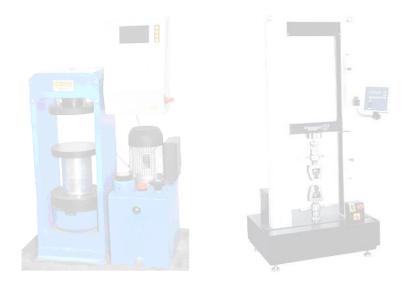# Department of Building Egineering

EXERCISE No.6

Cement – marking compressive and flexural strength of mortar bars

6.1. Marking flexural strength of mortar bars

The test bar is placed on the two bottom supports. To the upper support must be imposed a load which causes the breakage of the bar (Fig.1).
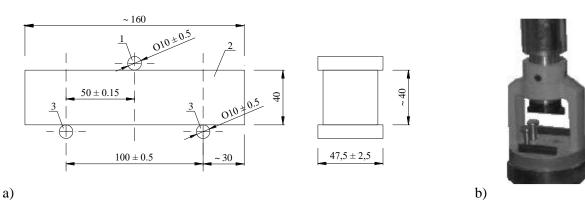

a)   b)

Fig.1 a) Scheme of the breaking test for flexural strength of cement:
1 – loading roller; 2 - sample; 3 – supports
b) Adapter for bending bars 40x40x160mm, in accordance with EN 196

Prepared bar, after removing from the bath, dry the cloth and put in the machine. Surface of the bar formed from the alignment of the upper surface should be placed vertically on the rolls of the support. Then, using loading rolls to transfer the vertical load on the opposite side surface of the bar. Pressure (50 ± 10 N / s) should increase evenly until the break bar.

The flexural strength (R$_f$) is calculated according to the formula:

$$R_f = \frac{1,5 \times F_f \times l}{b^3}, [MPa], \qquad (6.1)$$

where: b – length side of the section bar, mm;
F_f – breaking load on the center bar, N;
l – distance between supports, mm.

Fig.2. The universal testing machine to flexural strength

Final score.
With three of the results of measurements should be calculate the arithmetic average to 0,1 MPa.

6.2. Marking compressive strength of mortar bars

Compressive strength test should be performed on the bar's halves.

Fig. 3. Hydraulic press for testing compressive strength

Measurement in a hydraulic press
A bar should be placed between the compression plates of the test machine, in the longitudinal direction. The front surfaces of the bar should protrude about 10 mm from the plate. The upper surface of the bar, was created alignment a steel ruler, should be set vertically. Then set the load increment of 2.4 ± 0.2 kN/s, enable the drive and lead to the destruction of the samples.

At the time of destruction, read the force (F_c) on the pressure gauge (maximum value of the force).
Then, should be test the remaining halves of bars.

Calculation of compressive strength (R_c) be carried out according to the relationship:

$$R_C = \frac{F_c}{A}, \ [1 \ \text{N/mm}^2 = \text{MPa}]$$

where: F_c - force causing the destruction of the bar, N;
$A = 1600$ mm^2 - the area pressure plates (surface compression), mm^2.

Final score

The test result is the arithmetic average of the values obtained six measurements made on a set of three bars. If one of the six values differs from the average value by more than 10%, it must be rejected. Of the remaining five of the bars calculate the arithmetic average. If one of the five values differs from the average value by more than 10%, the test result must be rejected.
Individual results and the final value strength is given to 0,1 MPa.

Team: Date……………
1. …………………………
2. …………………………
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Exercise 6

MARKING COMPRESSIVE AND FLEXURAL STRENGTH OF MORTAR

TESTING BENDING STRENGTH			
No. sample	Load breaking the middle bar	Flexural strength	Average value
	N	MPa	MPa
1			
2			………………
3			

TESTING COMPRESSIVE STRENGTH				
No. sample	Compressive area	The value of destructive force	Compressive strength	Average value
	mm^2	kN	MPa	MPa
1				
2				
3				1.………………
4				2.………………
5				
6				

Conclusions: …………..………………………………………………………………………………
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