To the selection of the composition of dry-formed concrete

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Abstract: The essence of the method lies in the fact that the dry concrete mixture is compacted, its volume is fixed and then impregnated with water. As studies in the field of physicochemical mechanics have shown, during vibratory action, bulk materials acquire the fluidity characteristic of a liquid binder. Under certain parameters, the condition of the material, as well as the impact of vibration, it is possible to limit the compaction of bulk materials. In contrast to the wet method of concreting, dry concreting does not have the traditional dependence "workability - water content". In this regard, the approach to the selection of the composition of concrete changes significantly. On the basis of studies conducted by Khutortsov GM, Osin B.V. and Ovchinnikov IP, Some abilities of dry concreting are determined. It has been established that all kinds of materials are used for the preparation of a dry concrete mixture (materials with a moisture content of up to 0 5%); Squeaks, mostly fine-grained, and crushed stone with a size of up to 10 mm are used as aggregates, with SBS compaction It is necessary to use with a load of 100-150 g/cm2; Impregnation with water is carried out only after fixing the volume of compacted SBS.

Key words: durability, concrete condition, structure, drainage, dry, method.

The problem of increasing the durability of thin-walled reinforced concrete structures operating in difficult conditions, in particular, in irrigation and drainage structures, is currently very relevant. The durability of structures is largely related to the density of concrete. It is the structural density of concrete as a whole that determines its strength, water resistance, frost resistance, and, consequently, the durability of structures. In this regard, the increased interest of researchers is attracted by the method of dry concreting, which makes it possible to achieve high rates in terms of the main physical and chemical properties of concrete. The method of dry concreting was first proposed by the Soviet engineer Wolf I. V (Author's certificate 53807) and later improved by Mikhailov N. V, Khutortsov G. M. and Borisova A. V (Author's certificate 238384).

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Ovchinnikov IP, Some abilities of dry concreting are determined. It has been established that all kinds of materials are used for the preparation of a dry concrete mixture (materials with a moisture content of up to 0 5%); Squeaks, mostly fine-grained, and crushed stone with a size of up to 10 mm are used as aggregates, with SBS compaction It is necessary to use with a load of 100-150 g/cm2; Impregnation with water is carried out only after fixing the volume of compacted SBS. Publications on dry concreting give general recommendations for the selection of concrete composition, which boils down to the fact that

the main condition is to obtain concrete of the highest density. In this regard, studies were carried out to develop a methodology for selecting the composition of dry concrete. To increase the homogeneity of the SBS, a continuous granulometric filler was used.

The selection of the concrete composition is based on the calculation-experimental method, which includes the calculation by the method of absolute volumes, and the experimental one, which makes it possible to establish the water absorption during the impregnation of sbs, and also take into account the characteristics of the materials received. As a result of the research, a method for selecting the composition of concrete is proposed, which includes the following main stages:1. Selection of the enriched sand composition with the smallest voids;

2. Selection of a mixture of enriched sand and crushed stone with the smallest void space Taking into account the fact that in order to ensure the uniformity of SBS, the content of crushed stone should be within 30-40%;

3. Determination of the ratio of cement aggregate, based on the condition Obtaining the required strength of concrete four hours after heat treatment and the age of 28 days, as well as water absorption during impregnation of compacted sbs;

4. More convenient than the content of sand in the Aggregate mixture at the accepted cement consumption;

5. Checking the concrete of the adopted composition for water resistance and frost resistance;

6. Adjustment of concrete composition. As a result of the selection of the concrete composition, carried out according to the marked stages, the material consumption per 1 m3 of concrete is calculated according to the formula: formula (1)

$$\frac{\text{Ц}}{\gamma_{\text{ц}}} + \frac{A \cdot \text{Щ}}{\gamma_{\text{з}}} + \frac{B(\text{Щ} + A \cdot \text{Щ})}{100} = 1; \qquad (1)$$

where C is the consumption of cement, A is the proportion of aggregate (by weight of cement) B is the water content, in% From the mass of compacted sbs; .....-Payments for ment and aggregates (t/m3).

Solve the equation with one unknown, we determine the consumption of the remaining components of concrete. The calculated volumetric mass of concrete is determined by the formula: (2) formula.

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And as a seal, we sit according to the seal coefficient: the formula (3).

$$К_{упл.} = \frac{\gamma_{факт.}}{\gamma_{расч.}} . \quad (3)$$

Refinement of the composition of concrete is carried out according to its volumetric mass, determined experimentally, according to the formula: (4)

$$\gamma_{факт.} = Ц + А \cdot Ц + \frac{В.(Ц + А \cdot Ц)}{I00} \quad (4)$$

Where the designations of all incoming classes are the same as for formula 1.

