

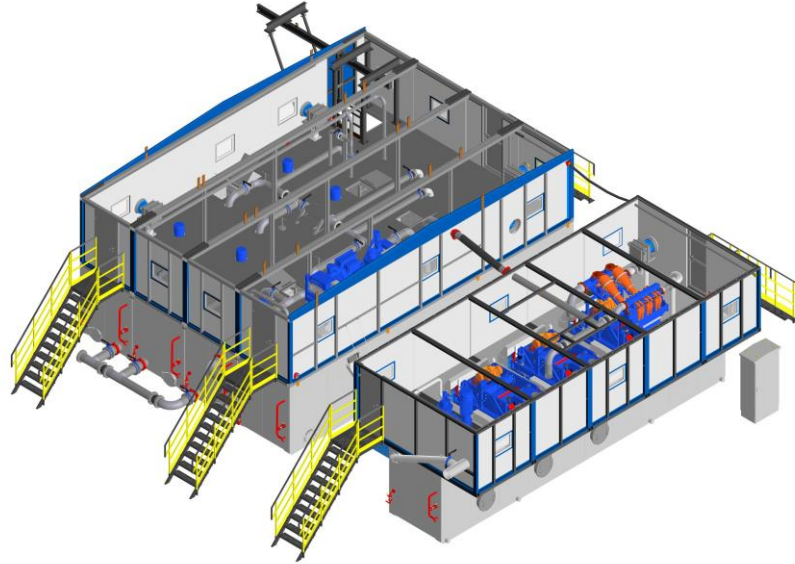


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Mud Circulating Systems TsS 200

Mud circulating systems TsS 200 are designated for preparation and keeping solutions for well drilling as well as for their cleaning and bringing to the required parameters before repeated application.

Mud circulating systems TsS 200 have a unit-modular construction. Design of modules in the form of dimensional blocks of the maximum factory readiness with preliminarily mounted equipment and piping elements provides high mobility during relocation of drilling rigs.

The mud circulating systems include:

- Tank unit for coarse cleaning of drilling mud and degassing;
- Tank unit for fine cleaning;
- Tank unit for drilling mud preparation and operating capacity;
- Tank unit for drilling mud storing.

During installation the equipment units are installed as the second layer on top of tank units and tied-up by pipelines.

Connection between the tanks is carried out through quick-disconnect couplings using corrugated pressure-suction hoses with India rubber expansion pipe.

