Materials Physics and Mechanics 37 (2018) 104-108 Received: December 22, 2017

ADDITIONAL STEEL FIBERS IN CONCRETE MIXTURE: STUDIES OF COMPRESSIVE AND TENSILE STRENGTH OF CONCRETE

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Abstract. Test results for average compressive strength of 200.81 kgF/cm^2 were obtained for 3-day age of concrete at the fraction of steel fibers equal to 2.5%; for 7-days concrete we obtained the corresponding value of 263.97 kgF/cm^2 at the fraction of steel fibers equal to 2.5%; for 14-day concrete this value was 183.84 kgF/cm^2 at the fraction of steel fibers of 7.5%; and for 21-day concrete the average compressive strength of 345.99 kgF/cm^2 was attained at the fraction of steel fibers of 7.5% steels. Test results for average tensile strength of 40.46 kgF/cm^2 were obtained for 3-day age of concrete at the fraction of steel fibers equal to 2.5%; for 7-days concrete we obtained the corresponding value of 48.95 kgF/cm^2 at the fraction of steel fibers equal to 2.5%; for 14-day concrete this value was 54.38 kgF/cm^2 at the fraction of steel fibers of 5%; and for 21-day concrete the average compressive strength of 56.27 kgF/cm^2 was attained at the fraction of steel fibers of 7.5% steels.

Keywords: steel fibers; concrete mixture; compressive and tensile strength.

1. Introduction

The beginning of studies of this problem was the occurrence of cracks at the college building facade, where the author lectures in the framework of the Civil Engineering Study Program. This was the initial moment for carrying out research to improve the properties of concrete. One of the directions in this research field is related to the improvement of the behavior of concrete, which is unable to withstand tensile stresses at forces exceeding the concrete strength, which is within 9 – 15% of its compressive loading [1].

Every loading, improving compressive strength, is accompanied by some increase in tensile strength. This value, obtained from the results of repeated tests, reaches the strength of 0.50 – 0.60 σ_c, therefore for ordinary concrete it is chosen the value of 0.57 σ_c [2]. Other assumption propose that concrete is considered capable to withstand the applied loading at the tensile stress of 27 kgF/cm^2, so it is considered inefficient, especially in tension and in the form of plastering. The displacements in concrete can lead to cracking even if stress is not so large. This is due to the cracking, caused by the nature of the concrete. This structural condition is often ignored because the tensile stress a fully restricted by the reinforcement in sufficient quantities and placed correctly. Rapid development of technology, at present, demands alternative effective approaches. One of the alternative methods is connected with the using steel fibers (stainless fibers). The main idea consists in reinforcement of concrete with uniformly dispersed steel fibers with random orientation. So that concrete does not experience cracks, which easily initiate due to loading or heat hydration [3]. Thus it is

http://dx.doi.org/10.18720/MPM.3712018_15