

# Experimental Study on Concrete Encased With Galvanized Iron Sheet

Parthiban.L<sup>1</sup>, Naveeneshwar.P<sup>2</sup>

<sup>1</sup>(Asst. prof, Department of Civil Engineering, Roever College of Engineering and Technology, Perambalur)

<sup>2</sup>(Asst. prof, Department of Civil Engineering, Roever College of Engineering and Technology, Perambalur)

## Abstract

This paper involves in determining the strength of galvanized iron (G.I) sheet encased concrete and sorptivity. In recent years G.I tube encased to concrete have been widely studied for their use in the civil infrastructure. G.I sheet of two varying thicknesses are used. Generally concrete has high strength properties, even though it has high strength it undergone damage because of its porous nature. Sorptivity test for concrete cube is done to determine its water absorbing capacity. Absorption of water is important in concrete so sorptivity test is carried out to determine its water absorption capacity. Experimental tests are conducted for determining the strength of G.I encased concrete and Sorptivity for cover concrete.

## Introduction

### 1.1 General

Concrete columns are fundamental structural component in engineering structures. The G.I encased concrete cylinders are increasingly becoming important in infrastructure because the G.I tube serve as stay in place formwork during construction and provide confinement during service, in addition to the resistance to corrosion up to ambient temperatures.

G.I encased concrete are releasing the moisture content and odour. This type of concrete are does not release any fumes. This G.I encased concrete also used for high rise buildings and bridges. Because of gives the better corrosion resistant and good appearance. The galvanised iron is easily available material.

It will further cause decomposition of G.I as a result, the G.I will lose their confinement effect and the concrete will collapse.

The purpose of this study is to understand the residual strength of G.I tube encased concrete cylinders through experimental testing.

### 1.2 G.I sheet

G.I sheet forms metallurgical bond between zinc and steel (or) iron creating a barrier to prevent itself from getting rusty as easily. It is an essential component of roofs, panel, electric appliance and machine parts.

To satisfy the needs, we offer 3ft x 6ft, 4 x 4ft, 4 x 8ft in standard size; meanwhile we can cut the size as your request.

### 1.2.1 Specification of G.I Sheet

Thickness	- 0.15mm – 3.5mm
Elongation	- min 7%
Zinc coating	- 60g/m <sup>2</sup> – 600g/m <sup>2</sup>
Density	- Density of G.I sheet is no different from other steel and is generally taken as 7850 kg/m <sup>3</sup>
Melting point (Aluminium)	- 1400°C (Stainless steel), 660°C

### 1.3 Materials

The materials used in this experimental investigation are

1. Cement: Ordinary Portland cement (OPC) 53 Grade (IS 1489 PART I 1991).
2. Fine aggregate: Locally Available clean river sand ZONE II of IS 383 – 1970.
3. Coarse aggregate : Locally available well graded crushed Granite Coarse aggregate of normal size 20mm is used.
4. Water : Locally available potable water obtained from source of college campus bore well is used for mixing and curing of concrete for normal conditions conforming to the requirements of water for concreting and curing as per IS: 456 – 2000.
5. G.I Sheet : G.I Sheet is received from Chennai.

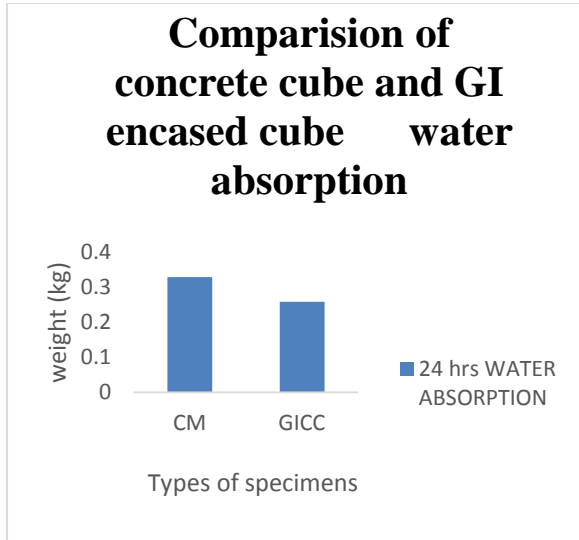
### 1.4 Methodology

- Concrete contains cement, fine aggregate, coarse aggregate and water. The cubes, cylinders and prism samples were cast on the mould in their required size with a water cement ratio as 0.50.
- Sorptivity test for unsaturated concrete

