per 1 cubic meter of concrete. Besides, the production of high quality concrete structures of enhanced durability ensures long life of their operation without maintenance and major repairs.

Summarizing the above, it should be noted:

1. The use of self-compacting concrete in the manufacture of precast and construction of monolithic reinforced concrete structures is a perspective direction in improving technology and precast reinforced concrete and further development of the building complex Republic of Belarus.

2. Due to the high cost of SCC, we must carry out research so as to get economical components for self-compacting concrete.

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STRENGTH AND DEFORMABILITY OF CONNECTIONS OF REINFORCING BARS

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The aim of presented in this work experiment is to obtain experimental data on the strength and deformability of connections of reinforcing bars.

Selection of the binder in the composition in the form of the joint of the polymeric composition based on epoxy resins due to the possibility to obtain high strength during rapid-day material. Connection length in this combination is taken to be the initial 250 mm (diameter of the abutting rods multiplied by 10) based on the results of the tensile test samples of compounds with different length sleeves. With a length of pipe – 10 ∅25 tests showed stable values gap in median plane connection with efforts of relevant ultimate steel pipe (Fig. 1).

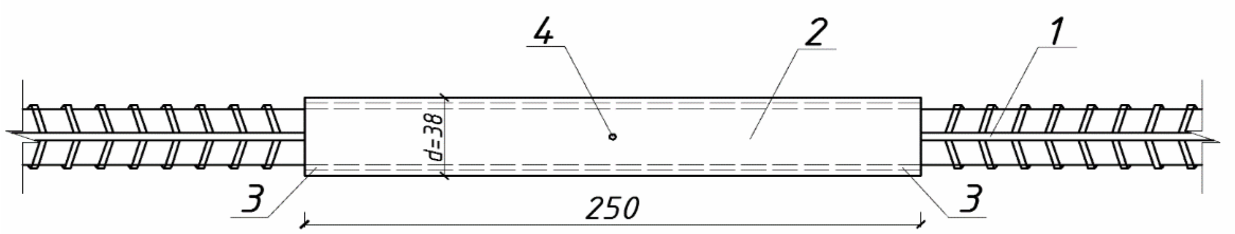

Fig. 1. Construction coupler connection reinforcement bars
1 – docked rebars ∅ 25 S500; *2* – coupling of d = 38 mm pipe with wall thickness of 4 mm;
3 – epoxy compound; *4* – 3 mm diameter hole.

Given the experience [1] proposed design with the steel grade C235, used in the manufacture of pipe compound offers a long anchoring 4d (100 mm). During the preliminary tensile test three samples were tested. The tests were carried out on a tensile testing machine R-50 at a constant rate of loading (Fig. 2 (A)).

The destruction was caused by pulling one of the reinforcing bars with loads of 153kN, 141kN, 194kN. As a result, it was decided to increase the length of anchoring to 5d (125 mm).

Compression testing was performed on the P-125 press at a constant rate of loading. To conduct the experiments special steel base of the prism, the size 200 × 200 × 50 mm, were made, two on each end of the armature. One of each pair of prisms were drilled a hole in later prism bolted. Prism was inserted in a hole in upright position and secured by rebar epoxy resin, then a similar operation was done with the other end fittings. General view of the structural assembly can be seen on Figure 2, B.

A)

B)

Fig. 2. The test sample in the tensile testing machine (A),
general view of a mechanical press as compound (B)

Taking into consideration the importance of the characteristics of deformability connection rebar to study the characteristics of strain distribution along the length and displacement relative to the coupling rods abutting ie compliance of the joint, the deformations were monitored at certain points of the samples by means of strain gauges type PKB with base 20 mm.

Observation of the linear movement of the abutting rods relative to the clutch lever was carried out by mechanical strain gauges of Gugenberger with an accuracy of 0,001 mm.

5 samples were tested bytension and compression. Rods tested were numbered 1P, 2P, 3P, 4P, 5P. Rods controlled compression 1K, 2K, 3K, 4K, and bars with couplings 1C, 2C, 3C, 4C, 5C. The loading was carried out step by step with an interval of 25 kN and 10 kN compression tension.

The results of these tests are shown in Table 1. The results of processing the data obtained are graphs deformation connection sample and the value of its elements and relative movement of the coupling abutting rods.

Table 1 – Summary table of tests of mechanical connections fittings

Compression		Type of destruction	Tension		Type of destruction
№ of sample	Crushing load		№ of sample	Crushing load	
1C	256 kN	Loss of stability	1P	212 kN	pulling rod
2C	256 kN	Loss of stability	2P	210 kN	pulling rod
3C	276 kN	Loss of stability	3P	230 kN	pulling rod
4C	269 kN	Loss of stability	4P	240 kN	pulling rod
5C	270 kN	Loss of stability	5P	240 kN	pulling rod

Under compression deformation in the coupling sections was considerably less strain abutting rods at all stages of loading. The explanation for this is less stress intensity at a higher cross-sectional area. In the transition zone, at the beginning and at the end of the coupling, the gradient is formed of deformation associated with the process of redistribution of stresses between the docked bars and clutch. Right in these areas bending of the specimens observed at the time when the buckling limit in compression effort.

When stretched, the initial stages of loading up 0,5 N_{max} character strain distribution along the length of the joint is similar to the distribution pattern when tested in compression. At higher stages of loading, approaching the critical zone is clearly seen anchoring, manifested through the work of adhesion forces in areas of intense transmission of forces between the rods and the coupling. Also at high stages of loading a zone of advanced nonlinear deformation middle joint, where in the future due to the achievement of ultimate strength of steel and the cleavage of the coupling.

Deformation of elements in the compound and the abutting rods relative movement of the coupling amount and nature of compressive deformations are different from deformations in tensile movement. Dependence N_{max} / N_i – compressive prototypes joints equal to the level of loading 0,7 N_{max}, is linear, with further loading schedule becomes non-linear shape, showing decreasing character of displacement values equal to 0.04 ... 0,08 mm. Tensile dependence N_{max} / N_i – is linear up to 0,7 N_{max}, then there is a growing non-linear dependence to the values 0,06 – 0,1 mm. It follows that by moving the rod with respect to the coupling connection compliance with the tensile force is 1,3 – 1,5 times greater than that when compressing.

After spending this research, the following conclusions can be made:

• Tensile test of the proposed design of the mechanical connection in the adopted configuration showed stable values gap efforts by the average cross-section corresponding to ultimate steel pipe couplings.

• Limiting compressive load at buckling interface prototypes had values close to the results of the tensile test.

• The nature of the strain distribution along the length of prototypes was found as well as its compliance in the form of linear displacement with respect to the coupling abutting rods. The areas creating strain concentration along the length of the joint were determined.

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