
KNM
RECEARCH & PRODUCTION COMPANI
KUBANNEFTEMASH

COMPANY OVERVIEW

In the market since
2006

7683 м²
production area

over 115,000
products manufactured

NPF Kubanneftemash LLC is a company engaged in the development, production and supply of the highest quality innovation-based import-substituting heat-resistant equipment ensuring complete heat treatment process for Ultraviscous Oil and Gas fields.

The Company is a key Russian manufacturer and supplier of the heat-resistant equipment systems of any degree of complexity for oil recovery by steam treatment of the reservoir.

The Company is operated globally

OUR KEY BENEFITS

CLIENT CENTRICITY

Development, manufacture and certification of the innovation-based oilfield equipment of any degree of complexity in compliance with the Customer's Technical Assignment.
We respond at short notice to any changes in a Customer's demands.

HIGH PRODUCTION AND RESEARCH-AND-TECHNOLOGY LEVEL

Fully integrated production is within one production facility. Strict quality control of the manufactured equipment is ensured at every stage of engineering and production process. In-house design bureau, huge experience, use of advanced production technologies, and numerous patents of inventions make NPF Kubanneftemash LLC one of the leading companies in Russia.

BROAD RANGE OF PRODUCTS

A wide selection of oil and gas field equipment and equipment systems is offered for both corporate and private customers.

CONTINUOUS IMPROVEMENT AND HIGH-LEVEL QUALITY ASSURANCE

Fundamentally new and efficient approaches are created to deal with any production challenge. The highest level of product quality, and the maximum process optimization and automation are ensured. All of this makes it possible to increase mineral recovery output, and to improve well construction technology.

HIGH-LEVEL SERVICE

A full range of services and equipment engineering support is provided. Constant feedback ensures high level technical support. Delivery is just-in-time.

QUALITY MANAGEMENT SYSTEM

ISO 9001-2015

GLOBAL REACH

RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH

NPF Kubanneftemash LLC is expanding its presence at the global market

BEST VALUE FOR MONEY
NOT INFERIOR TO EQUIVALENTS BY LEADING GLOBAL MANUFACTURERS

CORE CUSTOMERS AND PARTNERS:

ROSNEFT

LUKOIL

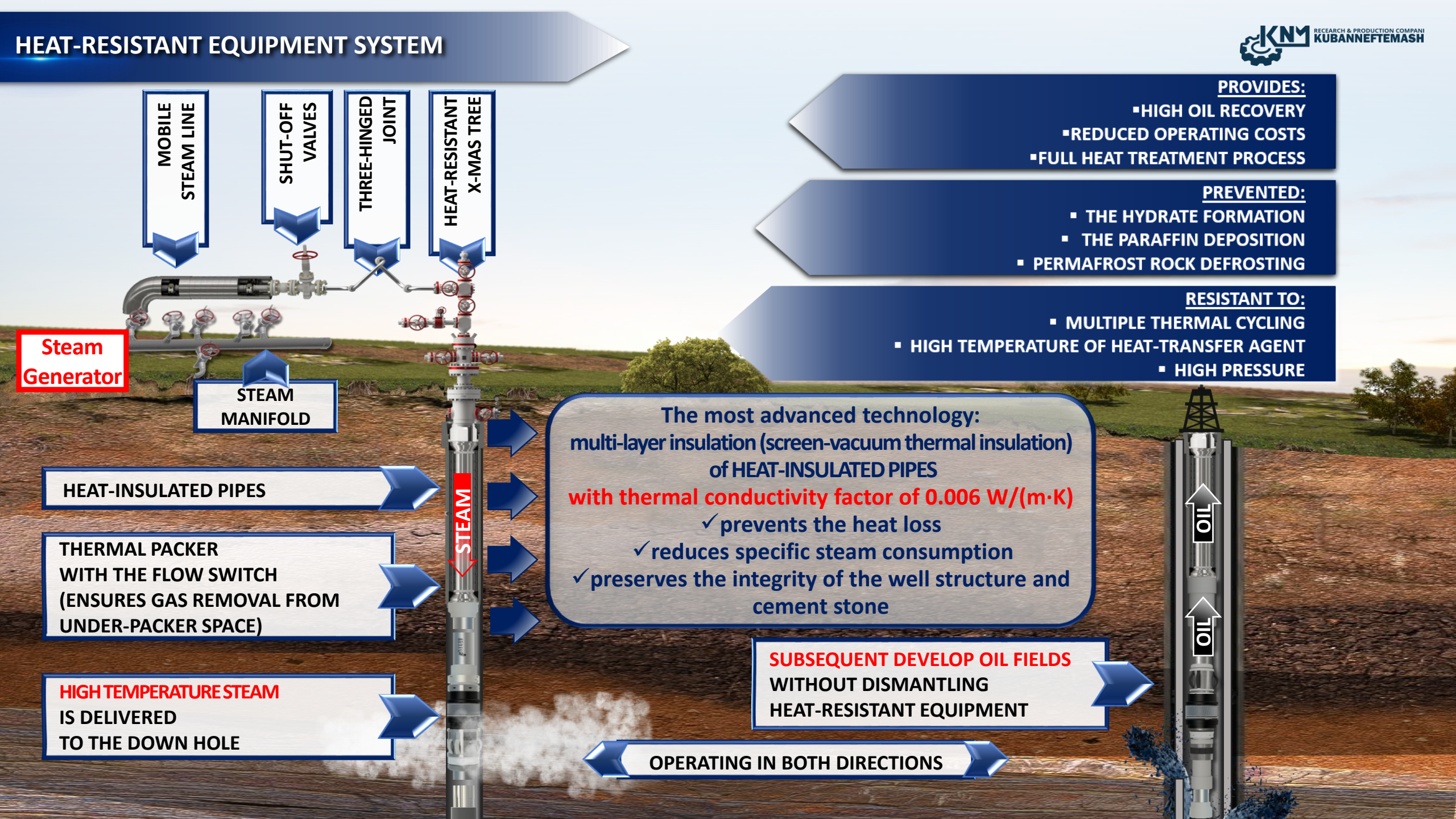
GAZPROM

ZARUBEZHNEFT
Joint Stock Company

SEG
SANOAT ENERGETIKA GURUHI

HEAT-RESISTANT EQUIPMENT SYSTEM

RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH



PROVIDES:
- HIGH OIL RECOVERY
- REDUCED OPERATING COSTS
- FULL HEAT TREATMENT PROCESS

PREVENTED:
- THE HYDRATE FORMATION
- THE PARAFFIN DEPOSITION
- PERMAFROST ROCK DEFROSTING

RESISTANT TO:
- MULTIPLE THERMAL CYCLING
- HIGH TEMPERATURE OF HEAT-TRANSFER AGENT
- HIGH PRESSURE

The most advanced technology:
multi-layer insulation (screen-vacuum thermal insulation) of HEAT-INSULATED PIPES
with thermal conductivity factor of 0.006 W/(m·K)
- ✓prevents the heat loss
- ✓reduces specific steam consumption
- ✓preserves the integrity of the well structure and cement stone

SUBSEQUENT DEVELOP OIL FIELDS
WITHOUT DISMANTLING HEAT-RESISTANT EQUIPMENT

OPERATING IN BOTH DIRECTIONS

MAIN PRODUCT LINE:

- Equipment for steam generating plant
- Heat-resistant equipment system
- Equipment for sucker rod pumping
- Equipment for underground gas storage
- Sand control equipment
- Drilling and workover equipment
- Heat treatment, metal processing, equipment repair, nondestructive testing laboratory services
- Innovations

