

Section 01. Innovations in Engineering

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The Choice of Drilling Pipes

The drilling string is the most important part of the drilling rig. It performs various functions. Through it, the torque and axial load are transmitted to the rock cutting tool to destroy the rock, a cleaning agent is supplied and the drilled core is removed from the face when it is hydrotransported, and the removable core receiver is lifted. Pumping materials are pumped through the column of the pipes and instruments for exploring the well are lowered. The tool for liquidation of failures is also lowered. In the multi-link design of the drilling string the main and auxiliary elements are different.

The main ones include the leading pipe, drilling pipes with connecting elements weighted by the drilling pipes (UBT). Auxiliary elements are adapters, centralizers, stabilizers, protectors. For high-speed diamond drilling smooth-boring drilling pipes of a nipple connection made of steel or aluminum alloys are used. Steel pipes smoothbore outside and inside with the connection pipe to the pipe and a minimum gap (2-3 mm) between the column and the well are used in diamond drilling with removable core acceptors.

Columns with muff-lock joints are used mainly for carbide-tipped, cone-shaped and impact-rotary drilling. In this case, you can use crowns and bits of several sizes. Steel thick-walled (19-22 mm) drill collars included in the lower part of the drilling string serve to create the necessary load on the rock cutting tool, improve the operating conditions of the drilling string, and reduce the curvature of the well. Drilling pipes and their joints form the main part of the drilling string. They provide the length of the drilling string as a continuous system for regulating the load on the rock cutting tool and feeding the circulation agent to the face. The circulation of the drilling fluid in the well is created by a drilling pump. It provides the required flow rate (flow rate) and creates a head that should exceed the sum of all the hydraulic resistances to the motion of the drilling fluid all the way from the pump to the bottom of the well, and then to the wellhead on the surface. Hydraulic calculation of the circulation system is performed in order to determine the necessary characteristics of the pump and their number. During the hydraulic calculation, the following parameters are determined: the necessary intensity of the cleaning agent flow, the flow regime of the fluid depending on the speed of movement, the hydraulic resistance to movement of the fluid along characteristic sections.

The entire system is subdivided into elements or characteristic areas for which head losses are determined separately. The main elements of this system can include drilling pipes and their connections.