**1.5 Result and discussion**

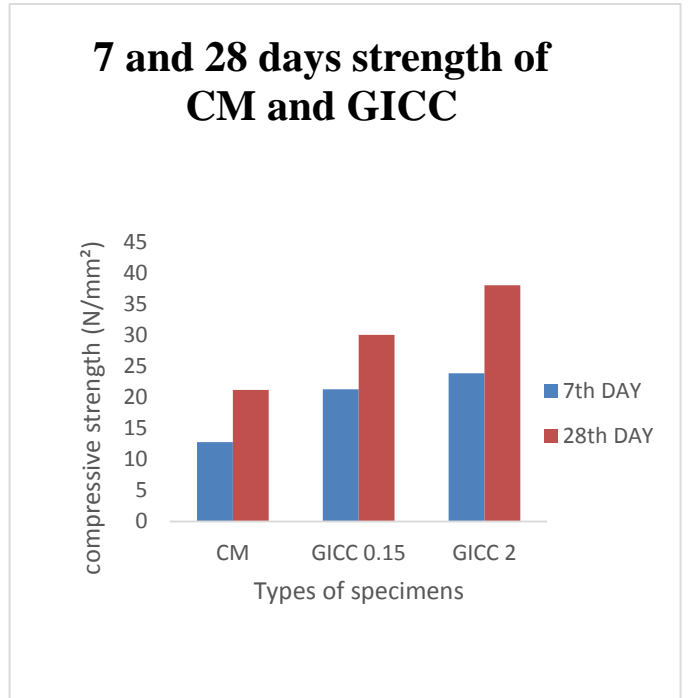
**1.5.1 sorptivity test results**

S.NO	Specimen weight	Weight of the specimen (kg)	Absorption of water 24 hrs (kg)
1	CM	6.50	0.33
2	GICC	6.92	0.26



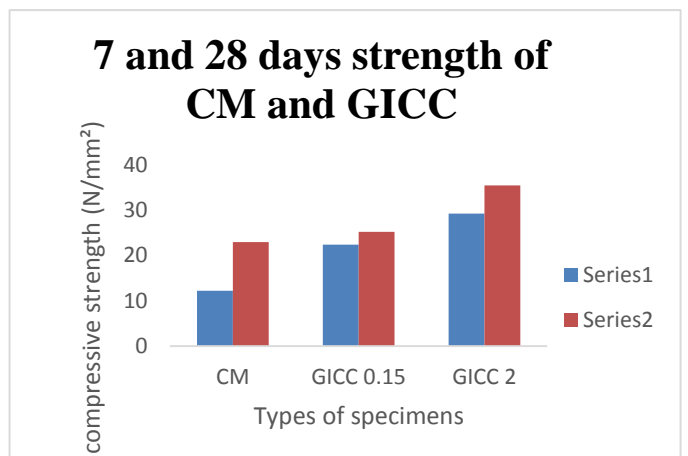
**1.5.2 compressive strength of plain concrete cylinders and GI sheet encased concrete concrete cylinders**

Sl.No	Specimens		Compressive Strength On 7 Days (N/mm <sup>2</sup> )	Compressive Strength On 28 Days (N/mm <sup>2</sup> )
1	CM		12.82	21.23
2	GICC	0.15 mm tk	21.31	30.12
		2 mm tk	23.92	38.12



**1.5.3 Comparison of 7 and 28 days CM Compressive Strength Values vs GI sheet encased concrete cubes**

Sl.no	Number of days	CM	GICC (mm)	
			0.15	2
1	Compressive strength on 7Days (N/mm <sup>2</sup> )	12.25	22.43	29.23
2	Compressive strength on 28Days (N/mm <sup>2</sup> )	23.00	25.23	35.45



### 1.5.4 Comparison of 7 and 28 days CM Split Tensile

#### Strength values vs GI sheet encased concrete cylinders

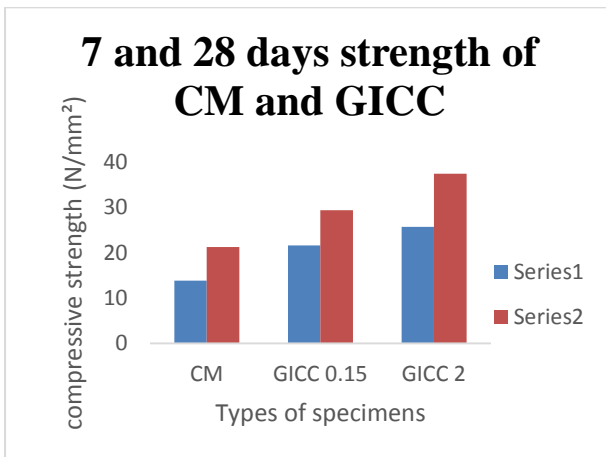
Sl.no	Number of days	CM	GICC (mm)	
			0.15	2
1	Split tensile strength on 7Days (N/mm <sup>2</sup> )	13.83	21.65	25.73
2	Split tensile strength on 28Days (N/mm <sup>2</sup> )	21.25	29.43	37.46

### 1.6 Conclusion

- G.I sheet encased cylinders gives more strength compared to the normal cylinders.
- It does not need any plastering. It gives the good appearance.
- The concrete cylinder has an encasing of G.I sheet of thickness 0.15mm and 2mm its strength tested.

### 1.7 Reference

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### 1.5.5 Comparison of 28 days Flexural Strength Values vs

#### GI sheet encased concrete prisms

Sl.no	Number of days	CM	GICP (mm)	
			0.15	2
1	Flexural strength on 28Days (N/mm <sup>2</sup> )	8.4	34.65	42.75