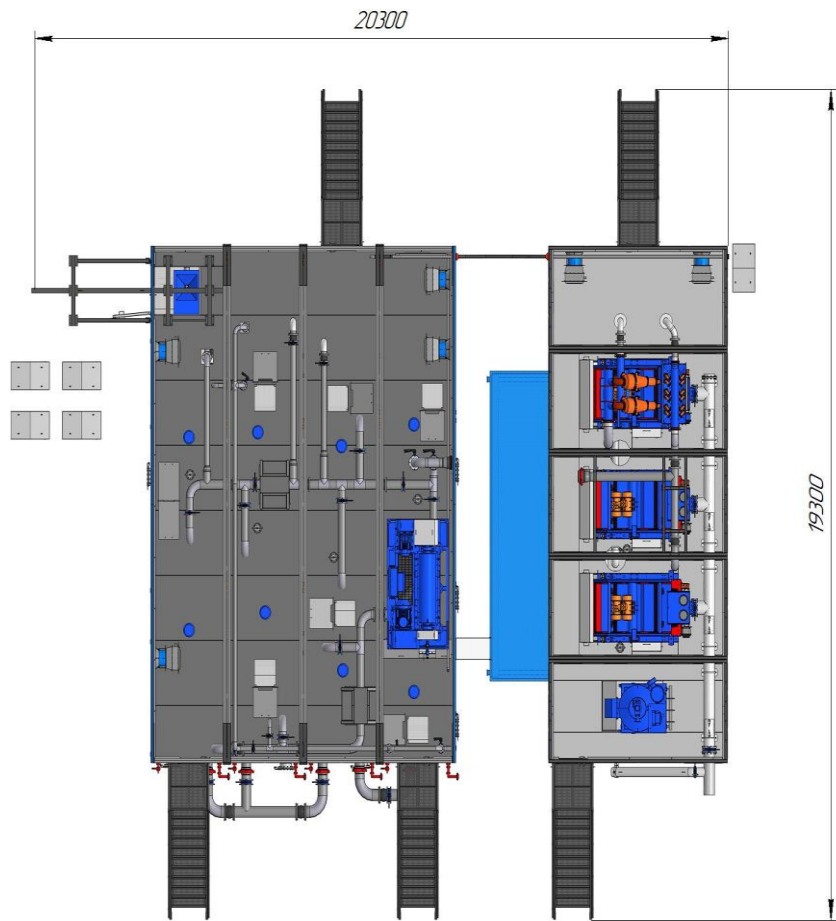
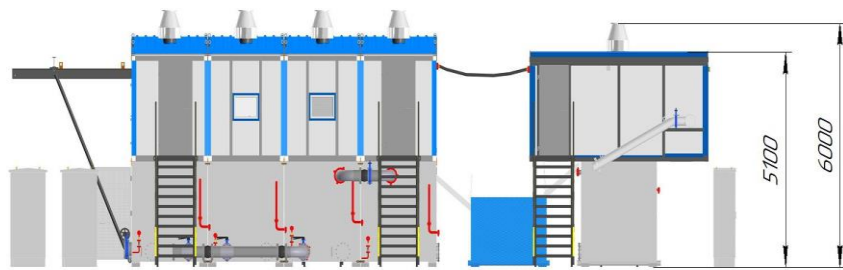
In the tank unit for mud preparation, there is a possibility of installation of a re-entry guide.

There is a traveling hoist with a remote-mount beam for the re-entry guide servicing.

Mobile circulating system is equipped with the system of forced ventilation and lighting in explosion-proof design. All technological tanks have connection for heating, and buildings are equipped with air heating units. All surfaces of a mobile circulating system have corrosion-resisting three-layer coating.

TECHNICAL SPECIFICATIONS

Description	Value
Mud circulating system, full volume, m ³	200
Mud channel nominal bore, mm	320
Variation range of drilling mud values:	
- density , g/sm ³	0.8-2.5
- PH value	9-13
- Drilling mud degree of mineralization, kg/m ³	300
- Plastic viscosity , Pa/s	0.05-0.025
- Dynamic yield point , Pa	1-40
- Drilling mud maximum operating temperature, ° C	60
Production capacity of the system , l/sec	60
Overall dimensions of one tank in the transport position, mm	12192 x 2438 x 2590
Weight of a single tank, up to, t	12
Thickness of tank walls, mm	5
Weight-lifting capacity of the traveling hoist, t	1
Internal cross section of connections between tanks	mm



MOBILE MUD CIRCULATING SYSTEM MCS-140

• Product designation

The mud circulating system is designed for collection, cleaning, degassing, preparation and storage of drilling mud when drilling oil and gas wells. It can be used as part of drilling rigs of all classes.

Climatic modification is U, location category - 1 in accordance with GOST 15150, ambient temperature - from - 45° C to + 45° C.

• Principle of operation and a device

The mud circulation system is designed for preparation, cleaning, regulation of properties, circulation and storage of drilling mud.

• Cleaning and degassing of drilling mud

For cleaning drilling mud from cuttings and other drilled solids, a unit for drilling mud cleaning is used, including a set of mechanical devices:

- Cleaning unit: shale shakers (2 pcs.), a degasser, desander and desilter (mounted above the dedicated shale shaker);

- Preparation unit - centrifuge with common drain.

