

Experimental Investigation on Tensile Behavior of Chicken Mesh for Ferrocement Application in Cost Effective Construction

Umesh S.S.^a, Ganesha Mogaveera^b

^a Associate Professor, ^b Professor and Head,

^{a,b} Department of Civil Engineering, Mangalore Institute of Technology and Engineering, Moodbidri, Karnataka, India

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Abstract: Tension Test were conducted on Chicken mesh which are available in market in different sizes such as 28, 22, 20 gauge. Wire diameter and opening size of types of chicken mesh are 0.35mm and 14.5mm (28 gauge), 0.70 mm and 15.59mm (22 gauge), 0.80 mm and 17mm (20 gauge). Tensile strength test was done on three samples of chicken mesh under each category such as 28,22,20 gauge. The main objective of the study is to find ultimate load carrying capacity and elongation. Test outcome confirmations that ultimate load carrying capacity of 22-gauge chicken mesh is more in comparison with remaining two types chicken mesh such as 28 & 20 gauge. Chicken mesh is one of the main constituents in Ferrocement application in cost effective Construction. Therefore, experimental Investigation in Carried out to standardize the tensile load carrying capacity of types of chicken mesh..

Keywords: Chicken mesh, Ferrocement, Tensile Behaviour

1. Introduction

Ferrocement is a Kind of Thin Wall Reinforced material, which is a combination of Closely Spaced Layers of Continuous and Relatively Small Size Wire Mesh Which is manufactured by using metallic or any other suitable material. Subsequently Ferrocement Own Certain Exclusive Properties, Such as High Tensile Strength-To-Weight Ratio, Superior Cracking Behavior, Lightweight, Mouldability to any required Shape. Ferrocement has wide range of applications and practice in manufacture of boats, manufacturing of housing components such as roofing elements, water tank, door and door frame, man hole cover, domes, arch, vaults and many more. Ferrocement is a very old material and it is a combination of different types of mesh, mortar and micro concrete. However, chicken mesh is a main component in ferrocement. But Manufactures are not concerned with quality production so it is necessary to investigate the quality of mesh before using in ferrocement application. In this direction research work had been carried out to verify the tensile behaviour of different gauges of chicken mesh such as 28,22, 20.

2. Material Used

The different gauges of chicken mesh such as 28,22,20 are used for tension test. The properties of types of chicken used are listed in Table-1

Table-1: Physical Properties of Type of Chicken Mesh (28,22,20 gauge)

Type of Mesh	Wire diameter (mm)	Spacing (mm)
Type-1 (28 Gauge)	0.35	14.5 x 14.5
Type-2 (22 Gauge)	0.70	15.59 x 15.59
Type-3 (20 Gauge)	0.80	17 x 17

3. Experimental Investigation

The key objective of the experimental investigation is to

Determine the tensile strength of types of chicken mesh such as 28, 22, 20 gauge for different ferrocement application in cost effective construction

Experimental setup

Experimental test setup is consisting of universal Testing machine of 100 Ton Capacity, Test specimen mounting arrangement, dial gauge. Test specimen is arranged in UTM

As shown in fig-1 and dial gauges are used record the elongation of chicken mesh at regular load interval.



Fig-1: Experimental Setup

B Preparation of Test Samples

Chicken mesh is sandwiched between 10mm thick MS flat plates however to develop gripping effect between flat plate and chicken mesh, initial torque is applied. Dimension of gripping plates and number of bolt requirement is considered based on availability of sandwich grip area.

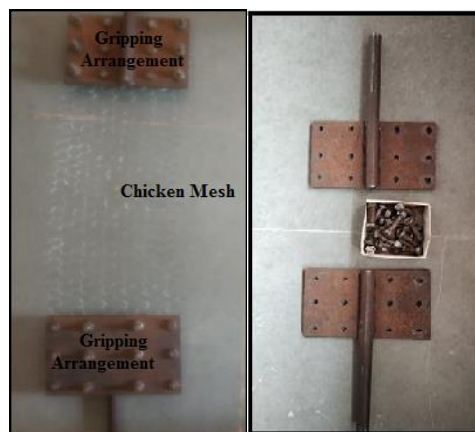


Fig-2: Gripping arrangement of test specimen

C Specimen Sizes for tension test

The different gauges of chicken mesh such as 28,22,20 are selected for tension test. In all three cases 60° orientation, 200 mm width and 500 mm length are common. For each type of chicken mesh three samples were taken for testing. The purpose of the investigation is to know the tensile behaviour of chicken mesh for ferrocement application.