Consider an example of selecting the composition of dry-formed concrete according to the proposed method. It is required to select a concrete composition that meets the following requirements: compressive strength grade M 400, frost resistance M200, water resistance B-8. Materials for the production of concrete: Portland cement grade 400 Olshansky cement plant; granite screenings and crushed stone of the 5-10 mm fraction of the Gnivan quarry; sand Dnieper with M = 1.35. The selection of the enriched sand composition was carried out using the experiment planning method. To obtain experimental data, a complete four-factor experiment of type 2 was carried out. The variable factors, their levels, and the conditions for encoding variables are given in the table. The output parameter is the volumetric mass of a mixture of grains of various sizes in a compacted state. Compaction of the mixture was carried out on a laboratory vibration platform. As a result of experimental data processing, a 4-factor linear model was built, expressing the dependence of the volumetric mass of a mixture of aggregates on the ratio of various fractions of granite screenings and sand (in code values): (5)

The adequacy of the model was tested using the Fisher criterion. From Equation 5 that all factors are significant; at the same time, an increase in the content of screenings of a fraction of 2.5-5 mm and river sand (x x) contributes to an increase in the bulk density of enriched sand, this is also facilitated by a decrease in the content of

ных):

$$y = I,806 + 0,0I \cdot X_I - 0,03 \cdot X_2 - 0,0I6 \cdot X_3 + 0,069 \cdot X_4 - 0,0I63X_2 \cdot X_3 + 0,0I63X_I \cdot X_4 + 0,225X_2 \cdot X_4 - 0,0II9X_I \cdot X_2 \cdot X_3 - 0,02IX_I \cdot X_2 \cdot X_4 - 0,0I88X_2 \cdot X_3 \cdot X_4 - 0,0II2X_I \cdot X_3 \cdot X_4 + 0,0I5X_I \cdot X_2 \cdot X_3 \cdot X_4 . \quad (5)$$

Переменные факторы	Обозначение	Основной уровень	Шаг варьирования	Верхний уровень	Нижний уровень
Содержание в весовых частях зерен заполнителя крупностью:					
2,5–5,0 мм	X_I	I	0,75	I,75	0,25
I,25–2,5 мм	X_2	I	0,75	I,75	0,25
0,63–I,25 мм	X_3	I	0,75	I,75	0,25
речной песок	X_4	I,25	0,75	2,0	0,50

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screenings of medium fractions (x x); to increase the bulk density of the enriched sand, a larger proportion by weight falls on river sand than on screening out the fraction of 2.5-5 mm.

When translating the code values of the variables into natural values, an equation was obtained that describes the dependence of the volumetric mass of enriched sand on the ratios of the considered fractions: formula (6)

$$\hat{y} = 2{,}093 - 0{,}205x_I - 0{,}324x_2 - 0{,}226x_3 - 0{,}I45x_4 + 0{,}I49x_I \cdot x_2 + 0{,}I2x_I \cdot x_3 + 0{,}I52x_I \cdot x_4 + 0{,}I72x_2 \cdot x_3 +$$

$$+ 0{,}I68x_3 \cdot x_4 + 0{,}I32x_2 \cdot x_4 + 0{,}087x_I \cdot x_2 \cdot x_3 - 0{,}092x_2 \cdot x_3 \cdot x_4 - 0{,}073x_I \cdot x_3 \cdot x_4 - 0{,}096x_I \cdot x_2 \cdot x_4 + 0{,}047x_I \cdot x_2 \cdot x_3 \cdot x_4. \quad (6)$$

Для определения оптимального соотношения отдельных фракций Неси песка мы применён метод движения по данных дополнительных экспериментов был получен состав смеси заполнителей: 2,5-5мм -25%, 1,25-2,5 мм-3% , 0,63-1,25 мм-10%, речной песок -62%. Объемная масса обогащённого песка после уплотнения составила 1,938 т/м3.

Этапом подбора смеси заполнителей было определение объемный массой смеси обогащенного песка и щебня фракции 5-10 мм, Взятых в различных с отношениях. При содержание смеси ши меня в количестве 30,35 и 40 % объемная масса смеси соответственно заставила 2,036, 2,038 и 2,026 т/м3.

Таким образом, при отмеченным содержании щебня существенного различия в Объемной масти уплотненной смеси не обнаружили. Для определения расхода цемента назначили три соотношениям цемент заполнитель – 1: 3,5;1:4,0 и 1:4,5. Предварительно приняли содержание обогащённого песка смеси заполнителя равным 60%. Прочность бетона при To determine the optimal ratio of individual fractions of Nesya sand, we applied the method of movement according to the data of additional experiments, the composition of the mixture of aggregates was obtained: 2.5-5mm -25%, 1.25-2.5mm-3%, 0.63-1.25 mm-10%, river sand -62%. The bulk density of the enriched sand after compaction was 1.938 t/m3.