The mud flow diagram when cleaning and degassing corresponds to the following sequence:

- From the well through pipeline, drilling mud enters the receiving hopper of the cleaning unit shale shakers (1st stage of drilling mud cleaning from sludge: relatively large particles of cuttings are separated. The size of the separated particles is regulated by the size of mesh holes / shale shaker screens);

- Drilling mud is treated by a degasser (gas is separated from the mud and removed outside of the circulation system to reduce the drilling mud gassing, interfering with the normal drilling process (deterioration of rheological mud properties, drilling speed reduction, talus, rockslide and fluid kick appearance, danger of explosion or poisoning by poisonous formation gases), etc;

- Drilling mud is cleaned by a desander (2nd stage of cleaning the mud from sludge: in hydrocyclones, under the influence of centrifugal forces, heavy particles are hit on the volute walls and pass into the sludge. To adjust the size of removed particles, replaceable nozzles have holes of different diameters);

- Drilling mud is cleaned by a desilter (3rd stage of cleaning the mud from sludge: in hydrocyclones, under the influence of centrifugal forces, heavy particles are hit on the volute walls and pass into the sludge. To adjust the size of the removed particles, replaceable nozzles have holes of different diameters);

- The mud is cleaned by a centrifuge (4th stage of cleaning the mud from sludge).

Supply of the mud to the desander and desilter is carried out by sludge pumps located on the tank of the cleaning unit. Hydraulic piping of the cleaning unit mud pumps allows for repair work without draining the liquid, as well as replace one of the pumps in case of failure.

Sludge separated by shale shaker screens, desander and desilter, and a centrifuge is removed by trays to sludge containers.

• Preparation of drilling mud

To prepare drilling mud, a mud preparation unit and drilling mud storage unit are used.

The calculated amount of the dispersion medium is poured into a container and fed through the discharge line to mud hopper in a closed loop using a slurry pump. The bag with powdery material is transported to the tank site using a hoisting mechanism, where it is moved to the mud hopper with the help of the hoist. Further powder from the mud hopper with the help of hydraulic vacuum is fed into the chamber of the ejector hydraulic mixer, where it is mixed with dispersion medium. The suspension is drained into a tank, where it is thoroughly mixed by mechanical and hydraulic stirrers. Circulation stops only when the calculated amount of components is mixed and the basic technological indicators of the mud properties are close to the calculated ones. Mud weighting occurs similar to the preparation process. Also, to improve the characteristics of the composition, it is possible to use a disperser and a high pressure ejector installed on the preparation unit tank.

• Storage of drilling mud

A storage unit is used to store drilling mud. The tanks are connected between pipelines through which the solution is bypassed from one tank to another. Mechanical stirrers are used to maintain the mobility of the drilling fluid (2 pcs.).

• Design features

MMCS design provides for the ability to work both with one and two mud pumps. MMCS design provides for free fluid flow between units without use of transfer pumps.

To exclude stagnant zones and unrecoverable residue when emptying tanks, in the tank design of all units there is provided connection of walls of all tanks with the bottom by rounding radius, and there are hatches for cleaning. Cleaning hatches are located on

level with the tank bottom to ensure a minimum of residue.

All units are equipped with exhaust fans.

For heating the units, steam registers are provided inside the tanks and air heating units, and in places where heating units do not provide the required heating of mud pumps, additional steam registers are installed.

All tanks are equipped with top hatches and technological staircases for the possibility of going down into the tank for the purpose of servicing. To control pressure on the pressure pump lines and on the intake manifolds of desanders and desilters through shut-off ball valves, there are installed pressure gauges with medium separators.

All MMCS modules are heat insulated and plated with a 2mm sheet.

• **Topping up BD-11 drilling mud**

The top-up system is designed to top up a well during construction stages of oil, gas and exploration wells.

The top-up system should provide the following top-up modes:

- Supply of the top-up into a well should be carried out by force - by a pump;
- The pump for supplying top-up liquid must be backed up by a reserve one;
- Return of excess fluid from a well should be carried out into the top-up tank by natural flow.

The top-up mode must be constant.

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