NONDESTRUCTIVE TESTING FILLING COMPOSITE MATERIALS BASED ON STALE TAILINGS

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Abstract

The paper presents the results of a study of samples of filling composite materials based on stale tailings shock pulse method, which is one of the main methods of nondestructive testing. The dependence of the obtained data with the results of studies on the electrohic machine Instron.

Keywords

nondestructive testing, filling composite materials, shock pulse method

One of the main characteristics of the properties of filling masses is their strength. Strength - an ability to resist destruction caused by internal stresses resulting from loads or other factors [1].

There are several ways to define it. Nowadays non-invasive methods of monitoring the strength of concrete are widely used, which allow to determine the strength approximately in any construction or on a separate part of a product design without destroying them. [1]

Nondestructive testing - control of properties and parameters of an object in which applicability of an object should not be faulted. Nondestructive testing is particularly important while developing and using vital products, components and constructions. [2]

We distinguish the following nondestructive testing method:

- rebound method;
- shock pulse method;
- method of plastic deformation;
- pulling test;
- method of cleaving;
- pulling test with cleaving;
- ultrasohic method .

Shock pulse method is one of the most common. The essence of this method is to register the impact energy, arising at the moment of impact of a striker on concrete surface. Devices using this method are characterized by lightweight and compactability and the determination of concrete strength with shock pulse method is a relatively simple operation. Measurement results are in terms of compressive strength [2].

In this project studies were conducted by use of the device Onyx- 2.5. Measurements of 14 samples were made. Testing the strength of each sample was carried out in accordance with GOST 22690-88 [3] and was a series of 10 strokes, eventually we obtained the average values (Table 1).

Table 1: Strength testing by use of device Onyx- 2.5

№ of sample	Strength, MPa
81/1	7,72
82/1	8,36
83/1	7,27
84/1	6,91
85/1	6,41
86/1	6,01
87/1	6,34
81/2	8,66
82/2	9,21
83/2	9,19
84/2	8,17
85/2	7,30
86/2	7,37
87/2	6,39

Comparing these data with the results of tests of samples of the compressive strength under compression in the electronic machine Instron 5882 , we identified correlation dependences, which are expressed by the following equations :

$$\sigma_i = 0,9003\ \sigma_o + 0,5311 \qquad (1)$$

where : σ_i, MPa - ultimate compressive strength obtained by the results of measurements on the electronic machine Instron, MPa;

σ_o, MPa - ultimate compressive strength obtained by use of the device Onyx 2.5 MPa.

Equation 1 is a linear dependence of the correlation coefficient R = 0,9048. Dependence diagram is shown in Figure 1.

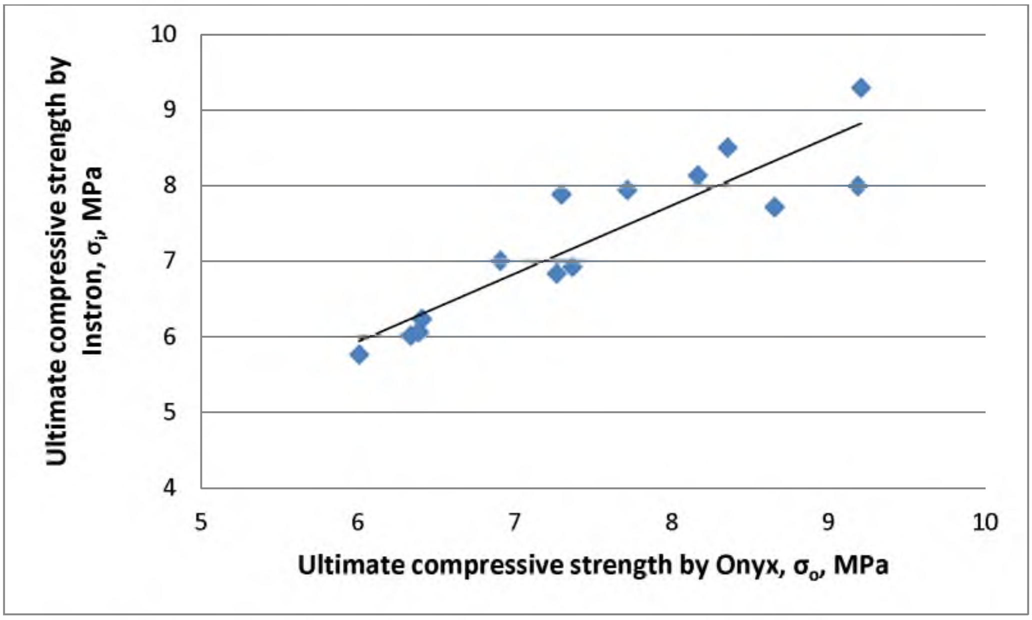

Fig. 1: Dependence diagram of σi from σ_o (linear dependence)

The resulting dependence has a high correlation coefficient value; it indicates that the data of nondestructive testing by use of Onyx 2.5 device may be applied without being proved by the laboratory method, in which drilling-out of core samples from the mass is necessary. Furthermore, this method is quite accurate, since strength tests of each sample are carried out in a series of 10 strokes.

References

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[3] GOST 22690-88. Concretes. Determination of strength by mechahical methods of nondestructive testing. – M.: Standartinform, 2009. – 20 p.