

BAZALT FIBRALARI ORQALI BETON TARKIBNI OPTIMALLASHTIRISH.

Rakhimov Rasuljon Ravshanbek o'g'li

Farg'ona politexnika instituti r.r.rakhimov@ferpi.uz (ORCID 0000-0003-2864-5735)

Annotatsiya: *Ushbu maqolada bazalt tolalari qo'shilgan beton va bazalt tolasini qo'shilmagan aralashmaning tarkibi va xossalari bo'yicha olib borilgan tadqiqotlar natijalari tahlili bayon etilgan. Maqolada beton uchun bazalt tolasining optimal tarkibi haqida ma'lumotlar berilgan.*

Kalit so'zlar: *Bazalt, fibra, fibrabeton, tola, konstruktsiya.*

Аннотация: *В данной статье описан анализ результатов исследований состава и свойств бетона с базальтовой фиброй и смеси без базальтовой фибры. В статье представлена информация об оптимальном составе базальтовой фибры для бетона.*

Ключевые слова: *Базальт, фибра, фибробетон, фиброволокно, строительство.*

Abstract: *This article describes the analysis of the results of research on the composition and properties of concrete with basalt fibers and the mixture without basalt fibers. The article provides information on the optimal composition of basalt fiber for concrete.*

Keywords: *Basalt, fiber, fiber concrete, fiber, construction.*

KIRISH

Zamonaviy qurilishda beton eng mashhur materialdir. Tolali beton texnologiyasini o'rganishning istiqbolli yo'nalishlaridan biri bazalt tolasini dispers armatura sifatida ishlatish samaradorligini asoslashdir. Ma'lumki, bazalt fibrasi nafaqat yuqori fizik-mexanik xossalari, balki kimyoviy chidamliligi, harorat - yorug'lik va ob-havoga chidamliligi, shuningdek, ishlab chiqarish texnologiyasining soddaligi va arzonligi bilan ham ajralib turadi.

Mahalliy bazalt tolasidan (ishlab chiqarish Jizzax shahrida o'zlashtirilgan) bazalt fibrali beton olishda dispers tolali qo'shimcha sifatida foydalanish imkoniyatlarini asoslash uchun bir qator eksperimental va nazariy tadqiqotlarni o'tkazishdan iborat. Sement biriktiruvchi, beton aralashmasi va bazalt dispers tolali qo'shimcha yordamida betonning xossalari, bazalt fibrali beton tarkibini optimallashtirish, shuningdek, ishlab chiqilgan bazalt fibrali betonni O'zbekiston qurilish sanoatida qo'llashning oqilona yo'nalishlarini oydinlashtirish.

Bazalt fibrasi qo'shilmagan beton kubik namunalari

№	Sinov o'tkazilgan	Namuna yoshi va sharoiti	Namuna o'lchamlari, mm			Kesim maydoni h^2	Namuna
			a	b	h		
1.	10.02.2023	28 s, normal	100	99	100	9900	990 000
2.	10.02.2023	28 s, normal	100	99	100	9900	990 000
3.	10.02.2023	28 s, normal	100	99	100	9900	990 000
4.	10.02.2023	28 s, normal	100	99	100	9900	990 000

5.	10.02.2023	28 s, normal	100	99	100	9900	990 000
6.	10.02.2023	28 s, normal	100	99	100	9900	990 000
7.	10.02.2023	28 s, normal	100	99	100	9900	990 000
8.	10.02.2023	28 s, normal	100	99	100	9900	990 000

Beton kublarning siqilishdagi mustahkamligi quydagicha topiladi:

$$R_i = \frac{N}{A}, \text{ MPa.} \quad (1.1)$$

Qolgan siqilishdagi mustahkamliklar shu tartibda topiladi:

$$R_1 = \frac{N_1}{A} = \frac{255 \cdot 1000}{9900} = 25,578 \text{ MPa}, \quad R_2 = \frac{N_2}{A} = \frac{245 \cdot 1000}{9900} = 24,747 \text{ MPa},$$

$$R_3 = \frac{N_3}{A} = \frac{230 \cdot 1000}{9900} = 23,232 \text{ MPa}, \quad R_4 = \frac{N_4}{A} = \frac{240 \cdot 1000}{22499} = 24,242 \text{ MPa},$$

$$R_5 = \frac{N_5}{A} = \frac{255 \cdot 1000}{9900} = 25,758 \text{ MPa}, \quad R_6 = \frac{N_6}{A} = \frac{240 \cdot 1000}{9900} = 24,242 \text{ MPa},$$

$$R_7 = \frac{N_7}{A} = \frac{235 \cdot 1000}{9900} = 23,737 \text{ MPa}, \quad R_8 = \frac{N_8}{A} = \frac{240 \cdot 1000}{9900} = 24,242 \text{ MPa},$$

