

A Review of Effective Use of Fischer Chemical for Rebar in Existing Concrete Structure

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Abstract - Post-installed reinforcement is widely used in the world because it is needed in rehabilitation and strengthening works. It helps contribute to the cost effectiveness of construction in general and offers a level of confidence in the structural integrity of civil engineering and civil engineering projects. Engineers must be certain of the performance of the adhesives to be used where the adhesives are used as a bond between steel reinforcing bars and concrete. Rebar technique in reinforced concrete construction is a method for proper fabrication and placement of reinforcement bars as per the design and drawings for RCC works. The reinforcement bars are mainly patterned over its surface to facilitate proper bonding with the concrete. To determine the strength of the adhesive (Fischer Chemical), we will perform a comparative test between conventional cubes cast with 16mm rods inserted during the casting process and simultaneously casting the same type of conventional cubes and after curing by drilling an 18mm diameter hole to insert 16mm rods along with the chemical. After the curing period, various tests will be carried out including NDT tests, pull-out tests and split tensile test.

Key Words: NDT Test, Adhesives, Fischer Chemical, Rebar etc.

1. INTRODUCTION

In recent years, new concrete technologies and materials have been widely used in engineering renovation and reinforcement. Chemical rebar reinforcement technology is a new type of reinforcement and reconstruction technology for reinforced concrete structures. It not only has the characteristics of convenient construction, small working face and high working efficiency, but also has the advantages of strong adaptability, wide application range, good integrity of anchorage structure and low cost. Therefore, it is widely used in building reinforcement and concrete reinforcement projects.

Good bonding between steels by using chemical fixatives as adhesion promoters between steel and concrete only after drilling holes in the fixing area, eliminating the need to drill many holes for fixing reinforced concrete structures can be ensured. This not only damages the original component, but also reduces the effort of the reinforcement technique.

Among the many structural strengthening techniques, the technique of planting reinforcing bars has unique technical characteristics.

(1) Flexible design and wide application. According to usage requirements, the number and specifications of reinforcements at each point of reinforced concrete structures can be designed according to structural stress characteristics.

(2) Positioning is accurate and reliable. In general, reinforced concrete structures need to secure embedded parts when connecting to other structures, but the weak point is that it is difficult to adjust the position of the embedded parts. After adjusting the structure and functions, the position of the embedded parts is difficult to change, the planting pole is flexible, and the reliability is equivalent to that of the embedded parts.

(3) Convenient construction.

(4) The process is easy and saves time.

2. NEED FOR STUDY

- Design changes and rapid expansion of structures.
- Rebar is not placed as planned.
- Various conditions in which the rebar process and equipment were changed.
- Reinforcement technology for prefabricated structures.

3. AIM

- To compare the results of conventional cubes and cubes casted with Fischer chemical.

4. OBJECTIVES

- Determine the resistance value of an unknown base metal using a pullout test.
- Verify the quality and safety of rebar and bonding systems after installation.

- If the strength of the base metal is not known, field tests of reinforcing bars and anchors should be carried out.

5. LITERATURE REVIEW

"Comparison of Pull-Out Strength Behaviour for Chemical Adhesive Anchors Installed in Concrete" Milan Mazumder, Md. Khasro Miahb, Al Aminc, Riyadul Hashem Riyadd 2020

The pullout load of the control samples is higher than all other retrofitted anchor samples where the chemical glues are used as a binder. Although the strength of retrofitted anchor samples is lower than that plaster in place, that is sufficient for rehabilitation and strengthening work. For casting on site and in mortar. It follows that the higher the degree of reinforcement and the higher the strength of the concrete, the higher the bond strength or recordable pullout load. The result shows that the pullout load values are higher for the 400W rebar and mix the ratio of 1:1.5:3 into the concrete by applying fischer chemical adhesive and INDEX. If the mixture ratio aggregates will change from 1:1.5:3 to 1:2:4, the pulling load will decrease by about 2% for fischer as well as INDEX installed samples.

