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The Influence Of The Central Asian Climate On The Strength Characteristics Of Brick Masonry

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Annotation: The article presents the results of an experimental study of the influence of temperature and relative humidity of the environment and sunlight on the strength characteristics of brickwork.

Keywords deformation, temperature, humidity, brick, mortar, construction, building, climate, masonry.

Introduction

The climate of Central Asia is sharply continental and the temperature of environment (air), in the hottest days, reaches up to 45-50^{0}C degrees celcius, with relative humidity of 12-17%. At night, the temperature drops to 20^{0}C, at relative humidity of 40%.

Change the in daily temperature on the hotlist day and relative air humidity for the Samarkand city are shown in (fig 1). As it can be seen from the Figure, the daily temperature difference is about 15-17^{0}C, and the humidity is about 15-20%.

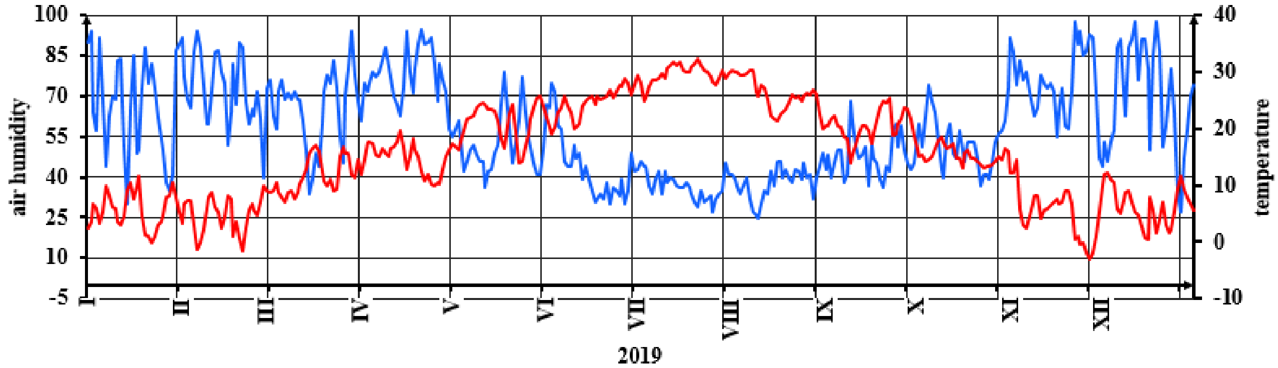

Figure 1: Change of temperature and relative environmental humidity for the city of Samarkand:
- humidity; - teperature.

In addition to the temperature and humidity of the environment, the sun's rays also act on the brickwork from the impact of which the temperature on the surface of the masonry can rich up to 60C.

The influence of the environment can be considered as a variable effect on the brickwork, which negatively affects the work of the structures [5].

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Currently temperature and humidity are not taken into account when designing multi-story brick buildings, only the length of the building is limited on the bases of the requirements without appropriate calculations [2].

Analysis of published results of the study of strength, the bearing capacity and the durability of the structures of brick buildings, led to the conclusion that systematic and targeted studies of the effect of variable temperature and relative humidity on the strength and state of stress and strain were not carried out.

In the published works, devoted to the study of brick structures, mainly methods were considered to prevent cracks in the outer walls of brick buildings and strengthening the corners of the buildings, to eliminate cracks that appear on the sides of window openings. Most of the studies were carried out in laboratory conditions at normal temperature and relative humidity, which are sharply different from the temperature and humidity of the environment.

To assess the effect of temperature and humidity and sunlight on brickwork in accordance with GOST (stat standard), four series of brickwork samples were made and tested [1].

The strength characteristics of bricks and mortar, were determined in the accordance with the requirements of the GOST by testing brick and mortar samples in the scientific laboratory of the Department of “Building Construction” of the state Architectural and Civil Engineering Institute (fig 2). The strength of the brick was R = 10 MPa, and the mortar strength was R = 2.5 MPa [3.4].

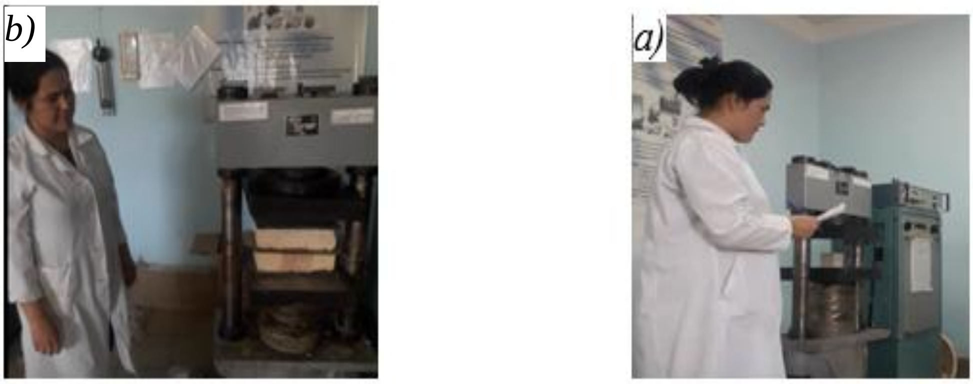

Figure 2: Test of brick compression (a) and mortar (b)

Samples of the M-1 (masonry) series were kept in an open environment under the influence of sunlight (fig 3, a). Samples of the M-2 series were kept in an open environment and protected from exposure to sunlight (fig 3, a). The third series of the M-3 samples were kept in laboratory conditions at normal temperature and relative humidity (fig 3, b). The fourth series of samples M-4 were made with violations of the masonry technology and were in an open environment under the influence of sunlight (fig 3, a).