1-jadval

Standart beton kublarni sinash natijalari jadvalga kiritiladi:

No	Buzuvchi kuch R, N, kN	Kesim maydoni A, mm	Kubik mustahkamlik $R_i = \frac{N}{A}$, MPa
1	255	9900	25.758
2	245	9900	24.747
3	230	9900	23.232
4	240	9900	24.242
5	255	9900	25.758
6	240	9900	24.242
7	235	9900	23.737
8	240	9900	24.242

Betonning siqilishdagi mustahkamligi bo'yicha sinfi aniqlash quyidagicha amalga oshiriladi.

a) Beton kublarning siqilishdagi o'rtacha mustahkamligi (R_m) quyidagicha aniqlanadi.

$$R_m = \frac{R_1 + R_2 + R_3 + \dots + R_n}{n} \quad (1.2)$$

$$R_m = \frac{R_1 + R_2 + R_3 + \dots + R_n}{n} =$$

$$\frac{25.758 + 24.747 + 23.232 + 24.242 + 25.758 + 24.242 + 23.737 + 24.242}{8} = 24.3704 \text{ MPa.}$$

b) Beton kublarning siqilishdagi mustahkamligining o'rtacha kvadratik cheklanishi:

$$\sigma = \sqrt{\frac{(\Delta R_1)^2 + (\Delta R_2)^2 + (\Delta R_3)^2 + \dots + (\Delta R_n)^2}{n-1}} \quad (1.3)$$

$$\begin{aligned}\sigma &= \sqrt{\frac{(\Delta R_1)^2 + (\Delta R_2)^2 + (\Delta R_3)^2 + \dots + (\Delta R_n)^2}{n - 1}} \\ &= \sqrt{\frac{(\Delta R_1)^2 + (\Delta R_2)^2 + (\Delta R_3)^2 + (\Delta R_4)^2 + (\Delta R_5)^2}{8 - 1}} = \\ &= \sqrt{\frac{1.284 + 0.017 + 1.295 + 0.135 + 1.284 + 0.016 + 0.401 + 0.016}{7}} \\ &= 0,301\text{MPa}\end{aligned}$$

d) Beton mustahkamligi bo'yicha o'zgaruvchanlik koeffitsienti:

$$v = \frac{\sigma}{R_m} \quad (1.4)$$

$$v = \frac{\sigma}{R_m} = \frac{0.301}{24.3704} = 0,0123 < [v = 0.135]$$

e) 95% ishonchligi ta'minlangan beton kubning siqilishdagi mustahkamligi bo'yicha sinfi quyidagicha aniqlanadi:

$$B = R_m(1 - 1,64v) \quad (1.5)$$

$$B = R_m(1 - 1,64v) = 24.3704 \cdot (1 - 1,64 \cdot 0.0123) = 20,878\text{MPa} \approx \text{B20}$$

Ogir betonlar uchun betonning elastiklik modulini QMQ 2.03.01-98 (Beton va temirbeton konstruksiyalar)da qabul qilingan yoki empirik formula bo'yicha hisoblaymiz.

$$E_b = \frac{55400 \cdot B}{21+B}, \quad (1.6)$$

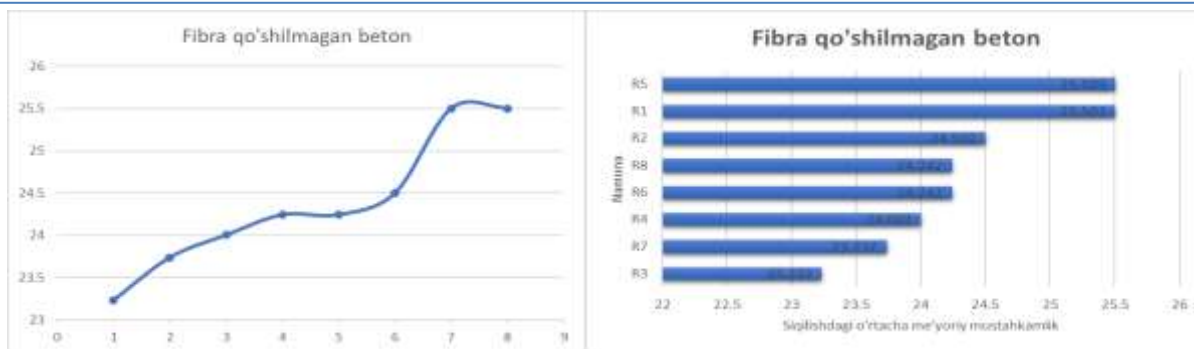
$$E_b = \frac{55400 \cdot R_m}{21 + R_m} = \frac{55400 \cdot 24.3704}{21 + 24.3704} = 28500\text{MPa} = 28 \cdot 10^3\text{MPa}$$