EQUIPMENT FOR STEAM GENERATING PLANTS

RESEARCH & PRODUCTION COMPANI KUBANNEFTEMASH

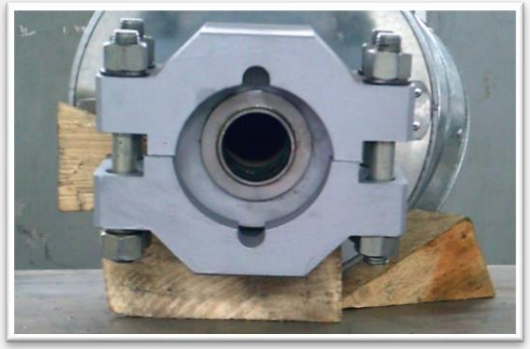
ASSEMBLIES AND PARTS FOR THE PROCESS UNITS AND PIPELINES

Pipeline sections are included in the heat-resistant equipment system to be used for oil recovery by means of thermal bed stimulation (thermal recovery method). Granulated cellular glass (foam glass) and rigid cylinders with external protective casing made of sheet s=0.8-1 mm thick are used as external thermal insulation layer.

Operating fluid temperature Tmax is not exceeding 356 °C
Operating pressure P max is not exceeding 17.7 MPa
Casing surface temperature is not exceeding 55 °C

ADVANTAGES:

- ✓ Energy is conserved, while the heat-transfer agent is transported from the mobile heat generators to the wellhead equipment.
- ✓ Sections of different length allow for construction of a steam line of any configuration and any trajectory with no need in fixed supports.
- ✓ Repeatedly usable without welding.
- ✓ Special support platforms and grips are used for the ease of installation.
- ✓ Equipment is characterized by low metal consumption per unit.
- ✓ Mobile steam line is installed in a short period.
- ✓ The risk of pipe freezing is limited during periods, when the plants are not operated in the cold climate environment.



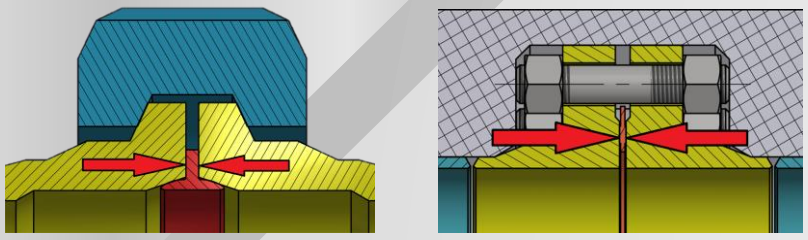
EQUIPMENT FOR STEAM GENERATING PLANTS

RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH

ASSEMBLIES AND PARTS FOR THE PROCESS UNITS AND PIPELINES

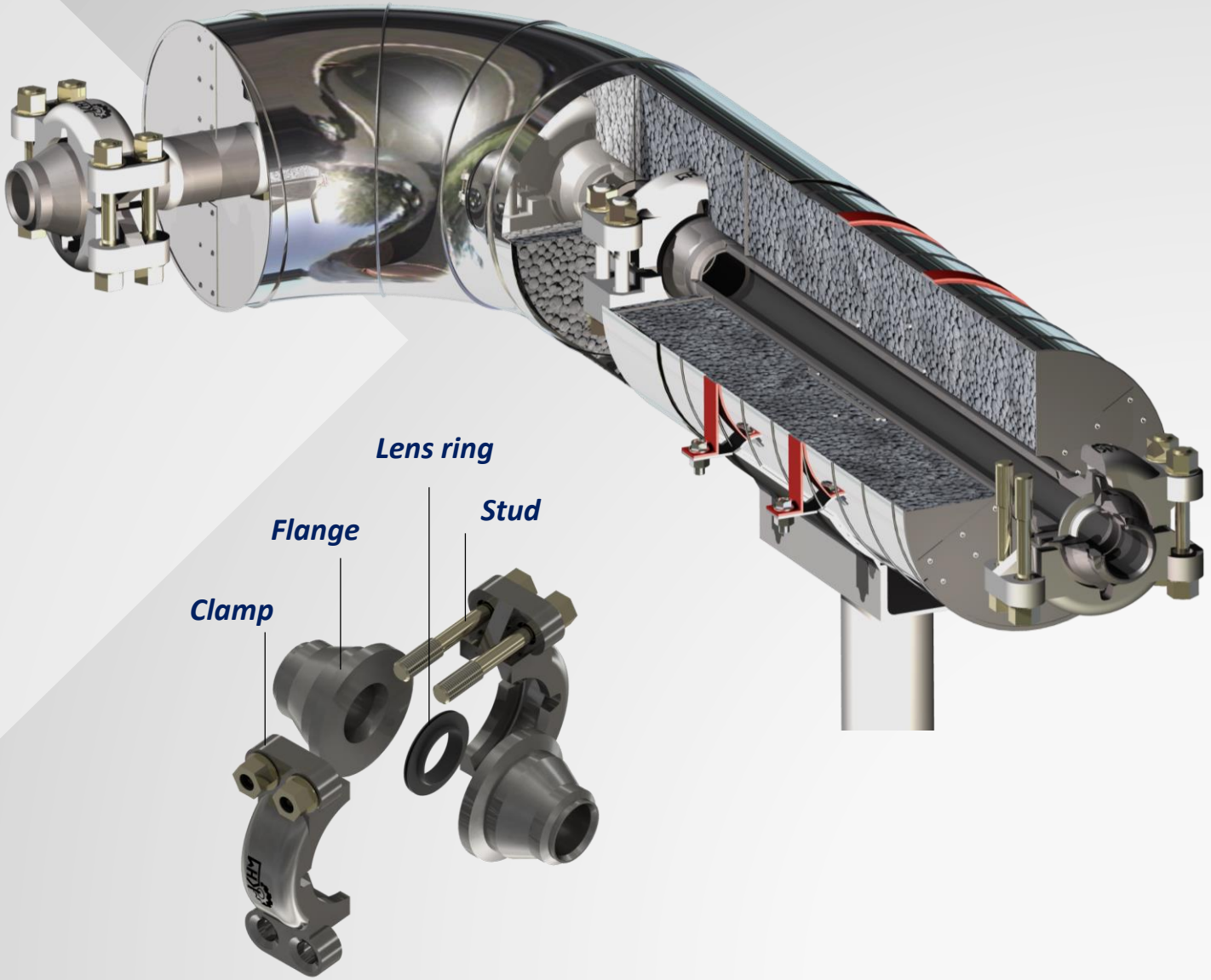
Greylock Connector

- ✓ Greylock type connectors, which is applied in the sections ensure increased reliability of the steam line joints if compared with a flanged joint. The axial load in the flange connection (Figure 1B) occuring due to temperature expansion of the pipes is transmitted directly to the sealing element, which can result in the pressure loss in the seal assembly after the pipe temperature is decreased. In a Greylock type connection (Figure 1A) the sealing rim of the lens ring is not deformed additionally due to the fact that the load is transferred to the circular band of the lens ring.



