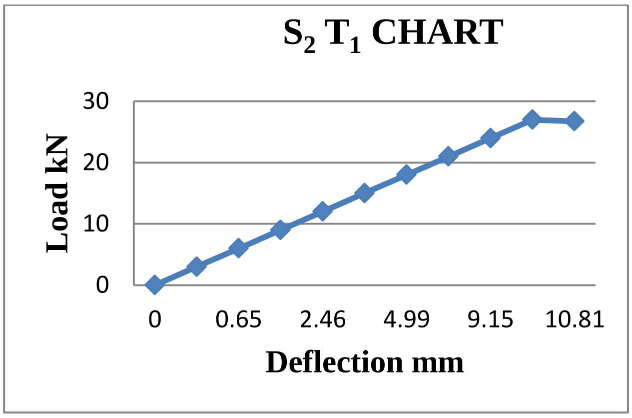


Figure 9 Deflection of slab S_2 T_1 CHART

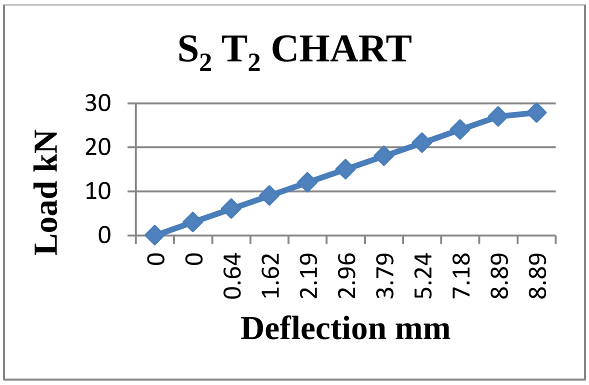


Figure 10 Deflection of slab S_2 T_2 CHART

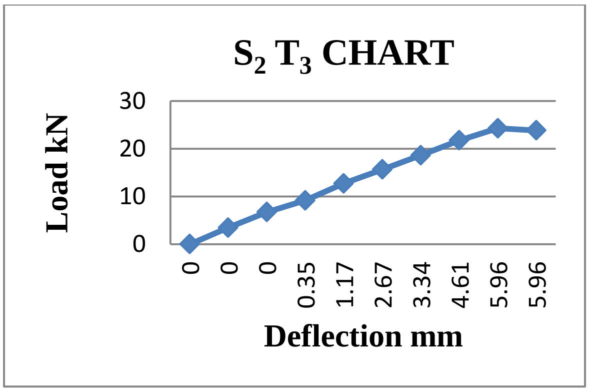


Figure 11 Deflection of slab S_2 T_3 CHART

V. CONCLUSION

The following conclusions can be drawn on the outcomes of this observe:

From the experimental outcomes, it's miles observed that

1. The unit weight of lightweight concrete is 1603.45 for S2 specimens (zero,050%)

2. The cube compressive energy is eight,590 N / mm2 at 28 days had been able to withstand the weight partition

three.Flexural prism electricity is three,440 N / mm2 at 28 days offers higher flexural electricity

four. Impact Test slab (S2) for five punches 1.1mm crack initiation and crack the stop of the two.Three received a larger than normal concrete punching shear values indicate higher and bending behavior five. For different loading conditions slab specimens had been tested and the values are tabulated, the results of the observerd that the slab can withstand in opposition to the bending, shear diagonal and area

6. The impact strength balance ensueres partition for nailing and different varieties of unexpected load generated by means of human movement

REFERENCES

1. Brady, K.C & Jones, M.R (2001) .Specification for Foamed Concrete
2. Chen, Y. And Zhang.Q (2009) Manufacturing generation of porous cement concrete for dual carriageway creation
3. Chris P.Pantelides, Brandon Ruifen T.Besser and Liu (2012) One manner to lightweight concrete shear conduct of bolstered bars
4. Dhawal Desai-IIT Bombay (2000) Development of Lightweight Concrete
5. E. K. K. Nambiar and K. Ramamurthy, "Air-emptiness foam concrete characterization," Cement Concrete Research, vol. 37, no. 2, pp. 221-230 2007
6. E. R. Domingo, "Introduction to autoclaved aerated concrete which includes design requirements using the power of design," M.S. Thesis, Kansas State University, Manhattan, Kansas, 2008
7. Gambhir, M.L. (2004) .Concrete Technology. New Delhi: Tata McGraw Hill
8. "A Guide to Structural Lightweight Aggregate Concrete". ACI 213R-87, American Concrete Institute, Detroit, Michigan. 1987
9. Husain Al-Naseer khaiat and Haque (1999) The electricity and durability of light-weight concrete
10. J. Newman, B. S. Choo, and P. Owens, Advanced Concrete Technology Processes, Elsevier Ltd., 2003, component 2, pp. 2 / 7-2 / nine
11. Aghaee Kamran, Mohammad Foroughi, (2000) Development of Lightweight Concrete Partition Using Textile Waste
12. K. J. Byun, H. W. Song, and S. S. Park, "Development of structural light-weight foamed concrete the usage of polymer foam agent," ICPIC 98th, 1998
13. E.P. Thirteen. Kearsley, Wainwright P.J. The have an effect on of porosity at the power of foamed concrete // Cement and Concrete Research 32 (2002) 233-239
14. Leming, M.L. "Lightweight Concrete Creep and Shrinkage". Department of Civil Engineering, North Carolina State University in Raleigh, North Carolina. April sixteen, 1990
15. L. B. Yen, "Study of the access of water into the foamed concrete," M.S. Thesis, National University of Singapore, 2006
16. M.S.Shetty Concrete Technology, Chand publication, version (2006)
17. M. O. Mydin and C. Y. Wang, "The mechanical houses of foamed concrete uncovered to excessive temperatures," Construction and Building Materials, vol. 26, no. 1, pp. 638-654, 2012
18. Narayanan, N. & Ramamurthy.K (2000) .Structure and nature Aerated Concrete. 22, No.5, pp 321 -. 329
19. O. Richard, M. Ramli and K. M. Al Shareem, "Experimental manufacturing of light-weight foamed concrete sustainable," British Journal of Applied Science & Technology, vol. 3, no. Four, pp. 1-12, 2013
20. "Standard Practice for Selecting The share of Structural Lightweight Concrete". ACI 211.2-ninety eight, American Concrete Institute, Detroit, Michigan. 1998
21. S.Rooyen, "Structural lightweight aerated concrete," M.S. Thesis, Stellenbosch University, 2013
22. T. Wenling, L. Liyuan, Z. Xiaoyan, Z. Mingjie, and W. Nana, "foamed concrete packages in street engineering," in Proc. International Conference on Transportation Engineering, 2009, p. 2114-2119