
SYSTEMS
oiltech
WELL HEATING SYSTEMS
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Our Company

OILTECHSYSTEMS OÜ is a part of a group of companies working in oil and gas industry which produce, engineer and develop systems with the most advanced plastic technologies for the conduction free of corrosion of all kind of fluids at high pressures and temperatures.

The group is working worldwide providing services, installations, products and performing turn key projects.

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Methods of impact on the well bottom-hole zone

A priority for any oil and gas company in the coming years is to increase oil and gas production by involving hard-to-recover reserves.

For this purpose, the introduction of innovative technologies and pilot tests of best practices among oil companies is carried out. Such as the use of various methods of influence on the bottom-hole zone of an oil well.

Methods of impact on the bottom-hole zone of the well are divided into 3 groups:

Chemical methods — *are used in cases where the permeability of the bottom-hole zone is deteriorated due to the deposition of substances that can be dissolved in various chemical reagents. An example of such an impact is hydrochloric acid treatment (SCR) of rocks of the bottom-hole zone of the well.*

Mechanical methods — *are used in low-permeable hard rocks. This type of impact includes hydraulic fracturing (fracking).*

Thermal methods — *are used in cases where viscous hydrocarbons (paraffin, resins, asphaltene) are deposited in the bottom-hole zone of the well, as well as in the filtration of viscous oils.*

In addition to these, there are methods that represent their combination.

Methods of impact on the well bottom-hole zone

One of the effective methods of intensification of oil inflow and increase of productivity of production wells is artificial increase of temperature in a trunk and in its bottom-hole zone.

When warming up the bottom-hole zone is achieved:

- *the decrease in the viscosity of oil;*
- *reduction of surface tension at the oil - rock and oil – water interface;*
- *transfer to liquid phase of some solid deposits for example, asphalt and paraffin;*
- *increased mobility of the fluid displaced from the reservoir.*

In the use traditional thermal methods of influence on the bottom-hole zone of the well, the following negative moments can usually occur:

- high cost of equipment used for processing;
- losses associated with downtime of the well;
- costs associated with the descent and lifting operations;
- the need for periodicity of treatments;
- reduction of efficiency of treatments depending on depth of treatments (at sufficient depth of a well condensed water will arrive on a bottom hole);
- when the bottom-hole zone is heated by steam, the casing string is subjected to high temperature stresses, which can lead to its destruction.

Technology of well bottom-hole zone heating

PROPOSED TECHNOLOGY:

In order to eliminate the disadvantages arising from traditional thermal methods of influence, Oiltechsystems offers to supply equipment for continuous heating of the bottom-hole zone of wells in order to reduce the viscosity of oil, eliminate colmatation and prevent the formation of asphalt-resin-paraffin deposits in the bottom-hole zone of the well, the working bodies of pumps and on the inner walls of pipes.

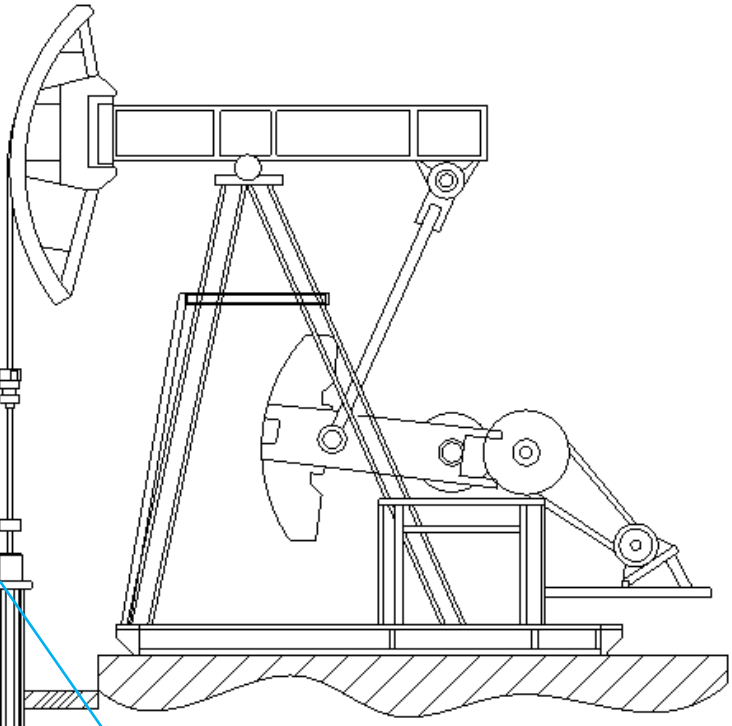
Scope of delivery:

1. Downhole stationary electric heater;
2. Heating control station with UPS series step-up transformer;
3. Power cable with heat-resistant extension.

Well heating system in assembly

Well heating system in assembly:

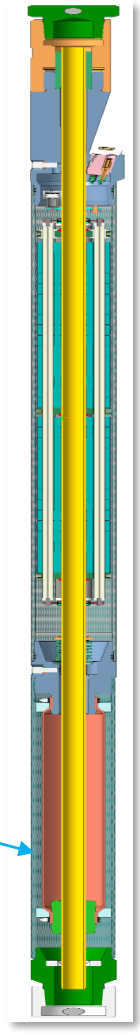
Control station



Sealed entry

Step-up transformer

Downhole stationary electric heater



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Well heating system purpose

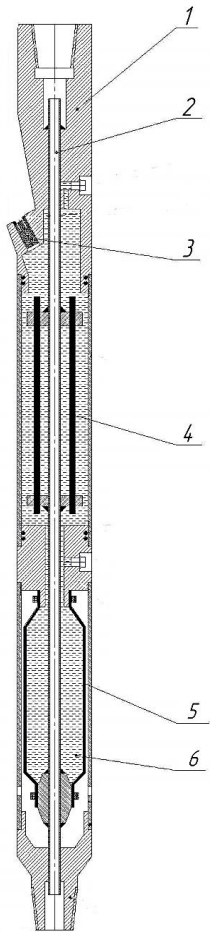
PURPOSE OF THE SYSTEM:

The downhole stationary electric heater is designed to warm up the bottom-hole zone and the downhole fluid passing through the internal hydraulic channel of the heater.

The electric heater stationary borehole through the adapter length of 0,5 meters is mounted on the lower end of the descending tubing by means of thread.

With the help of an extension cable with a connector, the stationary downhole electric heater is connected to the supply cable. The supply cable is fastened with clips on the outside of the tubing. At the wellhead, the cable is output through a sealed cable entry and connected to the well heating unit.

Composition of well heating system



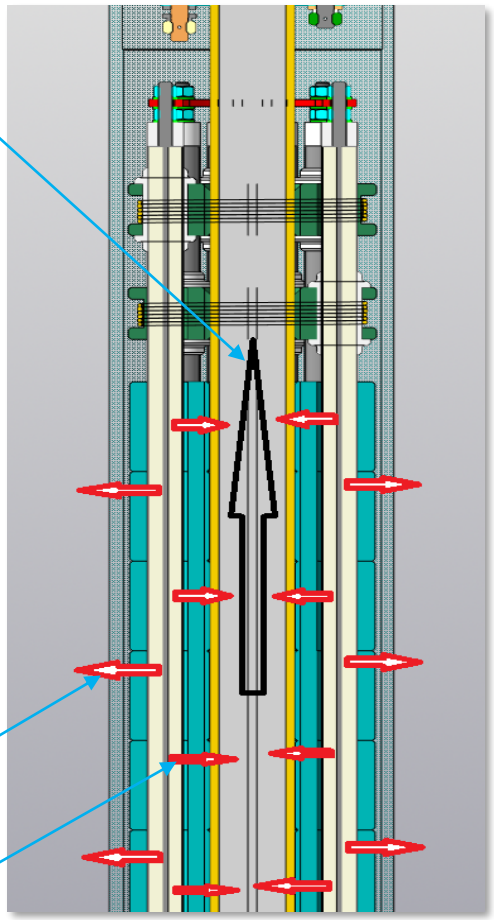
The composition of the electric heater:

1 *- housing*
2 *- internal hydraulic channel*
3 *- cable entry*
4 *- heating elements*
5 *- hydraulic compensator*
6 *- heat transfer fluid*

The electric heater stationary borehole consists of the housing **(1)**, the internal hydraulic channel **(2)**, cable entry **(3)**, heating elements **(4)**, the hydraulic compensator **(5)** and the heat transfer fluid **(6)**.