A B

Figure 1 — Force diagram of the lens ring assembly (A) and a flange joint (B)



HEAT-RESISTANT EQUIPMENT SYSTEM

RESEARCH & PRODUCTION COMPANI KUBANNEFTEMASH

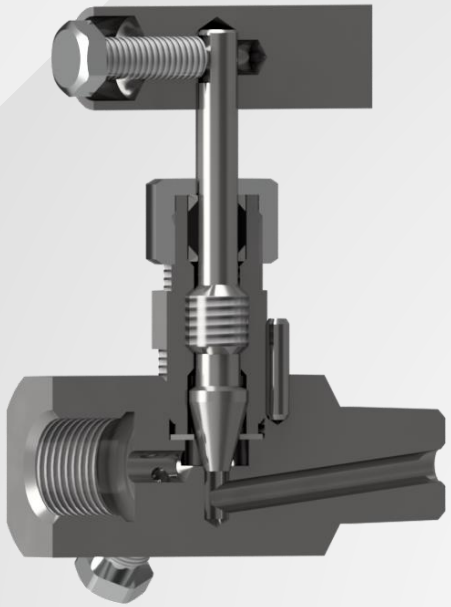
STEAM VALVE (GAUGE TYPE)

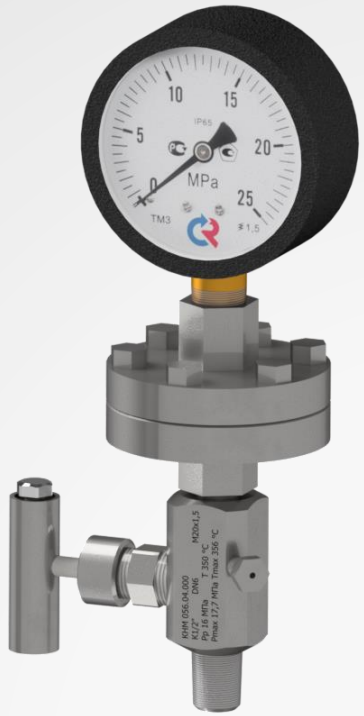
It is used as a locking unit at the vessels and pipelines, and with a view of pressure relief and pressure measurement. Operating fluid temperature is not exceeding 356°C

Operating pressure is not exceeding 17.7 MPa

ADVANTAGES:

- ✓ **Increased reliability during long-term operation on equipment lines**
- ✓ **Pressure monitoring capability**
- ✓ **Equipped with a shut-off mechanism, which enables replacement of the pressure gauge**





EQUIPMENT FOR STEAM GENERATING PLANTS

RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH

STEAM HEADER

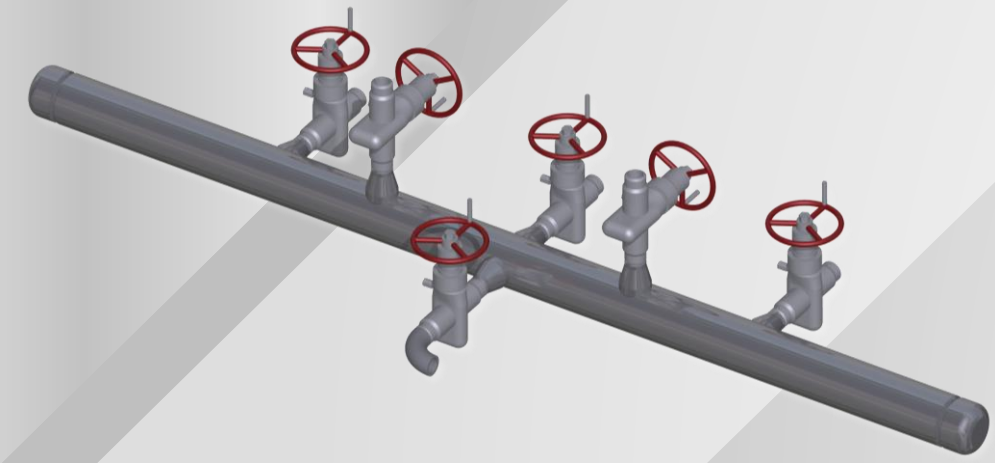
This equipment is designed for steam distribution along the steam lines in the course of steam injection in the formations with a view of increased oil recovery from the steam-injection wells and production wells.

Operating fluid temperature Tmax is not exceeding 356°C

Operating pressure P max is not exceeding 17.7 MPa

ADVANTAGES:

- ✓ **Uniform steam supply under equal pressure**
- ✓ **Withstanding repeated thermal cycling**



EQUIPMENT FOR STEAM GENERATING PLANTS

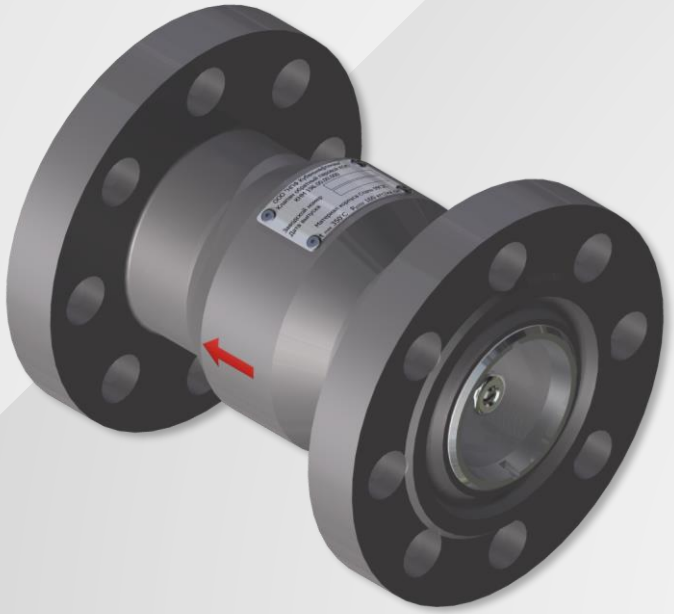
RESEARCH & PRODUCTION COMPANI KUBANNEFTEMASH

STEAM CHECK VALVE

It is intended for preventing reverse flow of the operating fluid and the ingress of borehole medium into the steam generating plant. The valve is included in the heat-resistant Xmas tree for the steam generating plant to be used for high viscosity oil recovery by means of thermal bed stimulation (thermal recovery method). The valve is installed as a part of the steam line.

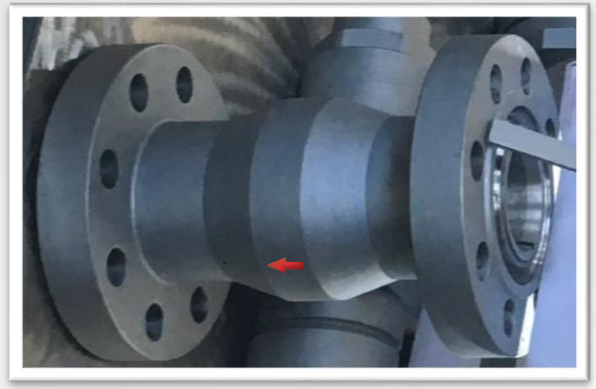
Operating fluid temperature Tmax is not exceeding 356°C

Operating pressure P max is not exceeding 17.7 MPa



ADVANTAGES:

- ✓ **Ease of installation**
- ✓ **High quality and efficiency**
- ✓ **Versatility, compact size**



HEAT-RESISTANT EQUIPMENT SYSTEM

HEAT-RESISTANT X-MAS TREE CONNECTION (THREE-HINGED JOINT)

Piping is included in the heat-resistant equipment system intended for steam treatment of the formation in the course of oil recovery and is designed for the wellhead equipment flange surface and supply pipeline surface to be matched. It is used at the oil and gas field production and injection wells.