4. Results And Discussion

Different gauges of chicken were tested to investigate the tensile strength. The results of the test specimen are presented in the form of load VS displacement curves

Table-2: Tension Test results for Chicken mesh

Type of Mesh	Sample NO	Ultimate Load (kN)	Deflection (mm)
(Type-1) 28 gauge	1	2.2	15.94
	2	2.4	8.33
	3	2.5	8.53
(Type-2) 22 gauge	1	3.0	12.76
	2	3.3	8.38
	3	3.3	8.20
(Type-3) 20 gauge	1	2.7	26.44
	2	3	56
	3	3.3	58

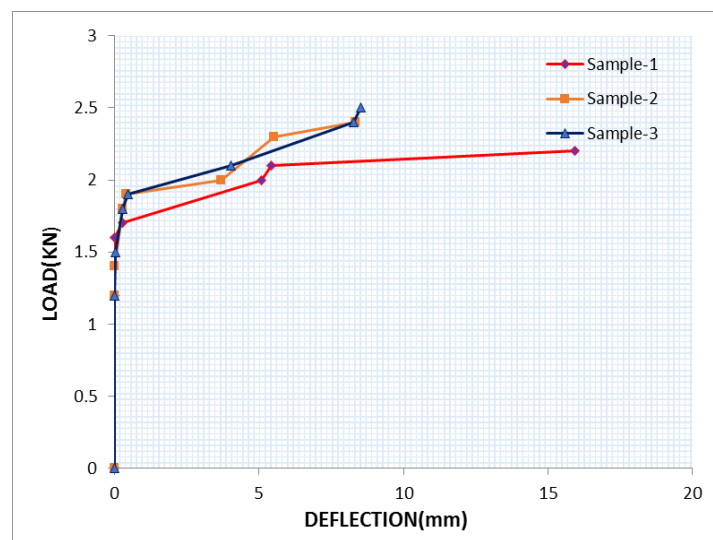


Fig-3: Load Vs Deflection of Type-1 Chicken mesh

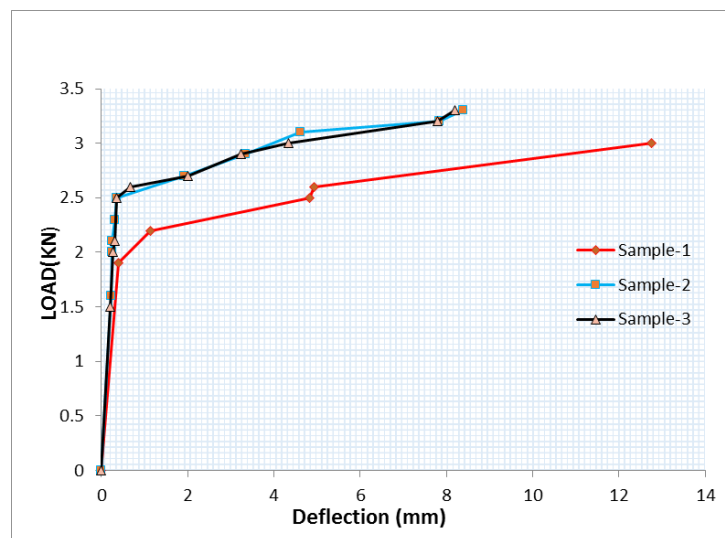


Fig-4: Load Vs Deflection of Type-2 Chicken mesh

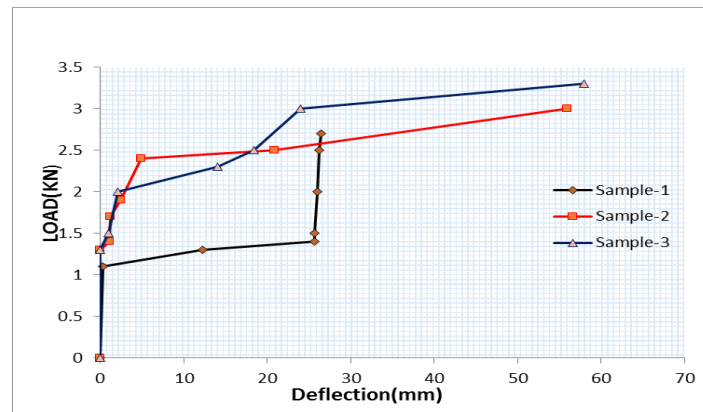


Fig-5: Load Vs Deflection of Type-3 Chicken mesh

5. Discussion

From Experimental Investigation it is observed that, Marginal variations in ultimate load carrying capacity between Type-2 and Type-3 chicken mesh. However, elongation is more in Type-3 chicken mesh when compared with Type-2 and Type-1 chicken mesh.

6. Ferrocement Application

Ferrocement is a type of reinforced concrete material having smaller diameter wire meshes act as reinforcement. Strength And load carrying capacity depends upon tensile strength of types of meshes used as reinforcement. Following are the list of ferrocement application in cost effective construction.

1. Water Tank
2. Boat
3. Toilet
4. Roofing component
5. Arch foundation
6. Domes
7. Vaults
8. Biogas plant
9. Building Components

7. Conclusion

1. Average ultimate load carrying capacity of Type-1 Chicken mesh is 2.36 kN and maximum deflection observed is 15.94 mm.
2. In case of Type-2 Chicken mesh, average ultimate load carrying capacity is 3.3kN however maximum deflection recorded is 12.76mm. In case of Type-3 chicken mesh, ultimate load carrying capacity is 3 and maximum deflection observed is 58mm.

Type-2 and Type-3 Chicken mesh are more suitable for casting ferrocement components.

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