2-jadval

Xisob jarayonini soddalashtirish maqsadida xisob natijalarini jadvalga kiritamiz:

R_i	Beton kublarning siqilishdagi o'rtacha mustahkamligi, R_m	$R_i = R_m - R_i$	ΔR_i^2	Siqilishda mustahkamlikning o'zgaruvchanlik koeffitsiyenti, σ	Beton mustahkamligi bo'yicha o'zgaruvchanlik koeffitsiyenti, v
25.758	24.3704	-1.132625	1.2837	0.301	0.0123
24.747		-0.131625	0.0174		
23.232		1.138375	1.295		
24.242		0.368375	0.1354		
25.758		-1.132625	1.2837		
24.242		0.128375	0.0164		
23.737		0.633375	0.4007		
24.242		0.128375	0.0164		

1-grafik.



3-jadval

6 mm li bazalt fibrasi qo‘shilgan beton kubik namunalar

Namuna i	Sinov zilgan sana	Namuna yoshi va sharoiti	Namuna amlari, mm			Kesim oni A, mm ²	Namuna i
			a	b	h		
1.	10.02.2023	28 s, normal	100	99	100	9900	990 000
2.	10.02.2023	28 s, normal	100	99	100	9900	990 000
3.	10.02.2023	28 s, normal	100	99	100	9900	990 000
4.	10.02.2023	28 s, normal	100	99	100	9900	990 000
5.	10.02.2023	28 s, normal	100	99	100	9900	990 000
6.	10.02.2023	28 s, normal	100	99	100	9900	990 000
7.	10.02.2023	28 s, normal	100	99	100	9900	990 000
8.	10.02.2023	28 s, normal	100	99	100	9900	990 000

Beton kublarning siqilishdagi mustahkamligi quydagicha topiladi:

$$R_i = \frac{N}{A}, \text{ MPa. (1.7)}$$

Qolgan siqilishdagi mustahkamliklar shu tartibda topiladi:

$$R_1 = \frac{N_1}{A} = \frac{260 \cdot 1000}{9900} = 26.263 \text{ MPa,} \quad R_2 = \frac{N_2}{A} = \frac{240 \cdot 1000}{9900} = 24.242 \text{ MPa,}$$

$$R_3 = \frac{N_3}{A} = \frac{255 \cdot 1000}{9900} = 25.758 \text{ MPa,} \quad R_4 = \frac{N_4}{A} = \frac{240 \cdot 1000}{9900} = 24.242 \text{ MPa,}$$

$$R_5 = \frac{N_5}{A} = \frac{245 \cdot 1000}{9900} = 24.747 \text{ MPa,} \quad R_6 = \frac{N_6}{A} = \frac{220 \cdot 1000}{9900} = 22.222 \text{ MPa,}$$

$$R_7 = \frac{N_7}{A} = \frac{268 \cdot 1000}{9900} = 27.071 \text{ MPa,}$$

4-jadval

Standart beton kublarni sinash natijalari jadvalga kiritiladi:

№	Buzuvchi kuch R, N, kN	Kesim maydoni A, mm	Kubik mustaxkamlik $R_i = \frac{N}{A}, \text{ MPa}$
1	260	9900	26.263
2	240	9900	24.242
3	255	9900	25.758
4	240	9900	24.242
5	245	9900	24.747
6	220	9900	22.222
7	268	9900	27.071

Betonning siqilishdagi mustahkamligi bo'yicha sinfi aniqlash quyidagicha amalga oshiriladi.

a) Beton kublarning siqilishdagi o'rtacha mustahkamligi (R_m) quyidagicha aniqlanadi.