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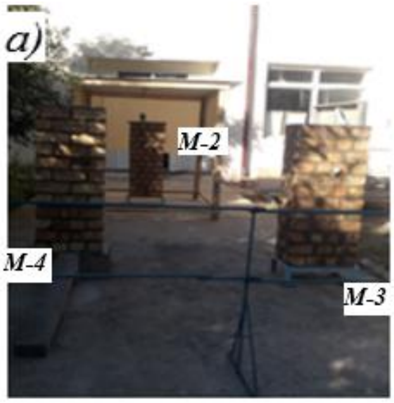

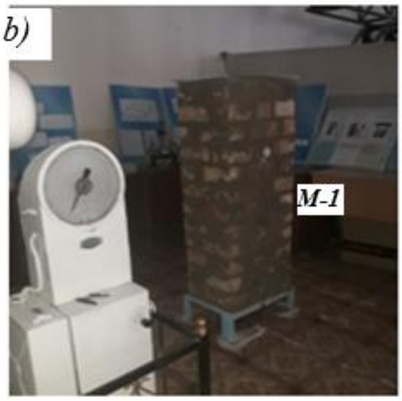

Figure 3: Samples for testing in the open air (a), and in the laboratory conditions (b).

The main samples were exposed to climatic influences for 90 days. During this period, the temperature and relative humidity of the environment were measured [6], longitudinal deformations of the masonry (fig 4). On day 90, the samples were brought to destruction (fig 5).

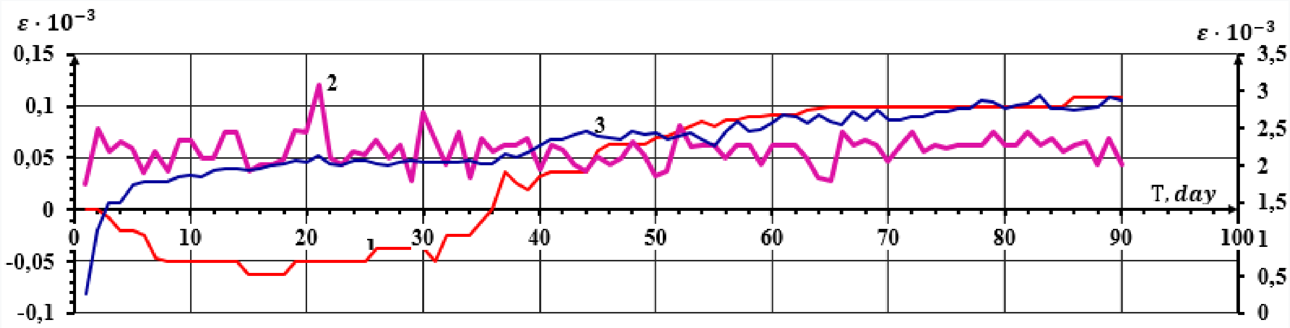

Figure 4: Longitudinal deformations of masonry: 1-M-1, 2-M-2, 3-M-3.

Figure 5: Destruction process of samples.

The results of experimental studies are shown in Table. 1 and 2. Based on the results of the experimental studies, it was found that temperature and relative humidity, as well as the sunlight, negatively affect crack resistance (Table 1), and the strength characteristics of brickwork (Table 2).

Table.1

Effort, corresponding	Sample series

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to the formation of the first cracks				
	M-1	M-2	M-3	M-4
N_{cr}, kN	698,72	521,11	359,57	301,2

Table2

Effort, corresponding to bearing capacity	Sample series			
	M-1	M-2	M-3	M-4
N, kN	723,24	686,47	625,17	416,78

Conclusions. As a result of exposure to variable temperatures from 20 ° C to 50 ° C and relative humidity of the environment from 12 to 40%, the crack resistance of brickwork samples under laboratory conditions by 48%, Durability increased by 13%.

References

[1] GOST 32047-2012. Stone masonry. Compression test methods. Moscow 2014.
[2] KMK 2.01.03-96. Construction in seismic areas. State Committee for Architecture and Construction of the Republic of Uzbekistan, Tashkent, 1996.
[3] GOST 7462-85. Stone materials. Methods for determining the ultimate strength in compression and bending.
[4] GOST 5802-86 Building solutions. Test methods.
[5] Kambarov Kh.U. Reinforced concrete structures in hot climates. Dis. of the cand. of tech sciences Tashkent, 1998. pp.5-6, 1998.
[6] Sanaeva N.P. “The process of observing the effect of changes on brickwork”. “Materials of the republican scientific and practicfl. Architecture and urban planning: past, present, future" pp. 410-413, 2021.