Operating fluid temperature Tmax is not exceeding 356°C

Operating pressure P max is not exceeding 17.7 MPa

Heat-transfer agent used: hot water; steam; gas; oil

ADVANTAGES:

- ✓ The piping design allows for compensating the thermal expansion of the casing string and the pipeline, which occurs during injection of the heat-transfer agent, and for excluding any potential accidents thereby.
- ✓ No welding work required during installation
- ✓ Connection piping angle is changeable
- ✓ Owing to the hinged joints in the piping the pipeline can be connected to wellhead equipment fittings if construction dimensions are mismatched up to 1.5 m in length and up to 10˚ by the angle of misalignment between the fittings and the supply pipeline.
- ✓ Positioning of fittings is facilitated during installation and re-installation by compensating for potential mismatch in the mutual arrangement of the heat-resistant fittings and the steam line.
- ✓ Wide range of operating temperatures and compensation for the thermal elongations by turning the hinge loop by the estimated value

HEAT-RESISTANT EQUIPMENT SYSTEM

RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH

ZPSHK STRAIGHT SLIDE GATE VALVE

It is designed to block the pass channel of the wellhead equipment fittings of steam injection and production wells and pipelines.

Nominal bore, mm is 50; 65; 80; 100.
Operating fluid temperature Tmax is not exceeding 356°C
Operating pressure, MPa is 1.6; 2.5; 4; 6.3; 16; 25.
Coupling dimensions of the flanges are as per Russian standards:
GOST 28919, GOST 33259, GOST 12815.
Climate version type is moderately cold (cold) (Russian UKHL (KHL)) as per GOST 15150.
Corrosion-resistant version is K1 as per GOST 13846-89.

ADVANTAGES:

- ✓ **Smooth opening and closing of the slide gate valve with low force applied.**
- ✓ **The gate part of the gate valve is fitted with a double-side seal, hence the gate valve becomes leak-tight and reliable. The type of the seal is: metal-and-heat-resistant polymer.**
- ✓ **The seat-and-slide-gate sealing assembly is designed for potential angular and axial displacement in order to prevent the gate surface damage during thermal deformations, thus contributing to the service life extension.**
- ✓ **The gate valve stem, regardless of its position, is covered by protecting cap, preventing any atmosphere precipitation from the ingress into the stem and heel contact zone.**

HEAT-RESISTANT EQUIPMENT SYSTEM

ZPSHK STRAIGHT SLIDE GATE VALVE THERMALLY INSULATED

Designed to block the pass channel production wells and pipelines.
Nominal bore, mm is 50; 100; 150; 200; 250; 300.
Operating fluid temperature Tmax is not exceeding 250°C
Operating pressure, MPa is 1.6; 2.5; 4.0.
Joint: flanged, threaded, hub and clamp, QRC (quick release coupling).
Climate version type is moderately cold (cold) (UKHL (KHL) in Russian) as per GOST 15150.
Leakage Class: A as per GOST 9544.
Corrosion-resistant version is K1 as per GOST 13846-89.

ADVANTAGES:

- ✓ Smooth opening and closing of the slide gate valve with low force applied.
- ✓ The double-sided seal of the gate part enables leak-tightness and reliability of the gate valve. Seal type is metal-and-heat-resistant polymer.
- ✓ The seat-and-slide-gate sealing assembly is designed for potential angular and axial displacement in order to prevent the gate surface damage in case of thermal deformations, thus contributing to the service life extension.
- ✓ The gate valve stem, regardless of its position, is covered by protecting cap, preventing any atmosphere precipitation from the ingress into the stem and heel contact zone.

HEAT-RESISTANT EQUIPMENT SYSTEM

THERMAL INSULATION COVER FOR SLIDE GATE VALVES

Efficient thermal insulation, where the following thermal insulation materials are used:

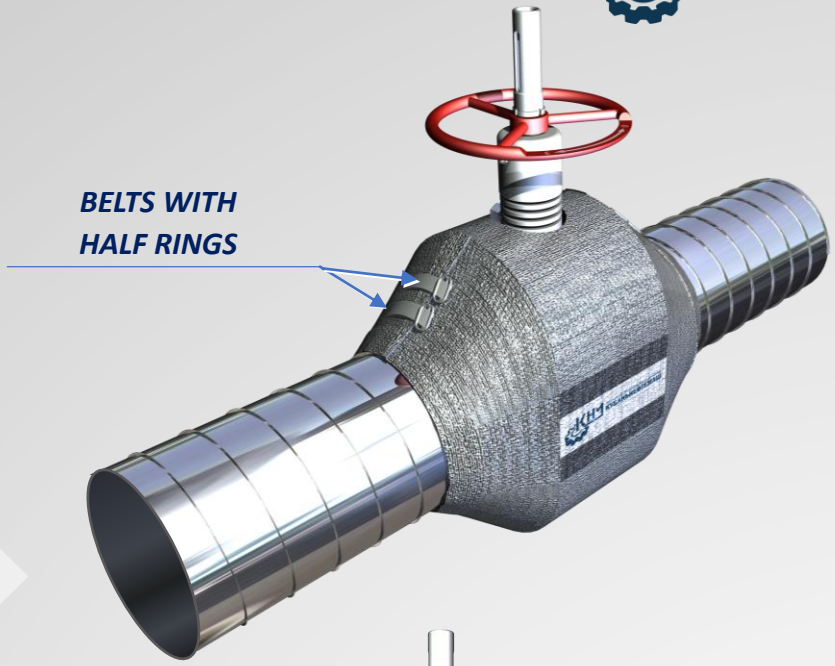
- **Basalt wool;**
- **Mullite silica felt;**
- **Fiberglass or silica-based aerogel.**

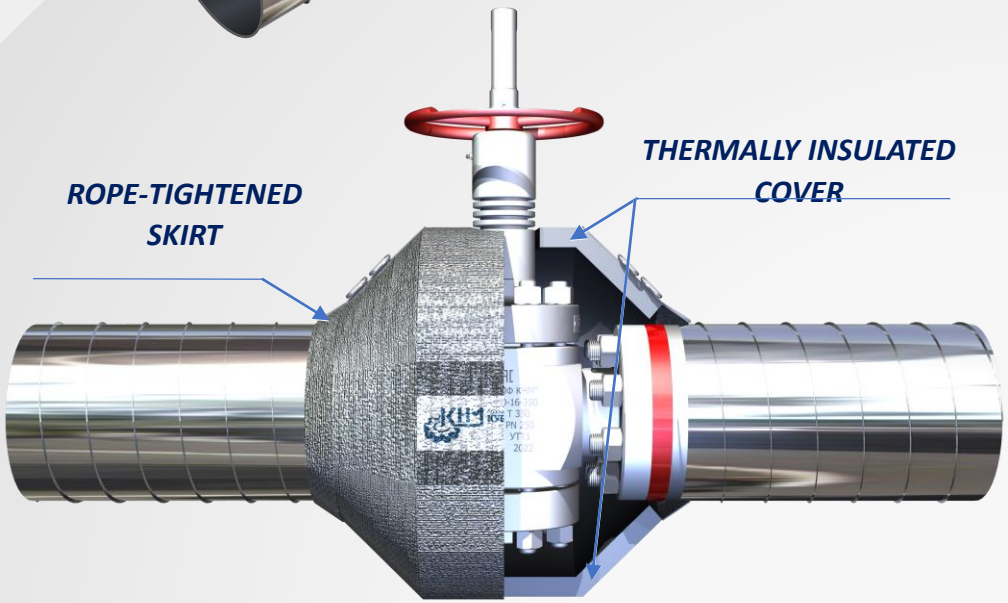
Best-in-class coating made of double-side silicone impregnated fiberglass fabric. Fiberglass fabric with silicone coating is characterized by its water-repellent property, elasticity, resistance to abrasion, to extreme and rapid temperature changes, chemical inertness to the most of aggressive substances (acids, alkalis, petroleum products, seawater, steam, etc.). High strength characteristics determine long service life of the thermal insulation cover.

