The American Journal of Applied sciences
(ISSN – 2689-0992)
Published: May 31, 2021 | **Pages:** 196-202
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-31

IMPACT FACTOR
2021: 5. 634

OCLC - 1121105553

Development Of Deformations In The Reinforcement Of Beams With Composite Reinforcement

Akramov Xusnitdin Akhrarovich
Doctor Of Science, Professor, Department Of Civil Engineering, Tashkent Institute Of Architecture And Civil Engineering, Tashkent, Uzbekistan

Makhkamov Yuldashali Mamajonovich
Associate Professor, Candidate Of Technical Sciences, Department Of Civil Engineering, Ferghana Polytechnic Institute, Ferghana, Uzbekistan

Umarov Shodiljon Abdugofurovich
Doctoral Student, Department Of Civil Engineering, Tashkent Institute Of Architecture And Civil Engineering, Tashkent, Uzbekistan

ABSTRACT

This article describes the results of experimental research equipped with bottleflastic composite fittings in this article and the installation of special devices in the stretching and compressive zones of the sample gaps Musasura through the mass deformations and processed. It contains cases of deformation in the length of composite combination in the bowls under the influence of cargo forms. There is information on the development of voltage and deformations generated in composite fittings. In the article, 3 seaters, with the form of sample bowls in 3 series, provide an experiments conducted on sample culving experiments with the differences in the turn of the transverse steps and placement of cargo.

KEYWORDS

Composite reinforcement, exertion, deformation, concrete, load, bending moment, transverse force.

INTRODUCTION

Currently, the use of composite fittings in construction increases the overall reliability, technical and economic efficiency of industrial, residential, public buildings and engineering structures to receive permanent, temporary and seismic stresses.

The use of flexible elements reinforced with composite reinforcement in industrial, residential, public buildings and engineering structures requires a scientific basis based on a new theory, confirmed by the results of experimental studies.

Published: May 31, 2021 | **Pages:** 196-202
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-31
IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

THE MAIN PART

Experimental studies were conducted on rectengular sample test-model beams, dimensions 16x30 sm, made of heavy concrete of B20-B30 class based on Portland cement. Composite reinforcements as 2Ø12 or 2Ø16SHKA were placed in the elongated area, 2Ø10SHKA in the compressive area of the beams as a working reinforcement, Ø4 or Ø8SHKA reinforcements were placed in 15 (10) cm increments as clamps. The sample beams were tested for bending on a specially prepared stand. The two accumulated forces were transmitted using a hydraulic jack. The distance from the base to the force was 40 or 70 cm, and the length of the net bending area between the forces was 70 cm. The beams were tested until they were broken by a gradual increase with 0.05-0.1 Qult loads. During the test, all the main parameters of the beams were recorded using measuring instruments.

Deformation of longitudinal reinforcement along the length of the sample beams is unevenly distributed under the influence of forces in the bent concrete elements with composite reinforcement. (Figures 1,2)

