Experimental and Investication Study Onconcrete by Encasedg. I Sheetand Exposed to Fire

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***Abstract*:- The aim of this experimental study is to determine 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 infra structure.G.I sheets 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. Electrical oven is used for distribute the temperature to the G.I encased concrete cylinders.The cylinders are kept in oven at different temperatures of 100°c, 150°c, 200°c, and 250°c with the time periods of 5hrs. Experimental tests are conducted for determining the strength of G.I encased concrete after temperature distribution and Sorptivity for cover concrete.**

INTRODUCTION

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 upto 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 concrete will collapse. It has been found that burning process is complex and non linear so, we will use the electrical oven for distributing the temperature with the time period of 5hrs group of temperature are 100,150,200 and 250°c.

Temperature increasing stage will cause using their strength properties and load carrying capacity. The purpose of this study is to understand the temperature distributions and 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.

It 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^2 – 600g/m^2
Density	- Density of G.I sheet is no different formother steels and is generally taken as7850 kg/m^3
Melting point	- 1400°c (Stainless steel)660°c (Aluminium)

1.3 Hot air oven

Fig 1.1

Hot Air Ovenoffered comprise inner chambers that are made in stainless steel finish with outer structure made using mild steel in power coated finish so as to provide for longer service life standards. These hot air ovens also feature gaps between walls that come fitted with glass wool insulation so as to ensure avoiding heat loses in given applications.

Further, the heating elements are constructed using high grade chrome plated micro-me wire with temperature controlled through thermostat usage.

1.3.1 Technical specification

- Inner chamber made of S.S. and outer made of Mild Steel with Power coating
- Gap between the walls fitted with glass wool insulation to avoid heat loses
- Heating elements are made of high grade chrome plated micro-me wire.
- Temp. is controlled by thermostat.
- Temp. range 50°C TO 250°C and Accuracy: +- 2°C.
- Air Ventilation's are placed on top of both sides to remove hot gases / fumes.
- In member Type units heaters placed at the right and left side of the inner chamber.
- All the control switches & pilot lamps are fitted on the front panel
- Trays should be supplied with G.I. wire mesh.

Materials

The materials used in this experimental investigation are

1. Cement : Ordinary Portland cement (OPC) 53Grade (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 portable 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 Trichy.

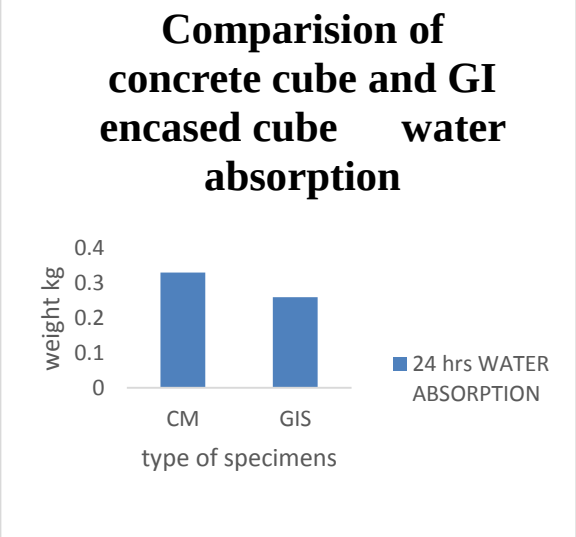
Methodology

- Concrete contains cement, water C.A and F.A. The cubes, cylinders and prism samples were cast on the mouldin their required size with a water cement ratio as 0.50.
- The cylinders were heated with different temperatures of 100ºc,150 ºc,200 ºc and 250 ºcwith the time period of 5 hours for compressive strength test.
- Sorptivity test for unsaturated concrete