"Strengthening of Reinforced Concrete Columns with External Steel Bars" Inayat Ullah Khan, Nasim Ayub, Akhtar Gul, Khalid Khan and Iqtedar Shah

The load capacity of reinforced circular and square columns is increased by 50% and 58%, respectively, compared to the control columns. The design of the beam-to-column connection is of the utmost importance. This method can be effectively used for strengthening columns, because it causes a significant increase in the capacity and ductility of structural elements. The design load is slightly less than the tested load due to the application of rational reduction factors. The deformation capacity of reinforced circular and square columns was improved by 33% and 20%, respectively. When using this technique for actual construction, a hydraulic support system for the slab should be provided to transfer the load of the slab to some temporary support during the application of the strengthening technique.

"Enhancing the Strength of Existing Building Using Retrofitting Techniques" Rahul P. Nimje, Badal Pazare, Nikhil R. Mathurkar, Girish Zade 2018

This paper described a comprehensive study, its steps, procedures and uses of retrofitting in various fields. It offers a variety of approaches to evolve damaged structures, allowing them to extend their lifespan and improve operability and safety. Retrofits rely primarily on the latest in technology and the unique ideas of his engineers and may vary by location.

"Non-Destructive Testing of Structures" Sreeshma P.S , Meera B, Megha Mathew 2016

Based on the literature on this topic and our own research, the current trend in the development of new non-destructive methods for diagnostic testing of building structures is mainly to detect flaws and defects in concrete elements and structures, and that acoustic methods prevail in this field. NDT testing can be used for various concrete structures of the transportation network, such as: bridges, tunnels, retaining walls, roadways, underground structures, etc. Different methods can be used for the same problem, but the best method can be selected based on the characteristics of the problem.

"Rebound Hammer Test: An Investigation into Its Reliability in Applications on Concrete Structures" Antonio Brenich, Rossella Bovolenta, Valeria Ghiggi, Davide Pera, and Paolo Redaelli 2020

This is a direct consequence of intrinsic properties rebound hammer test:

- Very limited area affected by the piston, making the test strongly influenced by all parameters that affect the local properties of the material
- Irregularities in the concrete mix near the surface that cannot be removed, smoothing the surface by grinding
- Piston interaction with local irregularities (voids, aggregates and rods)

"Review Paper on Effective Methods for The Retrofitting of Reinforced Concrete Structures" Shloka Awari, Khushali Ekbote, Ashlesha Patange , Anushka Surve, Shilpi Bhuiyan, Uttam R Awari 2022

Chemistry-based materials have been used to strengthen the RC elements, so the study can be extended to understand the impact of FRP on durability aspects. Conclusions regarding the use of FRP systems are: is. 1) Hassle free and easy to use. 2) Corrosion resistance. 3) Easy to carry, easy to roll and store. 4) High tensile strength and modulus of elasticity. 5) Helps with space management as it adds very little extra weight or bulk. 6) High fatigue strength. 7) Very high strength-to-weight ratio due to its low weight.

6. OBSERVATIONAL REMARKS

Based on the literature and our own research on this subject, the current trend in the development of new non-destructive methods for diagnostic testing of structures is primarily directed at the detection of flaws and defects in concrete elements and structures. and these acoustic methods have earned their place in this field. The NDT test can be used for various specific structures of transport networks, such as: B.:

Bridges, Tunnels, Retaining Walls, Roads, Underground Structures, etc. Different methods can be used for the same problem, but the best method can be chosen based on the characteristics of the problem.

The pull-out strength of the control sample is higher than other retrofitted anchors using chemical adhesives as adhesion promoters. Retrofit anchor samples are weaker than cast-in-place, but sufficient for rehabilitation and strengthening work. For both cast-in-place concrete and mortar samples, the higher the reinforcement ratio and the stronger the concrete, the higher the bond strength or pull-out load.

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