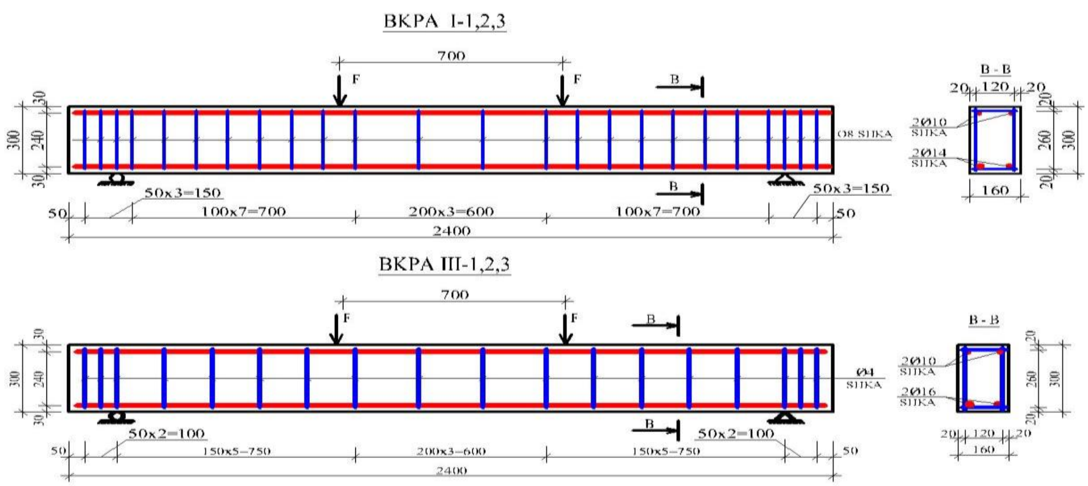

Figure 1. Armature and loading schemes of sample couplings in series I,III

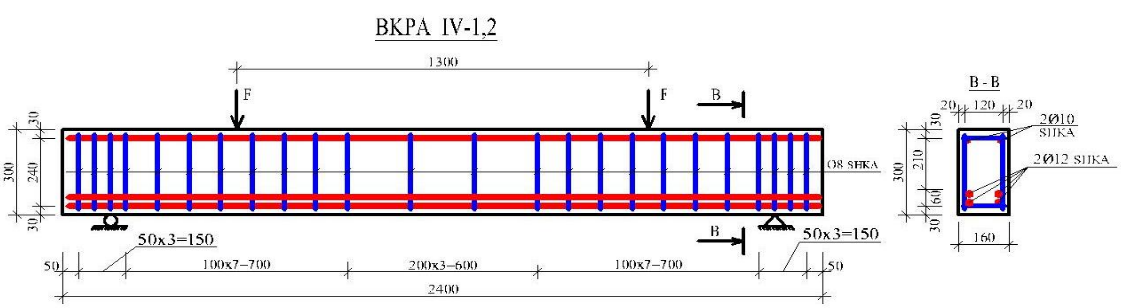

Figure 2. Armature and loading schemes of sample couplings in series IV

Published: May 31, 2021 | **Pages:** 196-202
Doi: https://doi.org/10.37547/tajas/Volume03Issue05-31
IMPACT FACTOR
2021: 5. 634
OCLC - 1121105553

In composite reinforced concrete elements, the deformations of the longitudinal reinforcement are unevenly distributed along the length of the sample beams under the influence of forces (Figures 3, 4).

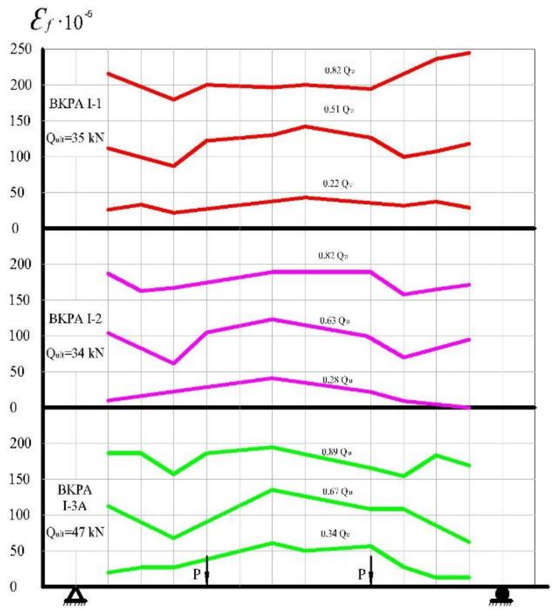

Figure 3. Distribution of deformations of longitudinal elongated reinforcement along the length of sample I-series beams with reinforcement coefficient $\mu_f = 0{,}64\%$ with longitudinal elongated reinforcement.

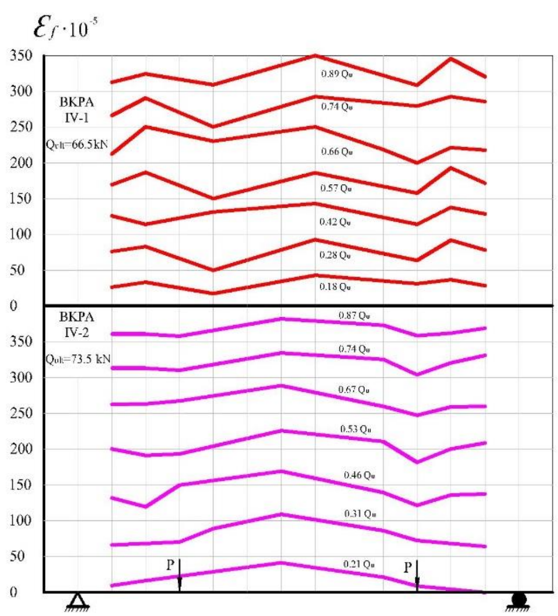

Figure 4. Distribution of deformations of longitudinal elongated reinforcement along the length of the sample beams of series IV with reinforcement coefficient $\mu_f = 0{,}94\%$ with longitudinal elongated reinforcement.

Deformation increases proportionally with increasing load until cracks are formed in the longitudinally elongated reinforcement. In this case, the values of deformations in the net bending area were slightly higher than in the shear range affected by the transverse forces. Deformations in the longitudinal reinforcement began to increase more rapidly after the formation of normal cracks in the longitudinal axis of the section in the elongated areas of the beams. This was especially evident at the intersections of the reinforcement cracks. Before normal cracks were formed, the deformations in the longitudinal reinforcement in the pure bending area were 2-3 times greater than in the shear interval.