The stage of selecting a mixture of aggregates was the determination of the volumetric mass of a mixture of enriched sand and crushed stone of a fraction of 5-10 mm, Taken in different ratios. With the content of the mixture of shea in the amount of 30.35 and 40%, the volumetric mass of the mixture, respectively, made 2.036, 2.038 and 2.026 t/m3.

Thus, with the noted content of crushed stone, no significant difference was found in the volume suit of the compacted mixture. To determine the consumption of cement, three cement-aggregate ratios were assigned - 1: 3.5; 1: 4.0 and 1: 4.5. The content of the enriched sand of the aggregate mixture was preliminarily assumed to be 60%. The strength of concrete with a compression age of 28 hundredths after heat treatment

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according to the regime of 3-9-3 hours at 70 * C, respectively, was 530, 416 and 336 kgf / cm2. Based on the required brand of concrete, C was taken: 3=1:4. Next, we tried to clarify the effect of the content of the enriched release of the aggregate mixture on the compressive strength of concrete. For this, we took h = 0.5; 0.6; 0.7; The strength of concrete was respectively equal to 363.416 and 342 kgf / cm2. Thus, h = 0.6 turned out to be optimal.

Further tests were carried out on the composition of concrete Ts:3=1:4 with a content of enriched sand of 60%. Determining the frost resistance of concrete by the compensation factor made it possible to establish that concrete can withstand over 500 freeze and thaw cycles, and its water resistance is not lower than 8 atm. Thus, the selected composition of concrete meets the requirements for it. To determine the consumption of materials per 1 m3 of concrete, we calculated according to formula 1 and received: Cement consumption 442 kg, crushed stone 738 kg, enriched sand 1110 kg, water 156 l; W / C \u003d 0.338; Estimated mass of concrete 2.466t / m3. The actual bulk density of concrete is 2.395t/m3. The concrete compaction coefficient was 0.97. After adjusting the composition of concrete according to the practically volumetric mass, the consumption of material per 1 m3 of concrete was: cement 448 kg, crushed stone 720 kg, enriched sand 1075 kg of water 151 lW / C = 0.338. The structural density of dry-formed concrete can be judged by comparing it with similar fine-grained wet-formed concrete M 400 (workability 20 s, cement grade 400 567кг/м3, В/Ц=0,40, The bulk density of concrete is 2,250 t/m3. The density of concrete was determined by the form for Morshansky N.A.: formula 7

$$П = I - U_{воз} - \frac{В - с \cdot Ц}{1000}, \qquad (7)$$

Where U-Relative volume of air entrainment, taken for ordinary concrete equal to 0.02, and for dry-formed concrete 0;

B-Accordingly, the consumption of water and cement;

c-Proportion of chemically bound water, taken equal to 0.15. For dry-formed concrete, the density was 91.7%, while for fine-grained wet-formed concrete, it was 83,8 %.

Findings.

1. The calculation-experimental method of selecting Sosal concrete allows taking into account the features of dry formation.

2. Comparison of dry and wet concreting indicates an increased density of dry-formed concrete.

References

1. Vandalovskaya L. A. I am looking for new properties of concrete in relation to reinforcement. In book. "Durability of building structures" K., "Budvelnik", 1972.2.0sin. B. V., Ovchinnikov I. P. New technology for the manufacture of products from dry concrete mixes. In book. "Abstract information about completed research universities of the Ukrainian SSR", 1977, issue 12.3. Khutortsov GM A new method for producing high-density concrete. "Concrete and reinforced concrete", 1971, 4.4. Shatalova I.G. and other physical and chemical bases of vibratory compaction of powder materials. M., Nauka, 1965.
2. Волженский А.В., Буров Ю.С., Колокольников В.С. Минеральные вяжущие вещества.- М.: Стройиздат, 1973,-472с.

