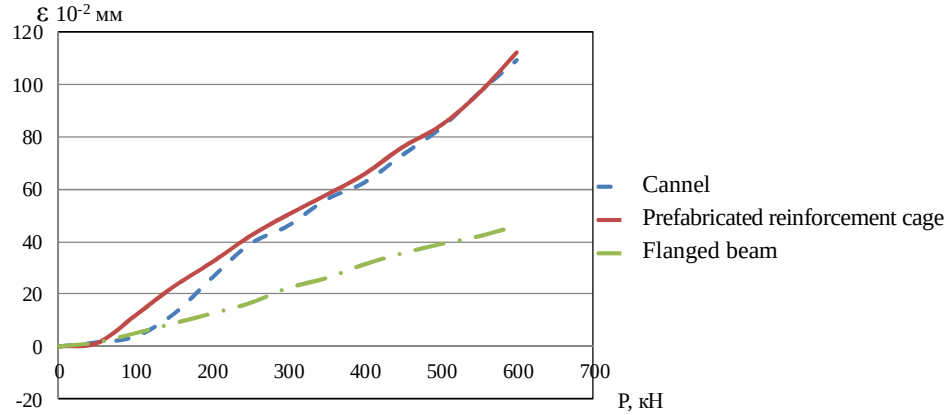

Fig. 5. Diagrams of deformation (horizontally at base of concrete footing) of experimental samples when central compression

From the graphs, it can be seen that displacements both in horizontal and vertical positions with the use of I-beam are significantly less than in other variants of the reinforcement. Consequently, the use of rigid rod in the reinforcement significantly increases the rigidity of junction of the reinforcement element and the existing foundation. It can also be noted that the use of rigid rod not only reduces deformability, but also increases bearing capacity of the whole construction what is also a significant factor when choosing a method of reinforcement.

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PLANT FOR INTEGRATED STUDY OF SIMPLE BENDING, RESTRAINED TORSION, TORSION BENDING

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The article deals with an experimental plant designed for the integrated study of simple bending, restrained torsion and bending torsion of different elements and constructions. The authors introduce a schematic diagram of the plant with a description of its constituent elements, as well as some testing points of the constructions.

The plant is designed for the integrated study of simple bending, restrained torsion and bending torsion of different elements (Point. 7) and constructions, made of these elements: prismatic bars (Fig. 2а), closed cross-section (Fig. 3а, б), open profile (Fig. 3 в, г, д), pre-stressed strut frames (Fig. 2 б), bents, trusses, roof and floor slabs. The materials of the studied elements and constructions are reinforced concrete, steel, duraluminium, plastic.

The plant consists of two rigid rectangular frames (Point. 1; channel No. 40), rest upon four bases (Point. 2). The bases are fixed to the bed with six anchor bolts 24 mm in diameter each. The angles are fixed to the upper part with bolts (Point. 5) and expand spatial rigidity of the installation and serve as fastening elements of the vertically placed constructions. I-beams (Point 4) are placed on the lower cross-channels No. 40 (Point. 3); there are hydraulic jacks on the beams (Point. 8) which generate the vertical bottom-up load up to 500 kN on each jack.