Commercial fastening components applied (belts, rings) ensure that the thermal insulation cover of the gate valve is reliably fixed.

ADVANTAGES:

- ✓ **Heat loss is reduced**
- ✓ **The ambient environment is not warmed up.**
- ✓ **Safety is ensured for the personnel and the process equipment.**
- ✓ **The operation safety is ensured by the surface temperature reduced to the rated values as per SP 61.13330.2012 Code of practice.**





HEAT-RESISTANT EQUIPMENT SYSTEM

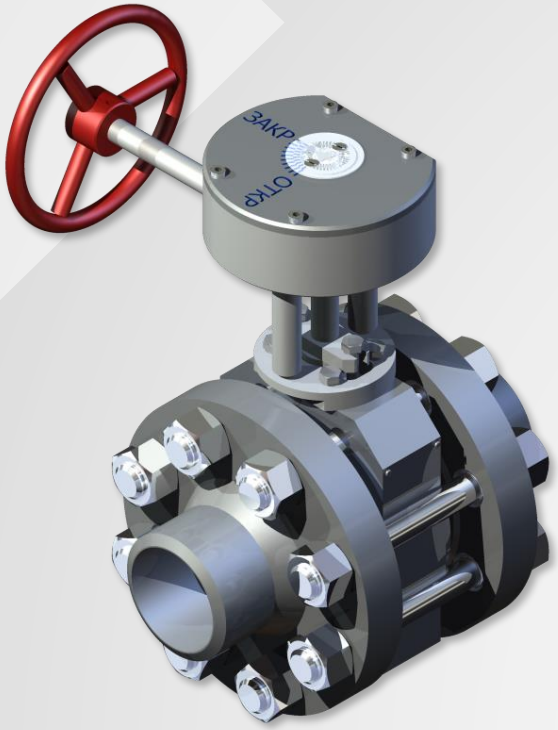
RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH

BUTTERFLY VALVE

The butterfly valve is intended for installation on general purpose industrial process pipelines, steam and water pipelines for oil and gas industry in order to regulate the service fluid flow parameters changing the flow rate by means of flow control device.
Operating fluid temperature Tmax is not exceeding 356°C
Operating pressure Pmax is not exceeding 17.7 MPa

ADVANTAGES:

- ✓ Small external dimensions and weight
- ✓ Simple design
- ✓ Quickly replaceable seal components
- ✓ Cost-efficient use



HEAT-RESISTANT EQUIPMENT SYSTEM

RESEARCH & PRODUCTION COMPANI KUBANNEFTEMASH

KPP STEAM PRESSURE RELIEF VALVE

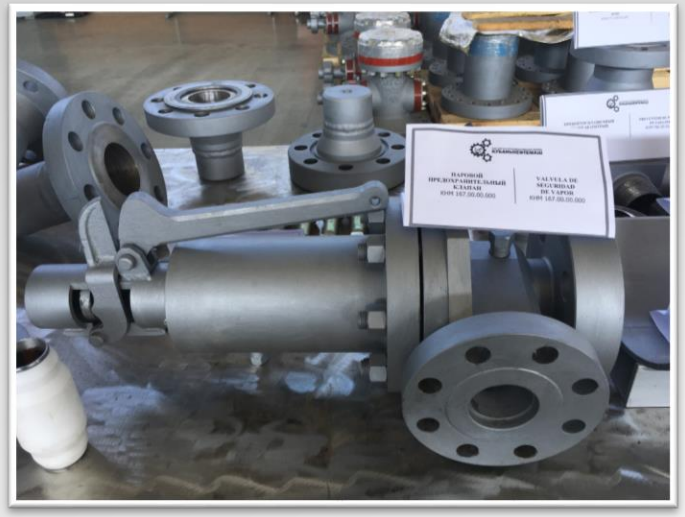
The steam pressure relief valve is designed for preventing potential pressure rise above the value allowed for the boiler operation of the steam generating plant. The valve is installed as a part of the steam generating plant connection piping. When the operating pressure is returned to normal, the valve is closed and equipment is operating normally. The valves is installed on a pipeline vertically, the cap on top. The safety valve design provides for the manual popping.

Operating fluid temperature Tmax is not exceeding 356°C

Operating pressure Pmax is not exceeding 17.7 MPa

ADVANTAGES:

- ✓ The valve operation in high temperature and high pressure environment is guaranteed.
- ✓ The leaks caused by thermal deformation are prevented.



HEAT-RESISTANT EQUIPMENT SYSTEM

RESEARCH & PRODUCTION COMPANI KUBANNEFTEMASH

PSK (WATER) PRESSURE RELIEF VALVE

The (water) pressure relief valve is designed for preventing potential water pressure rise above the value allowed for feed-water pump operation.

Its location is at the water outlet from the feed-water pump.

Operating fluid temperature Tmax is not exceeding 70°C
Operating pressure Pmax is not exceeding 20 MPa

ADVANTAGES:

- ✓ Guaranteed valve operation in high pressure environment
- ✓ Simple and reliable design, compact size

HEAT-RESISTANT EQUIPMENT SYSTEM

STEAM SHUT-OFF VALVE

The steam shut-off valve is designed for blocking the steam or water flow in the pipeline.

Operating fluid temperature is not exceeding 375°C

Operating pressure is not exceeding 25 MPa

Leakage Class: A

ADVANTAGES:

- ✓ **Guaranteed valve operation in high pressure environment**
- ✓ **Simple and reliable design**

HEAT-RESISTANT EQUIPMENT SYSTEM

HEAT-RESISTANT STEAM INJECTION X-MAS TREE

(INJECTION, RECOVERY, MULTI-PURPOSE, MONITORING, WITH TEMPERATURE COMPENSATOR)

Heat-resistant Xmas tree is either supplied separately or included in the heat-resistant equipment system intended for heat-transfer agent injection and/or for oil recovery by steam treatment of the formation.

Operating fluid temperature T_{max} is not exceeding 356°C

Operating pressure P_{max} is not exceeding 17.7 MPa.

Heat-resistant steam injection Xmas tree is also manufactured with a sealed lead-in, which is intended for entry of the underwater optical and electrical cables.

ADVANTAGES:

- ✓ Heat-resistant steam injection Xmas tree with temperature compensator ensures compensation for thermal expansion of the casing string during heat-transfer agent injection eliminating thereby any potential accidents.
- ✓ Multi-purpose heat-resistant steam injection Xmas tree makes it possible to reduce the scope of equipment to be purchased, to optimize transportation costs and to reduce the risk of equipment damage, while it is transported from well to well.

