ACCEPTABLE TECHNOLOGIES IN THE IMPROVEMENT OF THE FILLER AND MIXTURE CONTACT ZONE

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The scientists of our country and abroad pay the main attention to the composition and structure of the contact zone of the filler and the mixture and the properties between them when forming the properties of concrete. Concrete strength, frost resistance, waterproofing property, gas permeability, and many other properties directly depend on the characteristics of the contact zones of the mixture with the filler.

To further improve the quality of concrete and reinforced concrete products and structures, the authors studied the factors and methods of reducing the pores of the contact zone, including further increasing the strength characteristics of the contact zone:

− the shape of filler grains and surface relief;
- cement type, mineralogical composition, and cement surface area;
- mixture composition and water-cement ratio;
- hardening time and conditions of the hardening process;
− compaction parameters, compaction under load, and early loading;
- activation;
- layer thickness between fillers;
- use of chemical additives and polymers;
- treatment with mineral and organic materials, etc.

The analysis of the research carried out on the type and type of aggregate shows that the strength of concrete made with carbonate rock aggregates with a strength of 65 MPa is much higher than the strength of concrete made based on granite crushed stone with a strength of 180 MPa. When testing the contact zone of cement stone with limestone and granite, the defects appear in the contact zone of granite and cement stone, and when testing limestone and cement stone, the nature of the defects occurs through limestone. Filler surface relief and grain shape affect the properties of the filler-mixing contact zones.

Experiments conducted with original, sawn, sanded, and polished surfaces show that when using fillers with a polished surface, the adhesion of the contact zone with the mixture is 22 and 31% smaller than with sawn and original (broken) surfaces, respectively. In granite itself, the transition from 729 μm relief to 41 μm relief leads to a decrease in contact zone viscosity of up to 60%. However, the results of extensive experiments indicate that the pores of the contact zone are up to 1.5 times denser when sanded than when sawn. While the maximum radii of capillaries in both cases are 0.23×10-4 cm, the amount of capillaries close to this is more common when sawing. Even with the filler, the adhesion of cement stone and mixture contact zones can be increased up to 4 times when moving from "Z" granularity to "G" granularity.

When studying the effects of different cement and its mineralogical composition on the adhesion of filler and cement stone, it was widely studied by foreign and domestic scientists that the contact zone viscosity of Portland cement, NTS, GZ - cement stones with fillers used in concrete works is much higher than that of JG, JSh, and JS - cement stones. developed.

Compaction under load, when the optimal value of the load is 6 ÷ 8×103 Pa, the viscosity of the filler and the mixture contact zone increases by 2÷2.5 times and, in turn, leads to an increase in concrete strength.

ISSN 2277-3630 (online), Published by International journal of Social Sciences & Interdisciplinary Research., under Volume: 12 Issue: 04 in April-2023
https://www.gejournal.net/index.php/IJSSIR

Early hardening under load also causes an increase in contact zone viscosity.
Experiments have shown that fast-hardening cement stone with granite 14; After 18 and 24 hours, when a load of 50 g/cm2 is placed on the surface and hardened under normal humidity conditions, 2, respectively, compared to samples hardened under these conditions without load; causes a 1.9 and 1.5-fold increase. Without denying the existence of a relationship between the increase in the viscosity of the contact zone of the mixture with the filler, and the increase in tensile and compressive strength of concrete, we consider it appropriate to determine the parameters of one or another effect rationally using computer programs for the purposeful use of concrete and adaptation to the necessary properties of concrete.
Consideration should be given to: Types of aggregates and mix composition, use of chemical additives, compaction performance, compaction under load, and early loading.

We hope that in the research carried out by the authors, each of the technological indicators listed above will be useful in choosing the optimal production technologies for the improvement of the properties of the contact zone of the filler and the mixture, which will achieve excellent indicators in terms of viscosity, porosity, water permeability, and frost resistance.

We believe that the above information will be useful for construction industry engineer technicians and researchers in the future to improve the quality of concrete and reinforced concrete products and structures and their long service life.

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ISSN 2277-3630 (online), Published by International journal of Social Sciences & Interdisciplinary Research., under Volume: 12 Issue: 04 in April-2023
https://www.gejournal.net/index.php/IJSSIR