The flow of fluid to the pump

Downhole fluid flowing around the device, as well as passing through the internal hydraulic channel is heated and pumped into the pump-compressor pipe. When the temperature rises above the nominal, the heating elements change their resistance, which leads to a decrease in the output power. When the heating elements are cooled, the power increases.



Heating of the liquid in the bottom-hole zone

Liquid heating in the hydraulic channel of the heater

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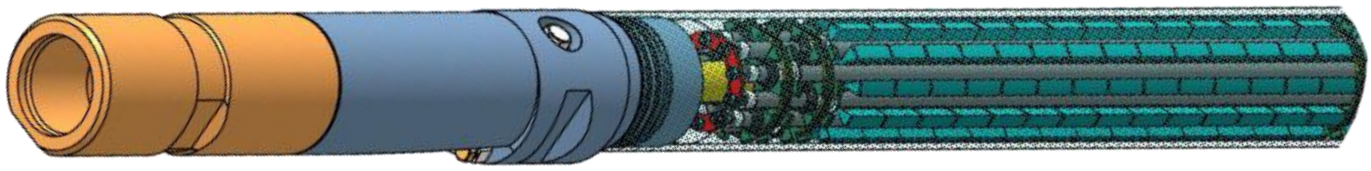
Technical characteristics of stationary downhole heater

Technical characteristics of stationary downhole electric heater:

Description	SNT(n) - 20	SNT(n) – 35
Rated power, kW	20±5	35±8
Outer diameter, mm	120	120
The length of the heater, mm	4500	4500
Nominal pressure, MPa	30	30
Supply voltage, V	680±65	920±75
Maximum temperature, °C	180	180
Diameter of hydraulic channel, mm	24	24

Stationary borehole electric heaters are manufactured in the usual version of SNT and in a stainless steel housing SNT (h).



Control station of well heating systems

Control and management of heating is carried out by means of installation of warming up of wells.

The control station is a sealed cabinet inside of which are placed an automatic switch, a device for protective disconnection of leakage current, a three-phase thyristor half-bridge (zero circuit) or bridge (bridge circuit) for contactless on/off, a control controller for regulating and controlling the process.

Technical parameters of a control station:

Description	Value
Supply voltage, V	3/380
Voltage of step-up transformer, V	650-950
Power supply frequency, Hz	50
Power, kW	63
Maximum output voltage, V	650-950
Maximum output current, A	30
Maximum heater temperature, °C	180
Dimensions, mm	1800x600x420
Weight, kg	150

Control station of well heating systems

Microprocessor control unit provides:

- heating on and off;
- control of the current flowing through the heating elements;
- control of the constant voltage applied to the heating elements;
- control of AC voltage applied to thyristors;
- control of current drawn by the thyristor;
- measuring the temperature of the liquid in the heater;
- turning off the heating when the set temperature is exceeded;
- temperature measurement of oil in thermo pocket;
- measurement and regulation of temperature inside the control compartment;
- measuring the temperature of the radiator cooling thyristors and turning on the fan when exceeding the set point temperature of the radiator;
- automatic power off in the presence of leakage current.
- automatically re-enable the installation when the breaks in electricity supply;
- display of the current parameters of the heating process on the operator panel;
- input and editing of heating process parameters from the operator panel;
- record the heating parameters to the archive for later viewing using a PC;
- record an archive of events for later reading and browsing using a PC;
- transmission of archive data and current parameters of the station to the control panel via Modbus RTU Protocol.

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