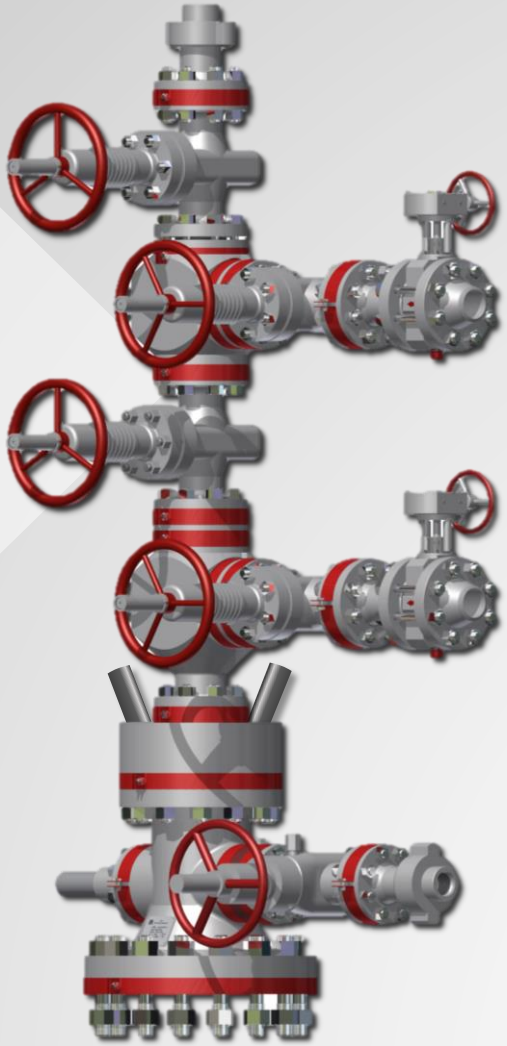
HEAT-RESISTANT EQUIPMENT SYSTEM

STEAM HEAT-RESISTANT X-MAS TREE FOR DUAL INJECTION

Steam heat-resistant Xmas tree for dual injection ensures wellhead sealing and the steam injection process control for dual injection in two reservoirs.
Operating fluid temperature Tmax is not exceeding 356°C
Operating pressure Pmax is not exceeding 17.7 MPa

ADVANTAGES:

- ✓ **It allows for dual injection of the heat-transfer agent in two reservoirs combined with the flow adjustment.**



HEAT-RESISTANT EQUIPMENT SYSTEM

SLIP CASING HEAD

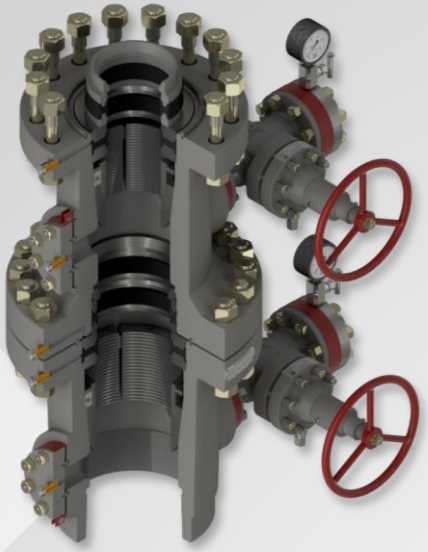
It is intended for casing string connection in order to suspend the casing, to separate the tubing/casing annulus, to control pressure in that annulus and to seal the tubing volume and the casing annulus of the wells.

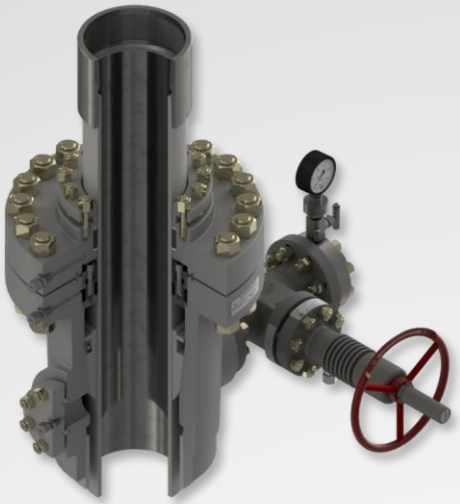
Key performance characteristics:

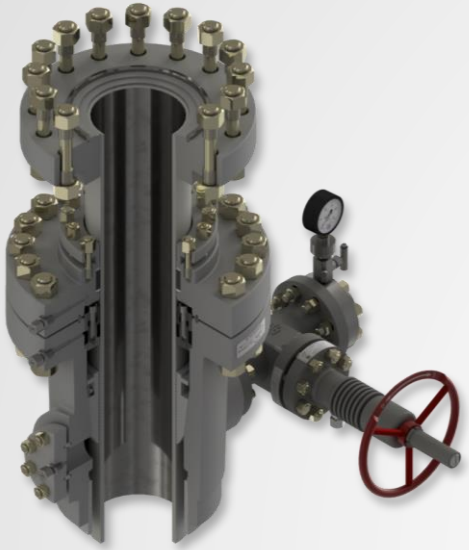
- Operating fluid is the fluid of oil and gas production wells;
- Possible design versions are subject to operating conditions as per GOST R 51365-99: non-corrosive, K1;
- Climate version is as per GOST 15150-69: KHL (cold climate);
- Operating fluid temperature Tmax is not exceeding +356°C;
- Operating pressure is not exceeding 21 MPa;
- Connection is flanged/collar type;
- Type of casing hanger is slip-type hanger;
- Type of threaded joint of the casing string is Buttress/OTTM, GOST 632-80.

ADVANTAGES:

- ✓ The slip casing head design can be customized with reference to the designed equipment to suit the operating conditions and with due consideration of the Customer's requirements.
- ✓ Casing string suspension
- ✓ Sealing and separation of the tubing-casing annulus
- ✓ Pressure control in the course of well drilling
- ✓ High manufacturing quality of this complex structure







HEAT-RESISTANT EQUIPMENT SYSTEM

PSHMT-62X21 HEAT-RESISTANT ROD-TYPE PREVENTER

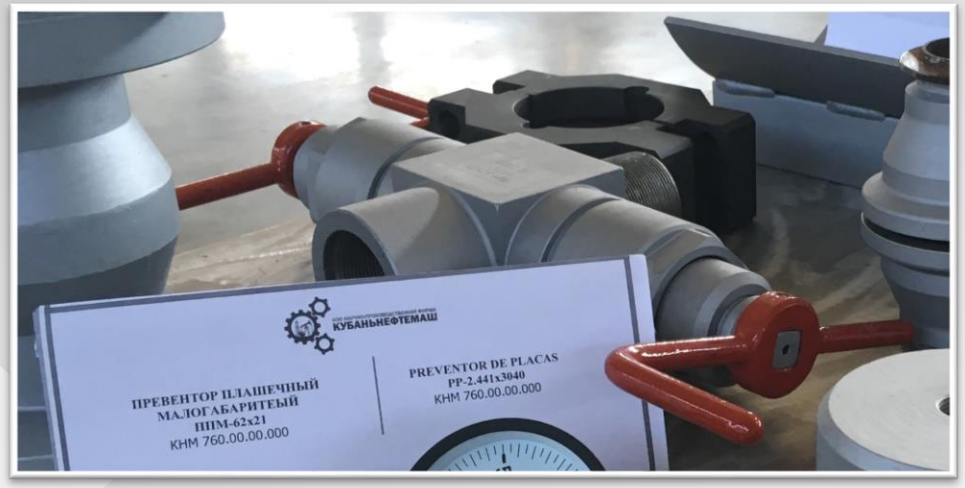
PSHMT-62X21 heat-resistant rod preventer is used in the function of the blowout preventer equipment with a view of sealing the wellheads of the oil and gas wells in the course of repair and geophysical operations in order to prevent and eliminate the shows of oil, gas and water and to ensure safety.