For example, while in series I beams, the deformations of the longitudinal working reinforcements before the formation of normal cracks in the area of pure bending were $\varepsilon_f = (44 - 46) \cdot 10^{-5}$, deformations in shear range on the same reinforcements were $\varepsilon_f = (15 - 25) \cdot 10^{-5}$. In series IV beams, the deformations of the longitudinal working reinforcements in the area of pure bending equaled to $(42\text{-}44)\cdot 10^{-5}$,, and in the shear range was $(12\text{-}25)\cdot 10^{-5}$ (Figures 5,6). The Q=(0,18-0,21)Qult values of the loads correspond to this case.

After the formation of normal cracks in the sample beams relative to the longitudinal axis of the cut, the deformations in the longitudinal working reinforcements increased to $(150\text{-}220)\cdot 10^{-5}$ in the pure bending and to $(50\text{-}100)\cdot 10^{-5}$ in the shear areas.

The formation of sloping cracks also led to an increase to $(150\text{-}250)\cdot 10^{-5}$ in deformations in the longitudinal working reinforcement even in the cutting range.

The subsequent increase in loads led to a slight "flattening" of the deformations of the longitudinal working reinforcement along the length of the beams. Thus, as the loads increase, the deformations in the longitudinal working reinforcements also increase. Deformations of longitudinal working armatures were found to be in the range of $(300\text{-}400)\cdot 10^{-5}$ when the amount of loads was in the range of (0.8-0.9)Qult. According to the results of the measurements, stresses (80-120) MPa are formed in the longitudinally elongated flexible fittings before cracks are formed. The average relative deformations of the elongated working flexible reinforcements in the area of pure bending increase continuously according to the curvilinear pattern as the amount of load increases, with a faster increase, especially at high values of load.

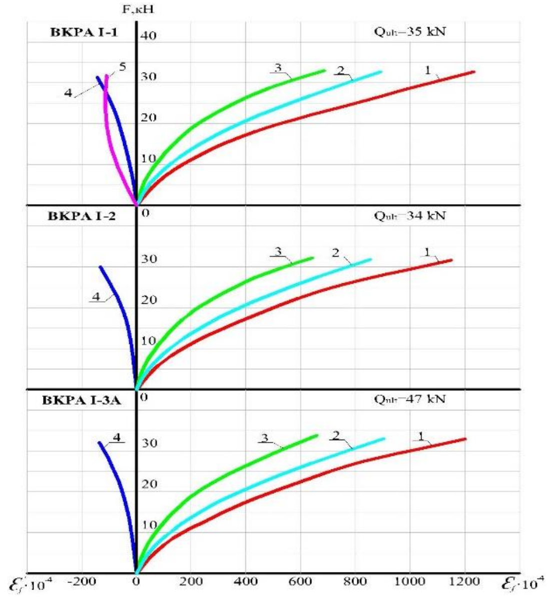

Figure 5. The average relative deformations of the beams of the sample beams of the I-series: 1 in the areas of pure bending of the elongated working armatures; 2.3 in the cutting range of elongated working fittings; 4 in the pure bending areas of the compression fittings; 5 in the cutting areas of compression fittings;

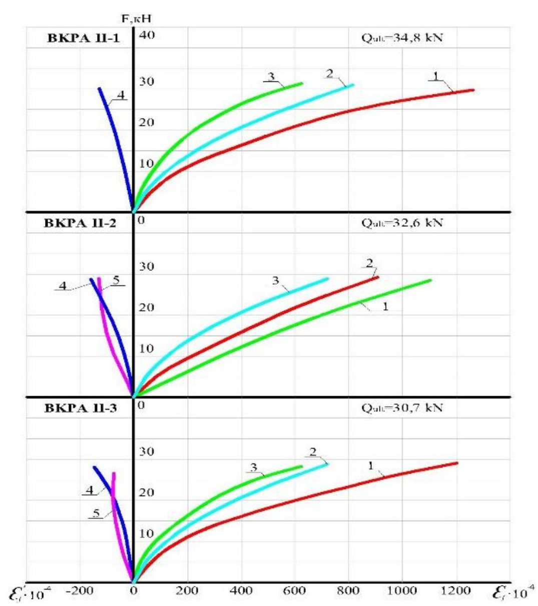

Figure 6. The average relative deformations of the armatures of the sample beams of series II: 1 in the areas of pure bending of the elongated working armatures; 2.3 in the cutting range of elongated working fittings; 4 in the pure bending areas of the compression fittings; 5 in the cutting areas of compression fittings;

It was observed that when the amount of load is close to the breaking forces, the deformations in the reinforcement reach values as (1000-1200)·10^{-4}. From the graph it can be determined that in such cases the tensile stresses in the fittings are 600-650 MPa.

