

**SIMULATOR FOR EXPERIMENTAL RESEARCH
OF THERMALLY INSULATED CONDUCTOR MODEL**

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The permafrost, which is the main base of hydrocarbons, occupies more than half of the Northern territories of the Russian Federation [1]. For the last 15-20 years the area of regions with a favourable climate for the existence of permafrost has been reduced by a third [2]. Melting the permafrost and increasing the depth of seasonal thawing significantly complicate the development and operation of wells in permafrost areas.

Researchers [1,3,4 and others] who involved in the problems of drilling and operating wells in permafrost areas have noted the need for using drilling fluids that are cooled to the ice melting temperature, as well as thermal equipment, materials and coatings. They consider the possibility of freezing the wellhead.

In the current situation it is very topical to develop equipment for freezing the wellhead, where the operation does not depend on temperature conditions.

Solving the problem, the structure of thermally insulated conductor with thermoelectric cooler modules (TEC) [5] has been demonstrated. For experimental studies for the development of this structure a simulator is designed (Figure 1).

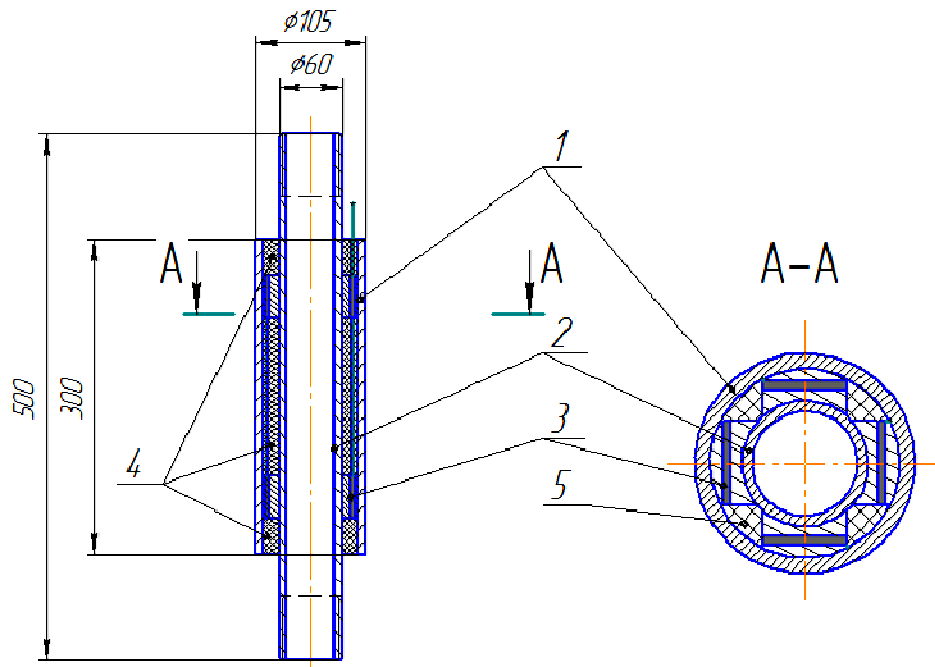


Figure 1 - The structure of thermally insulated conductor model

The simulator contains outer (1) and internal (2) pipes, inside of which there is a device of TEC (3), rings (4) and segments (5) of the heat insulating material (foam plastic), which fills the annular space between the outer and internal pipes. The device of the TECs (3) includes cases (6) made of the heat conducting material (aluminum) and the parallel

connected Pelteir’s TECs (7). The TEC is fixed to the case by the thermal grease (8) (Figure 2).

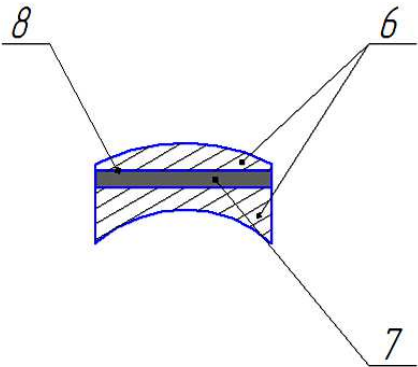


Figure 2 - The device of Pelteir’s thermoelectric cooler modules (TEC)

The device is fitted tightly to the outer and internal surfaces of pipes. The simulator has thermometers (9, 10, 11) to register the temperature of the outer pipe and the flow of the fluid that passes through the inner pipe (2), as well as the power supply unit (12). The installation scheme of thermometers is shown in Figure 3.

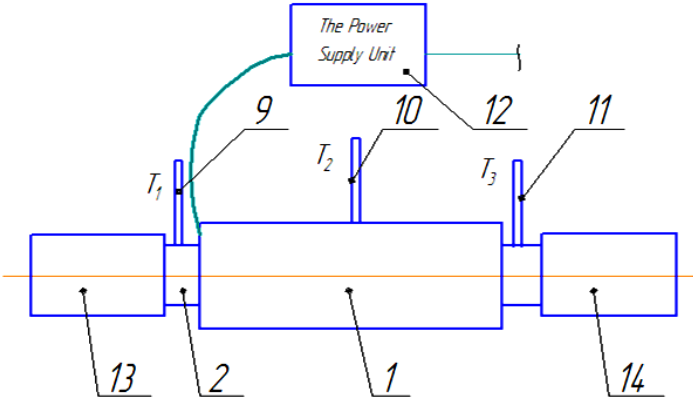


Figure 3 - Schematic installation of thermometers

The simulator for research of thermally insulated conductor model is fixed by mandrel subs (13, 14) on the pipe of the laboratory simulator of the wellbore [6].

The simulator for experimental research of the thermally insulated conductor model works as follows. The working fluid pumping from the tank on a pipe runs to the inner pipe (2) with a bore of 50 mm. Electrical current is directed from the power supply unit (15) to the device of the TEC (3). The device (3) will cool the outer tube (2) and transfer the heat generated by Peltier’s modules to the inner pipe (1).

As for the overall dimensions the simulator is 0.5 m wide the diameter of pipes is 0,105 m, the weight of the laboratory simulator is 15 kg.

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