$$R_m = \frac{R_1 + R_2 + R_3 + \dots + R_n}{n} \quad (1.8)$$

$$R_m = \frac{R_1 + R_2 + R_3 + \dots + R_n}{n}$$

$$= \frac{26.263 + 24.242 + 25.758 + 24.242 + 24.747 + 22.222 + 27.071}{7}$$

$$= 24.935 \text{MPa.}$$

b) Beton kublarning siqilishdagi mustahkamligining o'rtacha kvadratik cheklanishi:

$$\sigma = \sqrt{\frac{(\Delta R_1)^2 + (\Delta R_2)^2 + (\Delta R_3)^2 + \dots + (\Delta R_n)^2}{n-1}} \quad (1.9)$$

$$\sigma = \sqrt{\frac{(\Delta R_1)^2 + (\Delta R_2)^2 + (\Delta R_3)^2 + \dots + (\Delta R_n)^2}{n-1}}$$

$$= \sqrt{\frac{(\Delta R_1)^2 + (\Delta R_2)^2 + (\Delta R_3)^2 + (\Delta R_4)^2 + (\Delta R_5)^2}{7-1}}$$

$$= \sqrt{\frac{1.763 + 0.48 + 0.677 + 0.48 + 0.035 + 7.359 + 4.561}{7}} = 2.1 \text{MPa}$$

5-jadval

Xisob jarayonini soddalashtirish maqsadida xisob natijalarini jadvalga kiritamiz:

R_i	Beton kublarning siqilishdagi o'rtacha mustahkamligi, R_m	$R_i = R_m - R_i$	ΔR_i^2	Siqilishda mustahkamlikning o'rtacha kvadratik cheklanishi,	Beton mustahkamligi bo'yicha zgaruvchanlik koeffitsiyenti, v
26.263	24.3704	-1.32762626	1.7626	0.653	0.0262
24.242		0.69257576	0.4797		
25.758		-0.82257576	0.6766		
24.242		0.69257576	0.4797		
24.747		0.18752525	0.0352		
22.222		2.71277778	7.3592		
27.071		-2.13570707	4.5612		

d) Beton mustahkamligi bo'yicha o'zgaruvchanlik koeffitsienti:

$$v = \frac{\sigma}{R_m} \quad (1.10)$$

$$v = \frac{\sigma}{R_m} = \frac{0.653}{24.3704} = 0,0261 < [v = 0.135]$$

e) 95% ishonchligi ta'minlangan beton kubning siqilishdagi mustahkamligi bo'yicha sinfi quyidagicha aniqlanadi:

$$B = R_m(1 - 1,64v) \quad (1.11)$$

$$B = R_m(1 - 1,64v) = 24.3704 \cdot (1 - 1,64 \cdot 0,0261) = 23.8\text{MPa} \approx B22.5$$

Ogir betonlar uchun betonning elastiklik modulini QMQ 2.03.01-98 (Beton va temirbeton konstruktsiyalar)da qabul qilingan yoki empirik formula bo'yicha hisoblaymiz. $E_b = \frac{55400 \cdot B}{21+B}$, (1.12)

$$E_b = \frac{55400 \cdot R_m}{21 + R_m} = \frac{55400 \cdot 24.3704}{21 + 24.3704} = 28500\text{MPa} = 28 \cdot 10^3\text{MPa}$$

2-grafik



Xulosa. 1. Bazalt tolasining 0.36% tarkibida bazaltfibrosement toshining eng katta kuchiga erishganligi aniqlandi-qattiqlashuvning barcha davrlarida kuchning oshishi nazoratdan oshadi. Shu bilan birga, bazalt tolasini bo'lmagan nazorat tarkibiga nisbatan bazaltfibrosement toshining normal saqlash sharoitlarining 3 - kuni kuchning oshishi 28% (73 MPa), 7 - kuni-32% (84 MPa), 28-kuni-34% (98 MPa).

2. Bazalt tolasining kiritilishi sement qarishmasining strukturaviy yopishqoqligini 2-3 baravar oshirishi, o'tish oralig'ini yuqori kuchlanishlar tomon keskin siljishi eksperimental ravishda aniqlandi.

FOYDALANILGAN ADABIYOTLAR RO'YHATI:

1. Numanovich A. I., Ravshanbek o'g'li R. R. BASALT FIBER CONCRETE PROPERTIES AND APPLICATIONS //Spectrum Journal of Innovation, Reforms and Development. – 2022. – T. 9. – C. 188-195.