3. Атакузиев Т.А., Искандарова М.И., Бондаренко М.В. и др. Влияние высоких температур на сульфоминеральные цементы.- Узб. хим. ж.,1979,№ 4, с.60...62.
4. Рагозина Т.А. Гидролиз и гидратация моноалюмината кальция в растворах солей.-В кн. : Тр. инс-та химии АН УзССР. - В кн.: Ташкент, 1949, вып.2, с.47.
5. Рагозина Т.А. Влияние агрессивных растворов на процессы твердения моно алюмината и β -ортосиликата кальция. - β кн.: Тр. института химии АН УзССР. Ташкент, 1952. вып.3, с.195.
6. Атакузиев Т.А.,Мирходжаев М.М., Талипов Н.Х. и др. Получение сульфоминерального цемента повыенной белезны.- докл.АН УзССР, 1981 №6, с.43...44.
7. Эгамбердиев М.С., Шамаддинова Н.Э. Атакузиев Т.А. Коррозионная стойкость арматуры в САС цементе. Путь наука. Международный научный журнал. Волгоград 2019/12с.51-54
8. Эгамбердиев М.С., Шамаддинова Н.Э. Атакузиев Т.А. Атмосферостойкость САС цемента. Путь наука. Международный научный журнал.Волгоград 2019/12с.48-50
9. Эгамбердиев М.С., Атакузиев Т.А. Гидратация смешанного высокопрочного цемента при низких положительных (+3°С) температурах. Путь наука. Международный научный журнал.Волгоград 2020/72 С.43-44
10. Эгамбердиев М.С., Шамаддинова Н.Э. Атакузиев Т.А. Основные строительно - технические свойства промышленных сульфоцементов. Международный научный журнал.Волгоград 2020/72 С.45-46.
11. Эгамбердиев М.С., Шамаддинова Н.Э. Атакузиев Т.А. Синтез сульфатсодержащих клинкерных минералов и процессы минералообразования (монография) Бухоро-Дурдона-2020.158 б.
12. Kliger P., Greeing N.R. Propeties of Expansive cement Concretes. - Proc. Fifth Internatonale Sumposium on the Chemistry of Cement. The Cement Assoccaton of Japan, Tokyo, 1968, v. p. 439-456.
13. Nishi T., Harada T., Koh. Gneral Behavior of portal and Concrete made of Expansive Cement with Calcium Sulfoalumin. Cement clinker. - Ibid., v. 4, p. 389-418.
14. Якубов, М. С., & Мухамедова, З. Г. (2018). Анализ и оценка энергетической эффективности специального самоходного подвижного составажелезной дороги. Известия Транссиба, (4 (36)), 60-68.
15. Мухамедова, З. Г., Эргашева, З. В., & Асатов, Э. А. (2021). К вопросу о развитии транспортной инфраструктуры Узбекистана. Известия Транссиба, (2 (46)), 105-114.
16. Мухамедова, З. Г. (2021). МЕТОДИЧЕСКИЕ АСПЕКТЫ ПОДГОТОВКИ КАДРОВ НА ОСНОВЕ ПОТРЕБНОСТЕЙ РЕГИОНОВ. ИННОВАЦИИ В ПЕДАГОГИКЕ И ПСИХОЛОГИИ, 4(9).
17. Хромова, Г. А., Мухамедова, З. Г., & Юткина, И. С. (2016). Оптимизация динамических характеристик аварийно-восстановительных автомотрис. Монография. Научный журнал:«Fan va texnologiya», Ташкент–2016.–253 с.[In.

18. Мухамедова, З. Г. (2015). Продольные колебания главной рамы электровоза с учетом установки поглощающего аппарата в автосцепке. Бюллетень результатов научных исследований, (3-4 (16-17)), 47-54.
19. Мухамедова, З. Г., Ибадуллаев, А., & Мамаев, Ш. И. (2022). Расчет Остаточного Ресурса И Продление Срока Службы Специального Самоходного Подвижного Состава. Universum: технические науки, (2-3 (95)), 36-40.
20. Мухамедова, З. Г. (2020). СОВЕРШЕНСТВОВАНИЕ ПРИНЦИПОВ ПРОЕКТИРОВАНИЯ ОБОРУДОВАНИЯ МОНТАЖНОЙ ПЛОЩАДКИ АВТОМОТРИСЫ С УЧЕТОМ НОРМ НАДЕЖНОСТИ И РЕАЛЬНОГО СОСТОЯНИЯ. Известия Транссиба, (1 (41)), 83-91.
21. Мухамедова, З. Г., & Бахшиллоев, С. Х. (2021). СУЩЕСТВУЮЩАЯ ТЕХНОЛОГИЯ ПОГРУЗКИ И РАЗГРУЗКИ СКОРОПОРТЯЩИХСЯ ГРУЗОВ. Журнал Технических исследований, 4(3).
22. Мухамедова, З. Г., & Эргашева, З. В. (2021). ЭКОНОМИКО-МАТЕМАТИЧЕСКАЯ МОДЕЛЬ КОНТЕЙНЕРНОГО БЛОК-ТРЕЙНА. Журнал Технических исследований, 4(3).
23. Mukhamedova, Z. G. (2019). Analysis and Assessment of Power Efficiency of Special Self-Propelled Railway Rolling Stock. Acta of Turin Polytechnic University in Tashkent, 9(3), 104-109.
24. Sagatovich, Y. M., & Gafurdjanovna, M. Z. (2018). Analysis of optimal periodicity of preventive maintenance of rail service car taking into account operational technology. European science review, (1-2), 167-170.