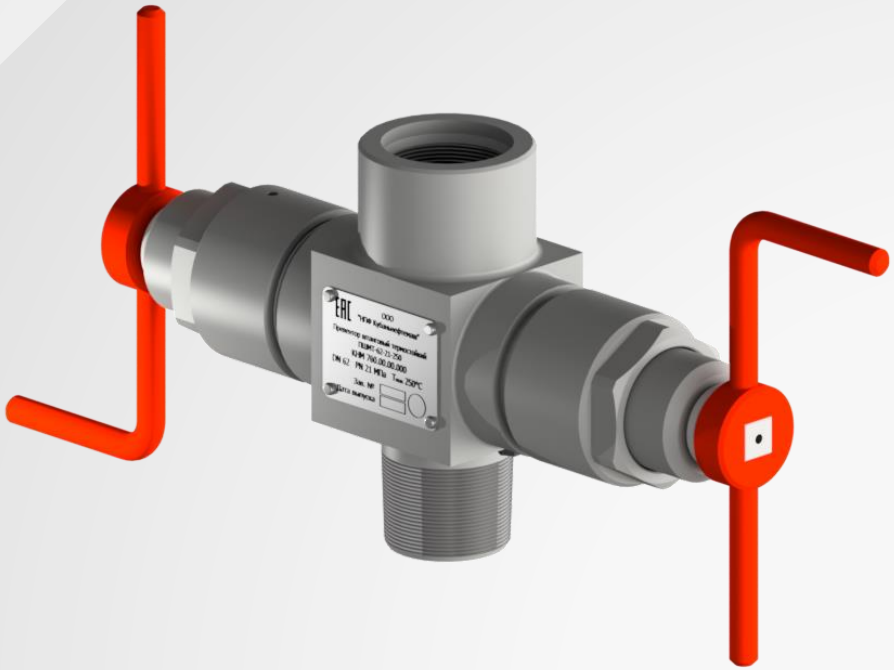
The ram actuator is: screw type, manual wheel actuated.

Operating fluid temperature is up tp +250°C
Operating pressure is not exceeding 21 MPa

ADVANTAGES:

- ✓ **The assured safety of the personnel**
- ✓ **Small overall dimensions**
- ✓ **Wide range of operating fluid temperatures**
- ✓ **It allows for sealing the tube channel of production tubing and for pressure control inside the tubing, when the sucker rod is run-in-hole and retrieved.**
- ✓ **The well can be quickly blocked manually by means of the wheels**
- ✓ **Protection of subsurface and environment**





HEAT-RESISTANT EQUIPMENT SYSTEM

HEAT-INSULATED DOWNHOLE TUBING

The multi-layer thermal insulated tubing production technology developed in NPF Kubanneftemash LLC is the most advanced to date allowing for production of high grade heat-insulated pipes.

The use of electron beam for the exhaust hole sealing is one-of-a-kind in Russia. Multi-layer thermal insulation technology allows for reduction of the thermal conductivity factor of the tubing down to 0.006 W/(m·K) at 350°C temperature inside the tubing.

The heat-insulated downhole tubing is included in the heat-resistant equipment system and is intended for equipping the steam injection and production wells with DN 114 mm or over nominal diameter operation string in the oil fields developed by thermal recovery methods.

It is used to prevent thawing and collapsing of permafrost soil around the borehole in the course of operation of the oil and gas fields.

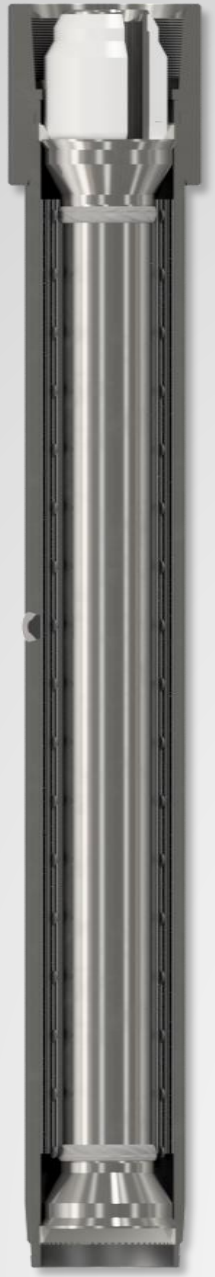
Outside diameters of heat-insulated tubing are from 73 mm to 168 mm.

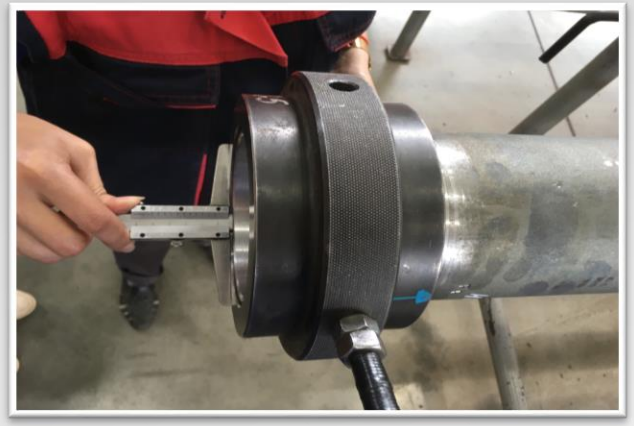
Coupling thread types are NKM as per GOST 633; Buttress as per GOST 34057; OTTG thread as per GOST 632.

Tubing parameters are selected based on individual Customer's requirements.

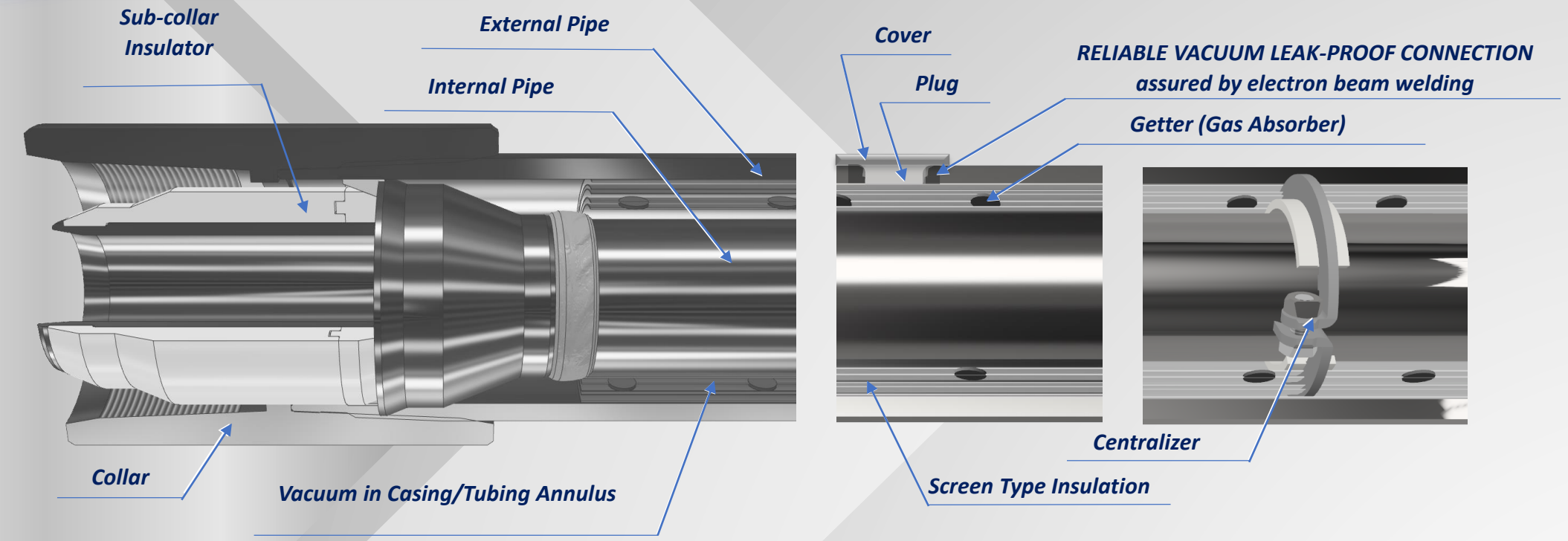
ADVANTAGES:

- ✓ Thermal energy is conserved while the heat-transfer agent is moving from the wellhead to bottom-hole.
- ✓ The set cement integrity of production string is maintained even in the wells, which are not prepared for heat-transfer agent injection.
- ✓ Hydrate formation and wax formation are prevented.
- ✓ The design can withstand repeated thermal cycling.
- ✓ Ecological balance is ensured in the oil and gas production area.

