



“ Test Examination on Glass Fiber Polymer Rebars ”

Akshay Gurnule¹, Rohit Gotephode², Yogina Bharadkar³, Sakshi Madavi⁴

Department of civil Eng.

Assistant professor Of Civil Dipartment

Smt.Radhikatai Pandav Collage of Engg. Ngpur

ABSTRACT-

In this inquire around we are considering around Glass fiber fortified polymer (GFRP) Bar and its noteworthiness. In a though a short time later developments, Corrosion of steel is one of the crucial falling detached defiance that significantly debases for the most parcel braced concrete components due to environmental impacts, driving to a reduced service-life of framework components. To overcontestins utilize GFRP bar since It is cheaper than steel. The basically appear day FRP rebar alter is based onpultruded composite things, which are made from longitudinally bundled filaments along the bar center implanted in a gum framework. The strands are the fundamental load carrying component and the gum ties the strands together, and therefore, exchanges the stack between person strands in appear abhor toward of the truth that ensuring them from chemical and physical ambushes. Coordinate a days, the most broadly used fiber sort for FRP bars in the Joined together States is glass based for the production of Glass Fiber Invigorated Polymer (GFRP) rebars. E and E-CR(Electrical/Chemical Secure) glass strands are the most commonly utilized ones since they have tall moldable quality, offer tall chemical resistance, and highlight moo period taken a toll. Offer offer assistance we are going to explore the conduct of steel and GFRP bars in concrete with respects to holding and flexure.

Keywords- - Glass fiber braced polymer (GFRP) Bar, gum matrix, bundled strands, E and E-CR (Electrical/Chemical Resistant) glass strands, tall flexible quality

INTRODUCTION :

Glass fiber braced polymer (GFRP was utilized as an elective material to the steel rebat. The number of braced concrete structures in a brief time a short time later a long time appearing up GFRP rebars has expanded exponentially, and hanumber of GFRP rebar producers. Additionally, creators have made distinctive GFRP rebar sorts, where the surface upgrade to make the bond with concrete changes. The unit weight of GFRP rebar shifts from about one-sixth to one-fourth that of steel, which diminishes transportation costs and makes the rebars less asking to handle at the job zone, yieldin. This Meander gives conifimation with respect to utilize of GFRP instep of Standard steel bar is favored or not. GFRP back can have more than twofold the malleable quality of steel; in any case, it has lower flexural (bowing) quality, lower abdicate quality and lower modulus of flexibility. This activates GFRP can endure greater levels of drive than steel when utilized in circumstances that put the component in weight such as at the foot of a essentially backed beam or the best of a cantilevered chunk. Be that as it may, steel rebar will tolerate more self-evident levels of flexible redirection than GFRP a few time recently yielding or persevering mutilation happens. Steel is characterized by tall ductility, which activates it will deform plastically a few time as of late frustration. Compared to steel, GFRP has an adaptable conduct and is not moldable, which incites it has a rupture point or maybe than a forsake point.These characteristic differences primitive GFRP- braced concrete is as a run the appear up planned for concrete pulverizing disillusionment whereas steel- reinforced concrete is typically facilitated for - desert disappointment.

THEORETICAL POINT OF VIEW :

There is require for an alternative commonsense surface to supplant traditional steel bar. FRP bars being a exceptional elective understands problems related to steel bars. These materials are guaranteed to be deterioration secure and reduces the lifecycle cost of concrete structures. One of the centers is to recognize and study the specific sorts of FRP materials and compare their physical and mechanical properties to the standard steel bar. The foremost point of this recommendation is to compare the flexural behaviour of steel and GFRP braced concrete component experimentally and utilizing compelled component examination (FEA) done by ABAQUS. Will as well be endeavored to select the mechanical properties and favor the centers of charmed given by the manufacturer. The flexural test will be in two bunches, one group will be braced with GFRP bar and other bunch will be invigorated with steel bar. The bars will be subjected to flexural test until thwarted expectation to select the phenomenal stack capacity, disillusionment mode, break organize and divide width ascribed to each of the bar. Gotten comparison will as well be done to check how compelling GFRP bars are if utilized as bracing materials in concrete membersDeflection in GFRP- reinforced structures is greater than steel due to GFRP's lower modulus of flexibility. This may require more obvious zone sizes or a higher fortification ratio to be utilized in collaborator applications GFRP has substantially more noteworthy bond quality to concrete than steel which makes GFRP-reinforced concrete more secure to cracking. In advancement, break resiliences in watery conditions are higher in GFRP structures (0.8 mm) than steel (0.5 mm) due to GFRP's deteriorating resistance

METHODOLOGY:

We have purchased a new normal steel shop in our locality and GFRP Bar from respectively of diameter 0.10 cm, 0.12 m, Pom from local Gujrat state 18 mm.

Following test are performed by group members.

1. Pull out test.

Procedure: -Pull-out test was performed using an apparatus in a universal testing machine. Deflection in GFRP-reinforced structures is greater than steel due to GFRP's lower modulus of elasticity. This may require larger section sizes or a higher reinforcement ratio to be used in structural applications. GFRP

has substantially greater bond strength to concrete than steel which makes GFRP-reinforced concrete more resistant to cracking. In addition, crack tolerances in aqueous conditions are higher in GFRP structures (0.7 mm) than steel (0.4 mm) due to GFRP's corrosion resistance. The specimen

was prepared similar to the concrete cube. 10 GFRP and steel bars of 300mm long was inserted at the centre of cubes after concrete pouring at a depth of 100mm. After 28 days curing, the specimens were inserted in the pull-out apparatus and placed in the universal testing machine. The ultimate bond strength was computed using equation below, to P_{max} / DL (MPa) Where r_b is the ultimate bond strength, P_{max} is the ultimate pullout load, D and L is the diameter and embedded length of reinforcing bars.