RESULT AND DISCUSSION

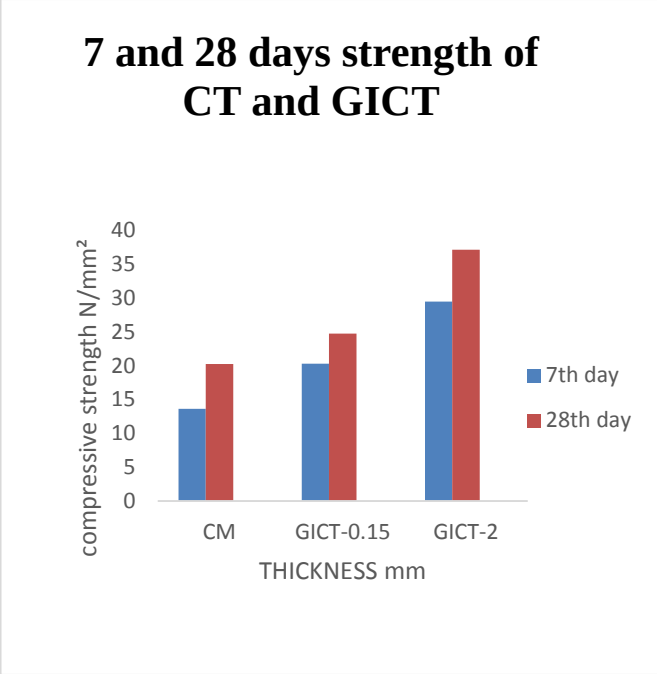
4.1 sorptivity test results

S.NO	Specimen weight	Temperature ºC	Weight before drying in oven (kg)	Weight after drying in oven (kg)	Absorption of water 24 hrs (kg)
1	CM-1	50	7.61	7.21	0.33
2	GIS-3	50	7.81	7.20	0.26



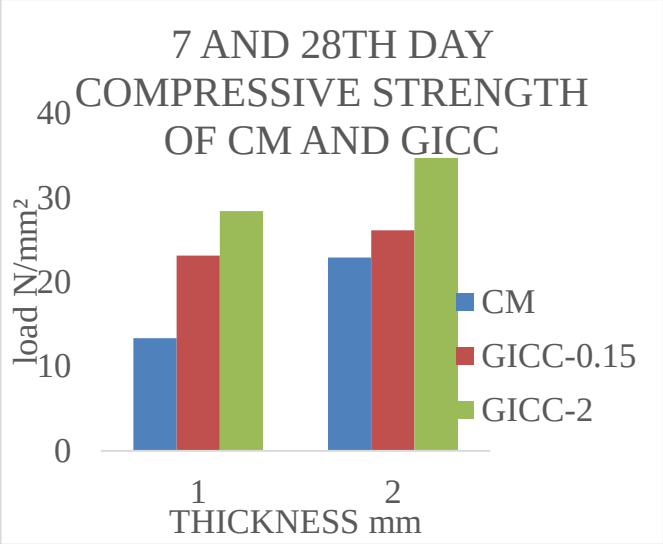
4.2compressive strength of plain concrete cylinders and GI sheet encased concrete concrete cylinders

Sl.No	Specimens		Compressive Strength On 7 Days (N/mm^2)	Compressive Strength On 28 Days (N/mm^2)
1	CT		13.61	20.24
2	GICT	0.15 mm tk	20.32	29.48
		2 mm tk	24.76	37.14



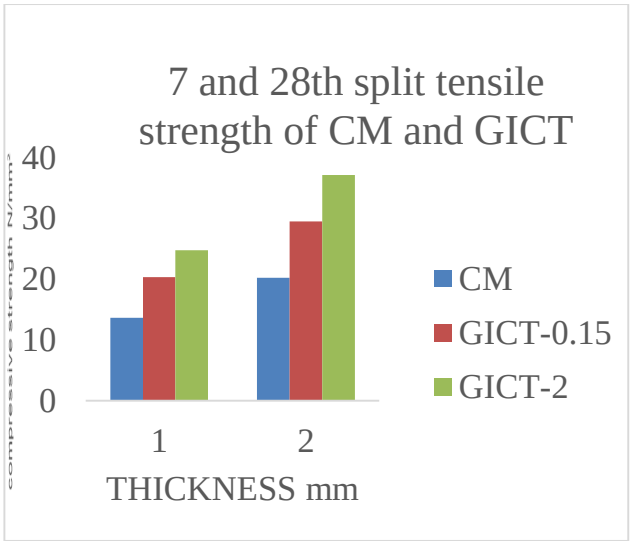
Comparison Of 7 and 28 days CM Compressive Strength Values vs GI sheet encased concrete cubes

Sl.no	Number of days	CM	GICC (mm)	
			0.15	2
1	Compressive strength on 7Days (N/mm^2)	13.32	23.11	28.4
2	Compressive strength on 28Days (N/mm^2)	22.89	26.1	34.67