The deformations of the beams in the elongated longitudinal reinforcement in the shear range were 1,2-1,5 times less than in the pure bending areas. In these reinforcements, a sharp increase in deformations was observed only when the largest loads were applied, i.e. before the boundary condition occurred in the girder, and the beams approached the deformations of the reinforcement in the areas of pure bending.

The load on which the deformations are applied in the compressive longitudinal reinforcement increased slightly along an almost straight line until the culvert values (0,4-0,6) Q_{ult} were reached. As a result of the subsequent increase in loads, the graph began to change along the curve, and a slight increase in deformations was observed. Compression deformations up to the values $\varepsilon_f' = (100 \div 150) \cdot 10^{-4}$ were observed in the reinforcement in the compression area when the beam samples were close to the distortion (see Figures 4,5). From this it can be concluded that in the boundary conditions in the compressive longitudinal reinforcement it is found that the formation of stresses exceeding $\sigma_f' = 100$ MPa.

CONCLUSIONS

1. The nature of the stress-strain state of flexible concrete beams reinforced with fiberglass composite reinforcement under loads, the development of deformations in the longitudinal elongation and compression was found to be qualitatively the same as that of steel reinforced flexible reinforced concrete elements.
2. The maximum deformations formed in the longitudinal elongated reinforcement indicate that they have developed tensile stresses in quantities that reach the calculated resistance of the composite reinforcement. Deformations in the compressive longitudinal reinforcement reached values (300–400) · 10^{-5}. Deformations of the concrete compression field indicate the formation of stresses equal to the compressive strength of the concrete.
3. As a result of the processing and analysis of the results of experiments, scientific teams were prepared on the state of composite articles based on state, cracking and non-existence.

REFERENCES

1. ШНК 2.03.14-18 «Композит полимер арматурали бетон конструкциялар» -Т, 2018, 157 б.
2. Махкамов Й. М., Мирзабабаева С. М. Прогибы изгибаемых железобетонных элементов при действии поперечных сил и технологических температур

//Проблемы современной науки и образования. – 2019. – №. 12-2 (145).
3. Махкамов Й. М., Мирзабабаева С. М. Температурные прогибы железобетонных балок в условиях воздействия технологических температур //Проблемы современной науки и образования. – 2019. – №. 11-1 (144).
4. ГОСТ 31938-2012. Арматура композитная полимерная для армирования бетонных конструкций. Общие технические условия. М.:Издво Стандартинформ, 2014., с.26-28.
5. Акрамов Х.А., Умаров Ш.А. Турсунов Б.А. “Перспективы применения композит арматуры в строительстве”. ФарПИ Илмий техник журнал. Ф - 2020. №1. б. 157-160.
6. Акрамов Х.А., Махкамов Й.М, Умаров Ш.А. “Прочность изгибаемых железобетонных элементов при действии поперечных сил в условиях воздействия повышенных и высоких температур”. //СамДАҚИ“ Meъmorchilik va qurilish muammolari” (ilmiy-texnikjurnal). Самарқанд – 2020. – №2. б. 57–62.
7. Акрамов Х.А., Умаров Ш.А. “Glass kompozit lireinforcing them with concrete bite cases”. // ISSN: 2456-6683 International Journal of Research Culture Society. Monthly, Peer-Reviewed, Refereed, Indexed Journal (№23) Scientific Journal Impact Factor: 4.526, Volume - 3, Issue - 11, Nov – 2019. Received on : 17/11/2019 Accepted on : 28/11/2019 Publication Date: 30/11/2019.Available online on - www.ijrcs.ORG India. P. 120-123.
8. Акрамов Х.А., Умаров Ш.А. “Research of stressed-deformed condition of beams with composite reinforcement”.//ISSN: 2456-6683 International Journal of Research Culture Society. Monthly, Peer-Reviewed, Refereed, Indexed Journal (№23) Scientific Journal Impact Factor: 4.526, Volume - 3, - 12, 12 – 2019 – 2019. Available online on - www.ijrcs.ORG India. P.1-4.
9. Акрамов Х.А., Умаров Ш.А. “Эгилувчи тўсинлар арматураланишини оптималлаштириш ва композит арматураларни қўлланилиши масалалари”. // “Актуальные проблемы внедрения инновационной техники и технологий на предприятиях по производству строительных материалов, химической промышленности и в смежных отраслях ” 1-Международная научно-практическая конференция. Том-3, 24-25 май, Фергана, 2019.- б.-154-156.