Fig : Pull out Apparatus

2. Pliable quality test

Procedure: -The pliable testing of steel bars was performed according to British Standard (BS EN ISO 6892-1) and GFRP bars concurring to ASTM standard (D7205/D7205M-06) to determine the extreme push, rate stretching and modulus of versatility. A steady pace rate of 0.6MPa was utilized for application of stack on the steel bars, whereas relocation sort load rate of 1mm/min was utilized on the GFRP bars, both reinforcement bars where stacked until disappointment. In planning GFRP bars stays are require in arrange to avoid harm due to the grasps of the malleable testing machine, steel tubes are utilized and filled with either cement grout or epoxy whom have great ompressive quality.



UTM Machine



GFRP After Testing on UTM Machine Materials are used in project work.

1. Cement: -UltraTech cement are utilized
2. Sand:natural stream sand is utilized
3. Totals: 20mm measure of total utilized
4. Water: unadulterated water utilized
5. Steel and GFRP bar utilized as per accessible.

Equipmuntare used in project work

1. All inclusive testing machine
2. Pull-out test device
3. Concrete 3d shape molds 15 x 15 x 15 cm
4. Steel Bar

COMPOSITION OF GFRP :

Glass fiber fortified polymer (GFRP) in some cases called glass fibre fortified plastic or fiberglass is composed of a polymer plastic lattice with implanted glasfibres. The polymer for GFRP rebar more often than not comprises of a finyl ester, epoxy or polyester thermosetting plastic Steel metal amalgam composed of press with a little rate of carbon. The fabric contrasts between GFRP and steel implies their basic execution and durability contrast when utilized as fortification in concrete.

STRUCTURAL EXECUTION OF GFRP VS STEEL REINFORCEMENT

GFRP support can have more than twofold the malleable strength of steel; be that as it may, it has lower flexural (twisting) strength, lower surrender quality and lower modulus of versatility.This implies GFRP can endure more noteworthy levels offorcethan steel when utilized in circumstances that put the component in pressure such as at the foot of a essentially backed bar or the best of a cantilevered piece. In any case, steel rebar will endure more prominent levels of versatile avoidance than GFRP some time recently yielding or permanent distortion occurs.Steel is characterised by tall ductility, which implies it will distort plastically some time recently disappointment. Compared to steel, GFRP has an flexible conduct and is not ductile, which implies it has a break point or maybe than a surrender point.

DURABILITY EXECUTION OF GFRP VS STEEL REINFORCEMENT

The solidness of steel rebar eventually depends on the amount of concrete cover given to keep it ensured in a stable, soluble environment inside the solidified concrete. Over time, carbon dioxide and chlorides in the discuss or water penetrate into the pores of the concrete and decrease the alkalinity or pH level of th... Tall bearing capacity, soli tensile capacity, the quality of the bar body is twice that of steel.

RESULTS CONCLUSIONS :

The summary of the experimental and analytical result findings is presented in this chapter.During tensile strength test of GFRP bars is significantly doesn't get as per as per information available in network when compared to that of steel bars but the GFRP specimen should be well prepared according to standard in order to achieve the satisfactory result The average tensile strength of the GFRP bars is about 65% higher than that of steel bars.The life of GFRP Bar is too much more than steel bar there for it increase the life of structure.The bond strength of the GFRP bars mainly rely upon the ribs and the inner cores of the reinforcing bars.GFRP's corrosion resistance

REFERENCES :

1. Aleesha Alexander, Nimesh Mohan M, 2015, "Retrofitting of Reinforced Concrete Beam with Glass Fiber Reinforced Polymer Strips and Sheet", International Journal of Engineering Research & Technology (IJERT), 3(29), 1-6.
2. Ali Kadhim Sallal, Ancy Rajan, 2016, "Flexural Behaviour of Reinforced Concrete Brans Strengthening with Glass Fiber Reinforced Polymer (GFRP) at Different Sides", International Journal of Science and Research (IJSR), 5(5), 1837-1843.
3. Nibin. M, Prof. A. Kumar, 2017, "Strengthening of Reinforced Concrete Beam using Glass Fiber Reinforced Polymer Composites", International Journal of Engineering Science and Computing, 7(1), 4258-4261.
4. Avinash G Hiremath, Nagraj Biradar, Sharangouda, 2018,
5. "Study on effect of longit...
6. Sayali Anil Kedge, M. V. Nagendra, 2018, "Experimental analysis of deep beam strengthened by Glass Fiber Reinforced Polymer Plate", International Research Journal of Engineering and Technology (IRJET), 5(6), 446-452.

-
7. Tabish Izhar, Qadir Raza, 2017, "An Experimental Study To Analyse The Effect Of Using Glass Fibre Reinforced Polymer (GFRP) Bars As Main Reinforcement In Beams And Columns", International Journal of Technical Innovation in Modern Engineering & Science (IUTIMES), 5(4), 736-743.
 8. Shital A Patage, Hirawale Bharat, Makasare Shivon,
 9. Katala Prashant, Ghute
 10. Damini, 2022, "Effects Of Glass Fibre On Concrete", International Journal of Creative Research Thoughts (IJCRT), 10(6), 928-931.