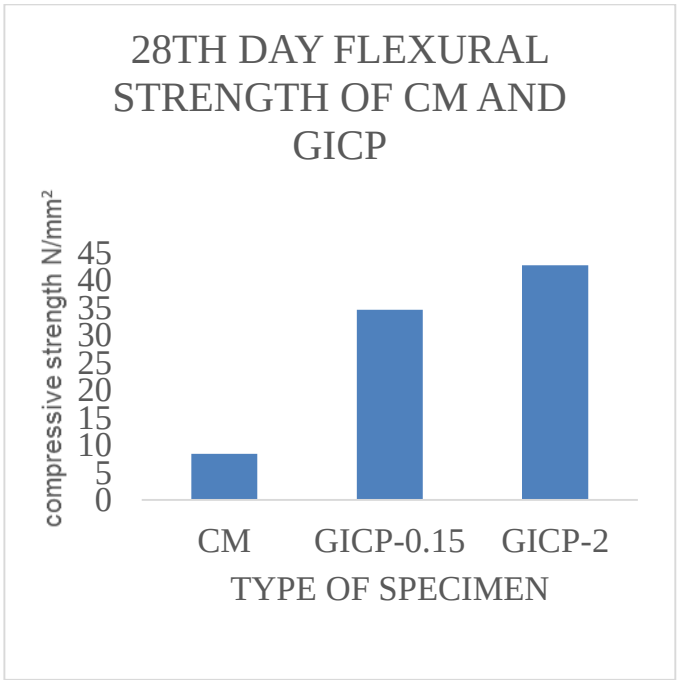
Comparison Of 7 and 28 days CM Split Tensile Strength values vs GI sheet encased concrete cylinders

Sl.no	Number of days	CM	GICT (mm)	
			0.15	2
1	Split tensile strength on 7Days (N/mm^2)	13.61	20.32	24.76
2	Split tensile strength on 28Days (N/mm^2)	20.24	29.48	37.14



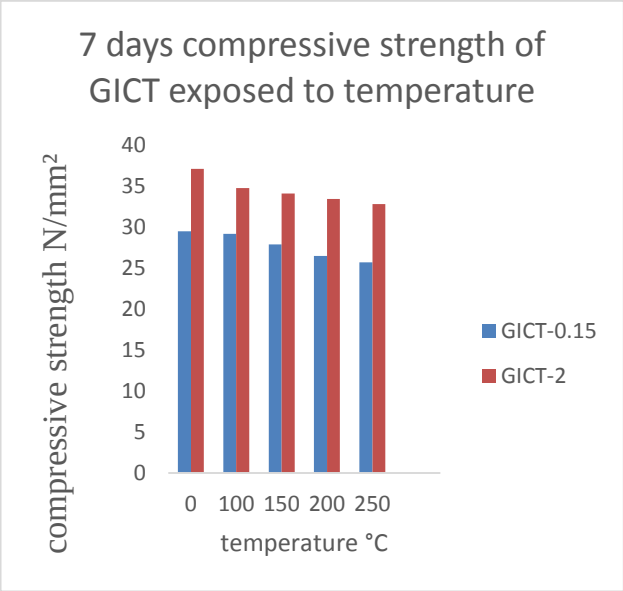
Comparison of 28 days Flexural Strength Values vs GI sheet encased concrete prisms

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



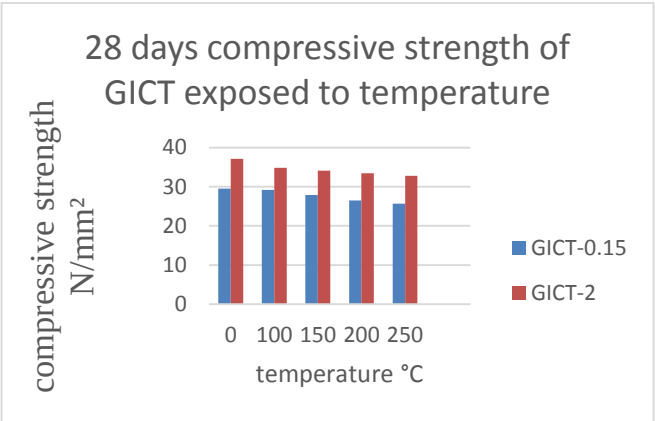
Comparison Of 7 days Compressive Strength Values for G.I encased concrete cylinders exposed to temperature vs GI sheet encased concrete cylinders with various thickness

Sl.no	Number of days	GICT (mm)		GICT$_t$(mm)	
		0.15	2	0.15	2
1	Compressive strength on 7Days (N/mm^2)	20.32	24.76	17.2	21.52
				16.59	20.30
				16.23	19.71
				15.85	18.45



