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Increasing operational safety and reliability of big hydro-engineering construction projects using effective Russian methods of foundation and structure soils compaction

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Increasing the operational safety and reliability is a very important task in the construction of hydro-engineering structures. One of the main factors in solving this problem is the compaction of soil hydro-engineering structures. Today in the world construction practice, different methods are used to compact foundation and structure soils: an explosive method, by heavy compactors, vibratory rollers and deep-water compactors. However, application of these methods in the overseas construction practice is based on the solutions developed by Russian experts in the 1950–60s. Over the recent years, these methods have been advanced considerably and used on a large scale in hydro-engineering and energy projects of the national level (flood preventing structures complex in St. Petersburg) and big hydro-energy construction projects (Irganai HPP), etc. Russian hydro-power engineers designed and constructed cult high dams both in Russia and abroad, including the highest in the world (304 m high), earth-fill dam of the Nurek HPP on the Vakhsh River in Tajikistan. Today, with the funds of the World Bank, the construction of the 330 m earth-fill dam of the Rogun HPP, which started in the USSR, continues with involvement of Italian specialists. The Kambarata-1 HPP (275 m high earth-and-rockfill dam) on the Naryn River in Kirghizia and the Dadjikum HPP (320 m high rockfill dam) on the Panj River in Tajikistan are being constructed. The issue concerning the compaction of the HPP dams in these earthquake-prone regions of construction is very topical. The paper presents the theoretical grounds of the dynamic compaction methods of different soils, data of the field studies and practical application of a specialized hydro-engineering roller of the Russian production and conceptually new heavy two-mass compactors, as well as design and technology solutions for compacting the body of a dam and its abutments to the edges of the canyon.

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