In Russia, the portion of foreign investments in construction currently comprises a substantial volume. The role of foreign specialists in the development of construction projects, monitoring of their realization, and acceptance of work performed is also increasing with the influx of foreign capital. Here, they more often than not employ their own, or international standards for the work and engineering surveys performed, which they are more accustom to for the perception and analysis of results. When Russian establishments perform this work for foreign clients, the need arises in part to expand the qualification of our specialists in the knowledge and use of international standards.

In 2008, the publicly owned joint-stock company Fundamentproekt turned to a foreign company with an atypical problem - to conduct field tests of soils with piles under a static load of up to 4,350 kN in accordance with the American standard ASTM D1143/D1143M-07 [1] (hereinafter ASTM), which assumes international status.

It was suggested that the client perform the technical task of testing two cast-in-place piles 1,000 mm in diameter and 20 m long in test groups at the site of the reconstruction of the Shatura state regional power plant (SRPP). The piles were installed by a BAUER BG 30 rig using drive pipes. Ursk clays of hard and semi-hard consistency were cut through from the upper design elevation of the pile. The design load on the pile, which was assigned by the design organization, was 1,450 kN. These same piles were intended for the foundations of a PGU-400MW steam-gas turbine plant under construction with turbines supplied by the American Company General Electric.

The Fundamentproekt has been successfully occupied with field testing of soils with piles over a period of several decades. During the past five years, the company has conducted more than 80 of these tests with piles under loads varying from 20 to 2,600 kN. The company had encountered a similar problem, however, and was also the first to solve the stated problem by studying the American standard ASTM. Here, we exposed a number of its pronounced differences from GOST 5686-94 [2] (hereinafter GOST), which are in-force for the type of work in question. The differences touched upon both work procedures, and equipment employed.
It should be pointed out that the GOST has not been updated since 1994, while the ASTM standard had been revised in 2007 at the time of the testing, and therefore took into account recent advancements in the production and technical plan, and called for use of more modern equipment.

The American standard discusses in detail mandatory requirements, recommendations, and the sequence of work production, and also covers in detail selection of equipment and its use.

The ASTM specifies seven possible procedures for soil tests under a static load, which are designated from "A" through "G." The specific testing procedure is determined by the design organization, depending on the structural, technical, and production characteristics of the building under design. The procedures are distinguished by the magnitude and rates of load application, the holding time of the load, etc. The GOST specifies only a standard (basic), and auxiliary (accelerated) method. Procedure "B" in the American ASTM is an analogy of the standard test method specified in the GOST. Their differences deal primarily with the loading steps, their holding times, and the recording frequencies of displacements.

Beyond the dependence on the procedure, the ASTM standard regulates the distance from the pile being tested to the anchor $L_1$, and the support of the reference system $L_2$ in the clear, which are appreciably greater than noted in the GOST, and to wit: $5d < L_1 > 2.5$ m versus $3d < L_1 < 1.5$ m, and $5d < L_2 > 2.5$ m versus $L_2 < 2$ m, respectively. These requirements will lead to a significant increase in the clearance dimensions of the support stand. In our opinion, these distances are on the high side, and can be justified only under conditions when the probability of interaction between the pile being tested and anchors, and also the reference system exists during the tests.

More detailed requirements, many of which are not mentioned in the GOST, are set forth for the equipment employed. Several of the most characteristic of these requirements are cited below.

Use of a dynamometric transducer is specified for measurement of the load transferred onto the pile, which is established between the jack and a beam of the support structure. The transducer verifies the load applied to the pile when tested for redundancy of the manometers readings.

It is suggested that strain gages (transducers for observing and measuring strains and stresses), which are mounted in the body of the pile being tested during its fabrication, be used in individual cases. This equipment will make it possible to obtain the load transmitted onto the pile over its entire length, and result in more accurate distribution of lateral and frontal components of pile resistance in the test results.

For more uniform transmission of the load from the jack onto the pile and support structure, a metallic plate no less than 25 mm thick should be installed over the entire surface of the pile in a layer of cement grout $− 6$ mm thick. This same plate is mounted beneath the entire width of the section of the support structure, which takes up the load. It should be pointed out that in our studies involving pile tests, we also called for use of metallic plates for these same purposes, but the GOST does regulate this requirement.

It is mandatory to position floating spherical supports on the jacks employed, which should possess a travel of no less than 15% of the diameter of the pile being loaded. The floating supports are used to compensate for possible radial loads on the connecting rod.

The connected hydraulic system, which includes a jack and pump, should be calibrated as a single unit. Calibration of each element of the system individually is also permitted, but with a smaller error than that for the combined unit.

In addition to the basic method of measuring pile deformations using instruments (deflectometers, indicators), visual and optical instrument controls are called for. The first is carried out on the basis of a graduated indicator scale (glued to two sides on the lateral surface of the pile) using a tensioned metallic string, the supports of which should also satisfy the above-indicated conditions concerning the minimum distance between reference supports and the piles; the second should be accomplished on the same scale using an optical theodolite or laser beam.

Thus, the existence of reserve systems for determination of pile deformations, and also transmitted loads (dynamometer), renders the tests more reliable, since they back-up the basic systems should they malfunction.