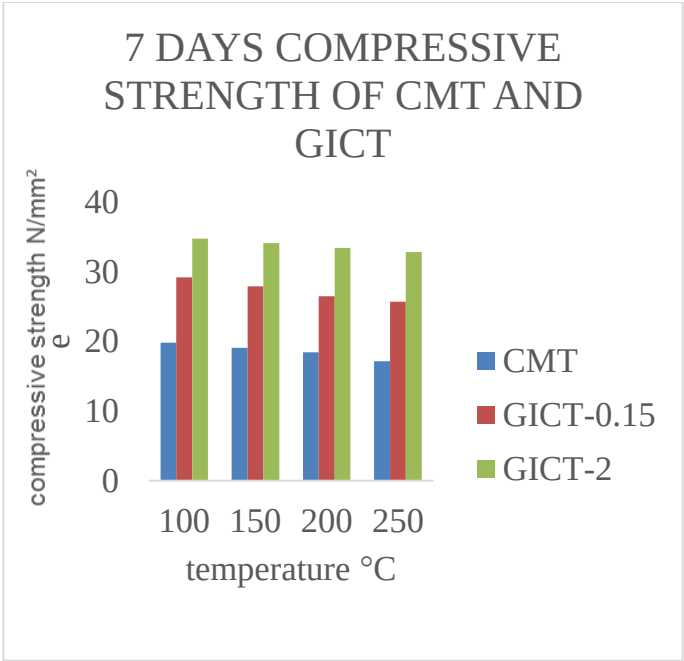
Comparison Of 28days Compressive Strength Values for G.I encased concrete cylinders exposed to temperature vs GI sheet encased concrete cylinders with various thickness

Sl.no	Number of days	GICT (mm)		$GICT_t$(mm)	
		0.15	2	0.15	2
1	Compressive strength on 28Days (N/mm^2)	29.48	37.14	29.19	34.78
				27.89	34.10
				26.48	33.45
				25.69	32.81



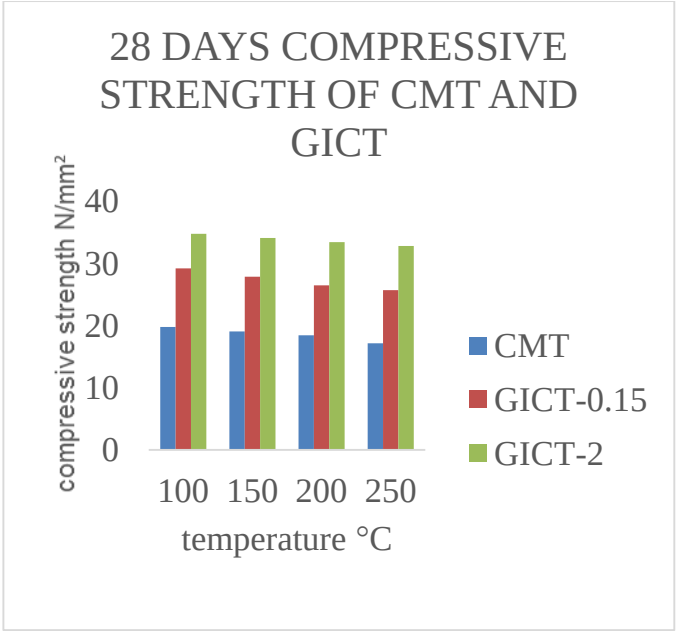
Comparison Of 7days Compressive Strength Values for G.I encased concrete cylinders exposed to temperature vs plain concrete cylinders after temperature

Sl.no	Number of days	CM_T	$GICT_t$(mm)	
			0.15	2
1	Compressive strength on 7Days (N/mm^2)	12.07	17.2	21.52
		11.47	16.59	20.30
		9.87	16.23	19.71
		9.28	15.85	18.45



Comparison Of 28days Compressive Strength Values for G.I encased concrete cylinders exposed to temperature vs plain concrete cylinders after temperature

Sl.no	Number of days	CM_T	$GICT_t$(mm)	
			0.15	2
1	Compressive strength on 28Days (N/mm^2)	19.81	29.19	34.78
		19.05	27.89	34.10
		18.44	26.48	33.45
		17.15	25.69	32.81



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.
- There is an increase of 43.5% is the compressive strength in heated condition.

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