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DEVICE FOR DETERMINING THE ADHERENCE BY SHEARING

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For determining the adherence stresses concrete-to-concrete a device for wrestling of added layer to the support is used, according to the Romanian norms. The connection to the determination apparatus is realized by a metallic plate bonded with special adhesive. The value of this stress is in many cases bigger than the adhesive strength, therefore the metallic plate detaches oneself before the separation of the added concrete.

1. Introduction

A constant preoccupation of specialists in constructions (researches, designers) is the consolidation of masonry or stone and concrete buildings, with reinforced or prestressed concrete.

The intervention measures are divers, but the element that guarantees the efficiency of the solution is the bond between the support and the added layer. The bond is realized by adherence or anchoring (connectors) or both.

A system that had provided the superiority consists in the applying by shotcrete of coating layers.

In the Concrete Laboratory of Concrete Structures, Building Materials, Technology and Management Department the test for adherence by wrestling for showing the influence of support type, surface preparing and application technology on the adherence value were performed. The results of tests obtained for shotcrete/pouring on a layer of concrete or masonry are presented in what follows. The consolidating mortar had different additions, one of them being the silica fume.

2. Experimental Program

The samples were realized *in situ* by pouring or shotcrete, near the consolidation works of some diaphragms of reinforced concrete to the City Hospital, Vaslui. The consolidation solution was realized by pouring of concrete or shotcrete.

For determining the values of adherence in the case of using mortars with silica fume addition there were used moulds realized of concrete or masonry as support layer, the shotcrete layer being applied near the consolidated wall of the Hospital. The witness samples were also poured.

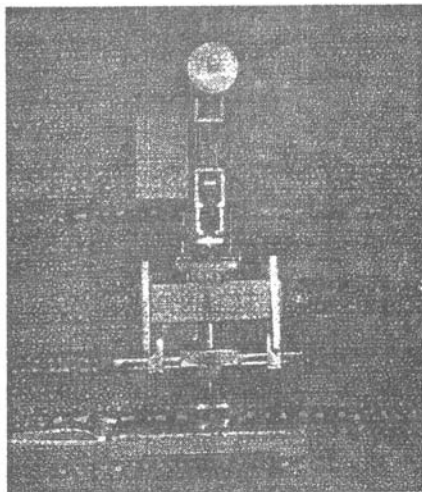


Fig. 1.- Device for adherence test (STAS 6203-75).

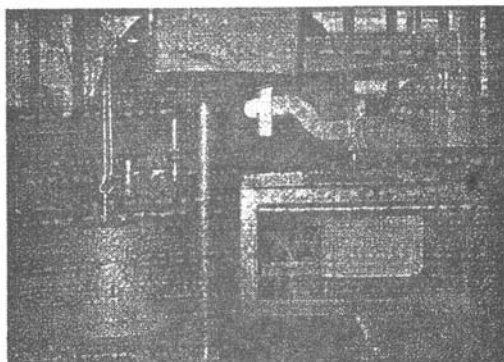


Fig. 2.- Test of adherence.

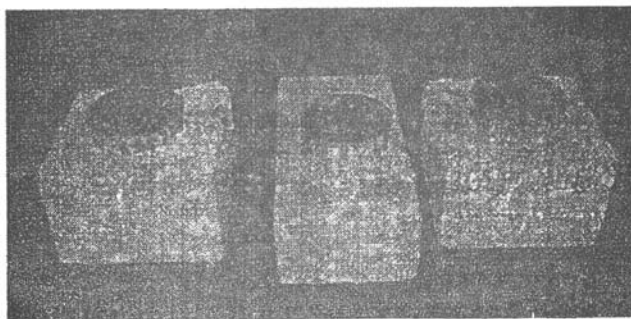


Fig. 3.- Failure through adhesive

Table 1

Support	Sample	Type of pouring	Adherence	Medium value, daN/cm ²
Concrete	1	Shotcrete	5.01	4.71
	2		4.71	
	3		4.41	
Concrete	1	Witness	4.80	4.00
	2		4.00	
	3		3.20	
Brick	1	Shotcrete	7.60	7.80
	2		7.80	
	3		8.00	
Brick	1	Poured	6.3	6.3
	2		6.4	
	3		6.2	

Figs. 1...3 are presenting the images from the testing performed in the laboratory. The former wrestling tests were produced by un-sticking of metallic plate from the support (Fig. 3).

For some witness samples the tablets of mortar or micro-concrete had been detached from support because of the vibrations during transportation (that was at 7 days after pouring). The experimental results are presented in Table 1.

It can be observed that the adherence increases to the brick, for anyone application system of the coating, and the homogeneity of results is better in the case of application of the silica fume mortar by shotcrete.

3. Proposal of Testing System

Because the fact that for a lot of adherence samples the test finished by the unstuck of metallic plates, by the standard system, the values of adherence stress could not been determined; from this reason, another type of testing was realized, using the shearing, not wrestling (Figs. 4 and 5).



Fig. 4.- Proposed device; aspect from the testing.

The obtained results (Fig. 6), in case of adherence stresses, were determined with the relation

$$(1) \quad \tau_{ad} = \frac{2}{\pi} \cdot \frac{P}{dh},$$

where: P is the splitting force; d – diameter of added cylinder; h – height of added cylinder.



Fig. 5.- Detail during the test.

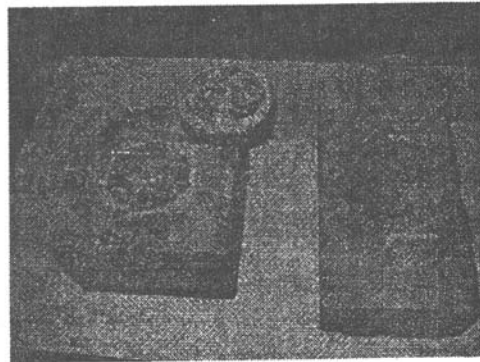


Fig. 6.- Adherence test; final results.

The obtained results are given in the Table 1.

The facility of these tests and the fact that never is used a metallic plate stick on support, but a connection between the two materials, makes the system to be recommended for using by others researches for determining the adherence stresses between layers.

The test by splitting is applied in laboratory for determining the tensile stresses, as it is known as “Brazilian method”. We propose it as a method for determining the adherence stresses.

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DISPOZITIV PENTRU DETERMINAREA ADERENȚEI PRIN FORFECARE

(Rezumat)

Pentru determinarea tensiunilor de aderență beton – beton se utilizează un dispozitiv de smulgere a stratului adăugat de suport, conform normelor românești, legarea la aparatul de determinare realizându-se printr-o plăcuță metalică lipită cu adezivi speciali. Valoarea acestei tensiuni este de multe ori mai mare decât rezistența adezivului, astfel încât plăcuța metalică se dezlipește, înainte de desprinderea betonului adăugat de suport.

Se propune un dispozitiv ușor de realizat și utilizat, pentru determinarea eforturilor de aderență prin forfecare, care poate fi recomandat pentru utilizare în laboratoarele de încercări ale elementelor din beton și beton armat, în special pentru verificarea calității lucrărilor de consolidare a pereților din zidărie de cărămidă sau piatră cu elemente din beton armat (sâmburi, colțari, cămășuieli).