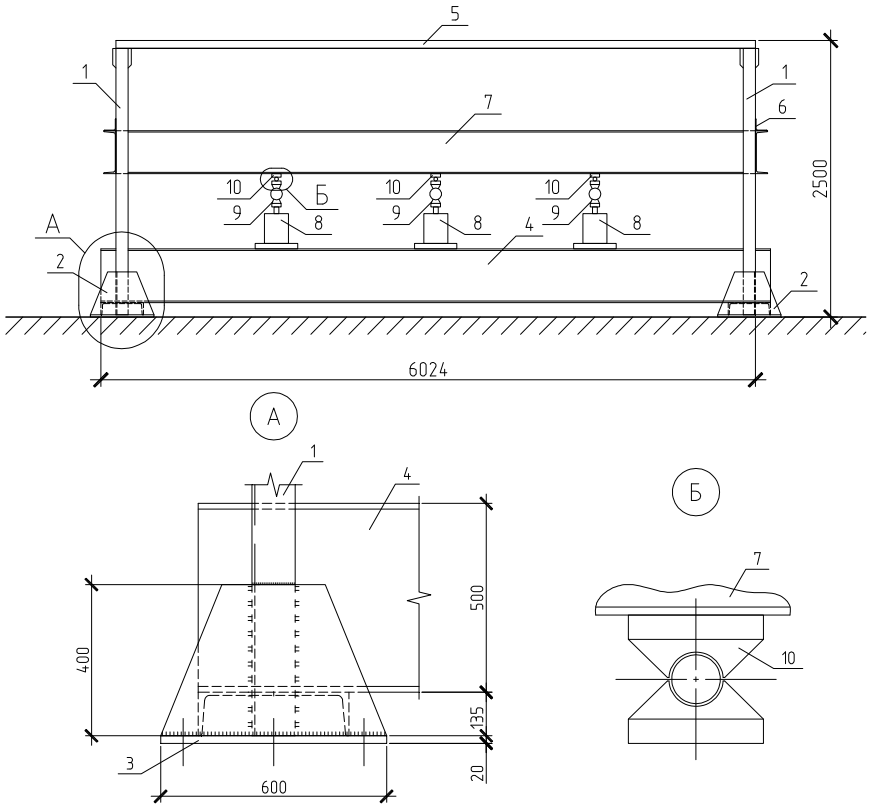

Fig. 1

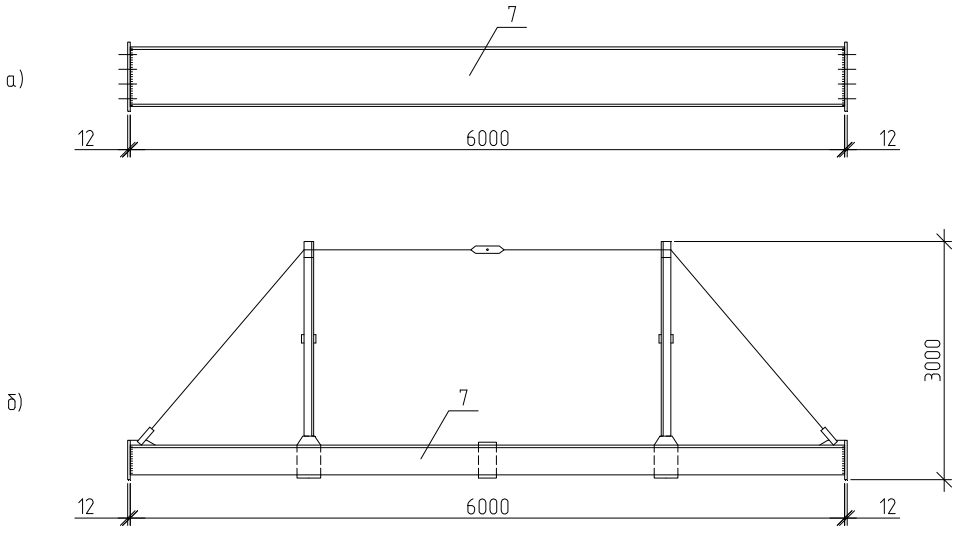

Fig. 2

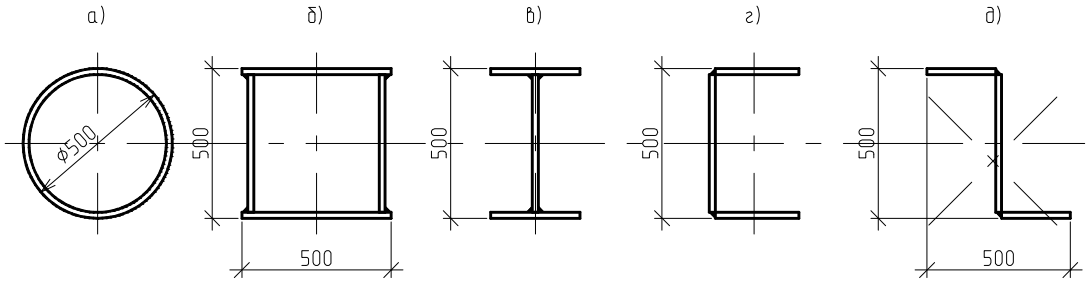

Fig. 3

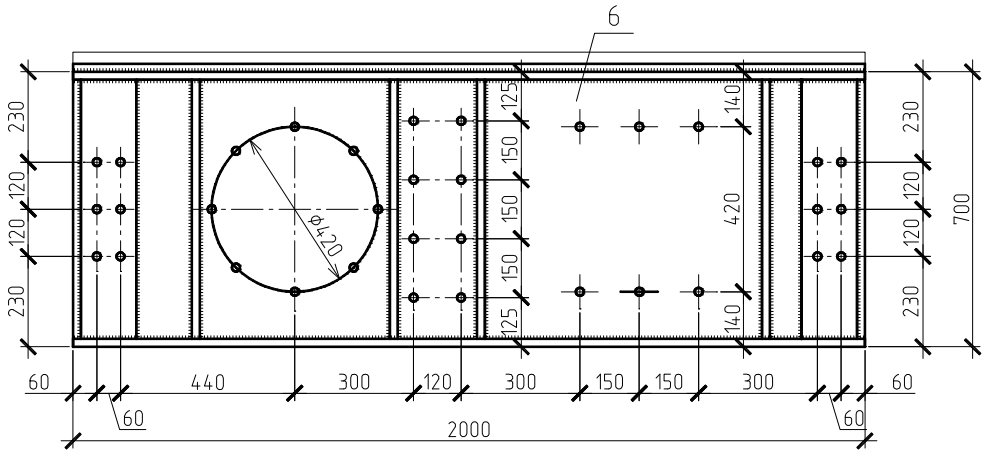

Fig. 4

The load, measured with dynamometer (Point 9), is transported to the construction (Point. 7; simple bending, pure bending) by means of post supports (Point. 10). The load is transported from the jacks to a special construction by torsion bending and then to the studied element. The construction, transporting torsion load, may vary due to different profiles of the cross-section. The construction consists of two beckets (Point. 11, 12) and welded cantilevers (Point. 14), when reinforced concrete tubes are tested (Fig. 5). To increase friction between them and the tube the beckets are tightened with four high-strength bolts with the help of elastic liners (Point. 14). A torque spanner is used for tightening.

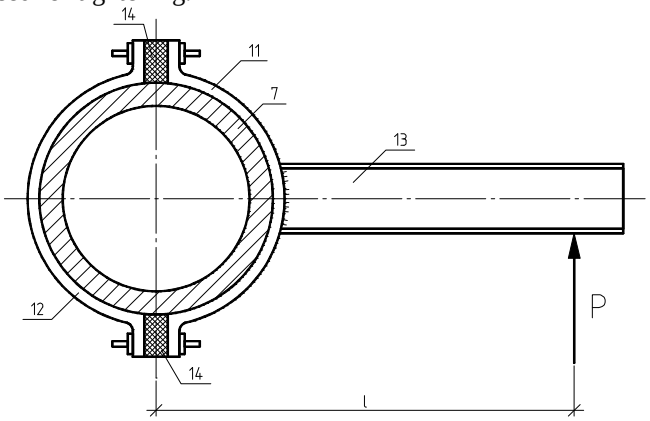

Fig. 5

Strain tension may vary from 10 kN to 100-150 kN. It depends on geometric parameters of the tubes. Shifting the load point P along the cantilever (Point. 13), the bending stress rate less than 5 per cents of restrained torsion stress can be observed, thus only torsional deformation can be taken into account in the future. A set of removal cross bars makes the plant unique. The bars are fixed to the frames (Point. 1), the studied constructions are fixed to the latter. The bars are made of welded channel and L-angle 16/10 to enlarge bending rigidity of the bar. The installation is loaded before the test itself to press the bolts down. Bending deformation properties of the cross bars and cantilevers should be taken into account by data analyses.

Tension and deformation of separate sections of the construction are changed by means of resistance strain gauges, strain gauge factor equals to $\delta = 2.5\text{-}3.0$; indicating gauges, grating period is 0.01 mm; and Maksimov's deflectometer.

Industrial, civil, mechanical engineering and farm building are the most favourable fields of application of the plant.

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