2. Abobakirova Z. A., Bobofozilov O. Ispolzovanie shlakovykh vyazuyushch v konstruktsionnykh solestoykix betonax //international conferences on learning and teaching. – 2022. – T. 1. – №. 6..

3. Abobakirova Z. A., Bobofozilov O. Remont betonnoy pola–vidy povrejdeniy i mery po ix ustraneniyu //international conferences on learning and teaching. – 2022. – t. 1. – №. 10. – s. 32-38..

4. Kimsanov Z. O., Goncharova N. I., Abobakirova Z. A. Izuchenie texnologicheskix faktorov magnitnoy aktivatsii tsementnogo testa //Molodoy uchenyy. – 2019. – №. 23. – S. 105-106.

5. Umarov, S. A. (2021). Development of deformations in the reinforcement of beams with composite reinforcement. *Asian Journal of Multidimensional Research*, 10(9), 511-517.
6. Умаров, Ш. А. (2021). Исследование Деформационного Состояния Композиционных Арматурных Балок. *TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI*, 1(6), 60-64.
7. Abdugofurovich, U. S. (2022). BONDING OF POLYMER COMPOSITE REINFORCEMENT WITH CEMENT CONCRETE. *Gospodarka i Innowacje.*, 24, 457-464.
8. Абдуллаев, И. Н., Умирзаков, З. А., & Умаров, Ш. А. (2021). Анализ Тканей В Фильтрах Систем Пылегазоочистки Цементного Производства. *TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI*, 1(6), 16-22.
9. Davlyatov, S. M., & Kimsanov, B. I. U. (2021). Prospects For Application Of Non-Metal Composite Valves As Working Without Stress In Compressed Elements. *The American Journal of Interdisciplinary Innovations Research*, 3(09), 16-23.
10. Умаров, Ш. А., Мирзабабаева, С. М., & Абобакирова, З. А. (2021). Бетон Тўсинларда Шиша Толали Арматураларни Кўллаш Орқали Мустаҳкамлик Ва Бузилиш Ҳолатлари Аниқлаш. *TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI*, 1(6), 56-59.
11. Тошпулатов, С. У., & Умаров, Ш. А. (2021). ИНСТРУМЕНТАЛЬНО-УЧЕБНО-ДИНАМИЧЕСКИЕ ХАРАКТЕРИСТИКИ СРЕДНЕЙ ШКОЛЫ И КОНСТРУКТИВНЫЕ РЕШЕНИЯ СРЕДНЕЙ ШКОЛЫ № 2 Г. ФЕРГАНЫ. *TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI*, 1(6), 10-15.
12. Mamazhonovich, M. Y., Abdugofurovich, U. S., & Mirzaakbarovna, M. S. (2021). The Development of Deformation in Concrete and Reinforcement in Concrete Beams Reinforced with Fiberglass Reinforcement. *Middle European Scientific Bulletin*, 18, 384-391.
13. Набиев, М. Н., Насриддинов, Х. Ш., & Кодиров, Г. М. (2021). Влияние Водорастворимых Солей На Эксплуатационные Свойства Наружные Стен. *TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI*, 1(6), 44-47.
14. Hasanboy o'g'li, A. A. (2022). Stress Deformation of Flexible Beams with Composite Reinforcement under Load. *American Journal of Social and Humanitarian Research*, 3(6), 247-254.
15. Hasanboy o'g'li, A. A. (2022). Stress Deformation of Flexible Beams with Composite Reinforcement under Load. *American Journal of Social and Humanitarian Research*, 3(6), 247-254.
16. угли Ахмадалиев, А. Х., & угли Халимов, А. О. (2022, May). КОМПОЗИТНОЕ УСИЛЕНИЕ ИЗГИБАЮЩИЙ БАЛК ПОД НАГРУЗКОЙ. In *INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING* (Vol. 1, No. 7, pp. 409-415).

17. Abdullayev, I., & Umirzakov, Z. (2020). Optimization of bag filter designs (on the example of cement plants in the fergana region of the republic of Uzbekistan). Збірник наукових праць ЛОГОΣ, 31-34.
18. Abdullayev, I. N., & Umirzakov, Z. A. (2021). Efficiency of Fabric in The Systems of Dust and Gas Cleaning of Cement Production.