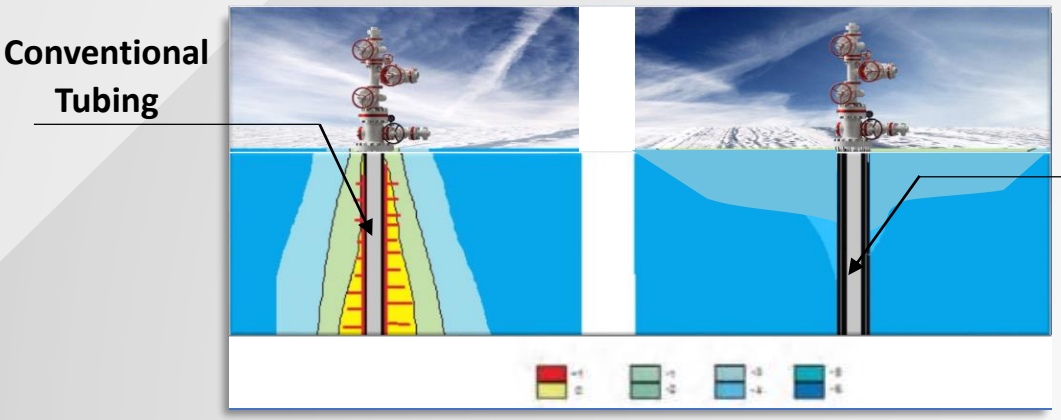




HEAT-RESISTANT EQUIPMENT SYSTEM



THE STATE-OF-THE-ART TECHNOLOGY OF MULTI-LAYER (SCREEN-VACUUM) THERMAL INSULATION OF TUBING WITH THERMAL CONDUCTIVITY FACTOR EQUAL TO 0.005 W/(M·K)



HEAT-RESISTANT EQUIPMENT SYSTEM

THERMAL PACKER

The thermal packer is intended for sealing the casing/tubing annulus in 114-178 mm nominal diameter casing string with large curvature sections, in the course of high-viscosity oil recovery by means of thermal recovery method with a view of casing (operational) string protection from exposure to high pressure and high temperature associated with the process of steam injection.

ADVANTAGES:

- ✓ **Casing string is reliably sealed.**
- ✓ **Thermal elongation of the string of heat-insulated tubing is compensated by the polished rod displacement relative to the stuffing box while its leak-tightness is preserved.**
- ✓ **The available rod extension in the form of flexible element allows for driving the directional sections of the wells.**
- ✓ **The polished rod rigidity is weakened.**
- ✓ **The length of the packer effective part is reduced.**

DESIGN AND TECHNOLOGY ARE COPYRIGHT PROTECTED:

RU 2482263 C2, May 20, 2013

HEAT-RESISTANT EQUIPMENT SYSTEM

HEAT-RESISTANT PACKER FOR DUAL INJECTION

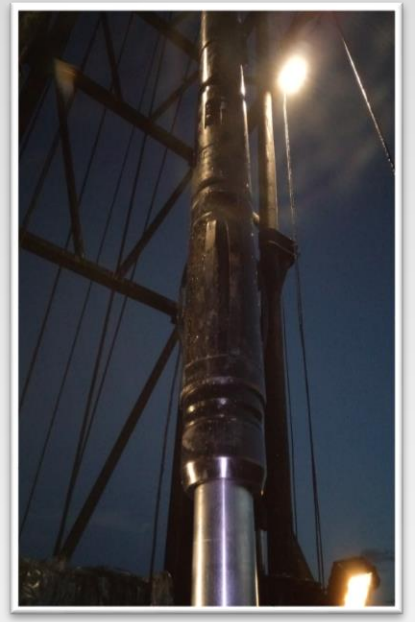
The heat-resistant packer for dual injection is intended for sealing the casing/tubing annulus, for reservoir pressure maintenance and for reliable separation between two formations in the casing string of 168 mm and 178 mm nominal diameter during high-viscosity oil recovery by means of thermal recovery methods in order to protect the casing (operation) string against exposure to high pressure and high temperature associated with the process of steam injection.

The packer is operated in vertical and directional wells.

The heat-transfer agent is dually injected in two producing horizons.

ADVANTAGES:

- ✓ Producing horizons are reliably separated.
- ✓ Thermal elongation of the heat-insulated tubing string is compensated by the polished rod relocation.
- ✓ The available flexible element representing the rod extension makes it possible to drive the directional sections of the wells.
- ✓ The length of the packer effective part is reduced.



HEAT-RESISTANT EQUIPMENT SYSTEM

PGT 219-16-345 HYDRAULIC THERMAL PACKER

Hydraulic thermal packer is intended for sealing the casing/tubing annulus of the casing string of DN 245 mm nominal diameter during high-viscosity oil recovery by means of thermal recovery methods. The main packer seal made of high-quality materials is designed to the pressure of 21 MPa at the temperature of 345°C.

The heat-transfer agent used:

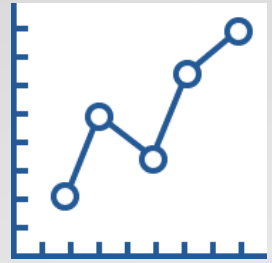
- **Hot water;**
- **High temperature steam.**

The packer used for injection of the heat-transfer agent (steam, hot water), in the course of oil recovery by thermal methods, shall be used in combination with the casing string temperature expansion compensator.

It is intended for vertical and directional wells.

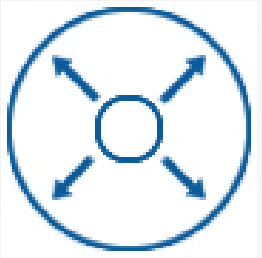
ADVANTAGES:

- ✓ **The ring with a ratchet gear maintains the seal tension.**
- ✓ **Prior to run-in-hole operations the packer retrieval force is field-adjustable.**
- ✓ **It withstands high axial loads.**



Maximum durability

High temperature steam up to 345°C



Strength

EQUIPMENT FOR SUCKER ROD PUMPING

RESEARCH & PRODUCTION COMPANI KUBANNEFTEMASH

OM steel support for RHAM insert pumps with the top mechanical mounting as per OST

Intended for installation and removal of RHAM pump

Pump Identification	Drawing Number	Threads	
		K1	K2
20-125-RHAM	31-60-32	TUBING 60 GOST 633	TUBING 60 GOST 633
25-175-RHAM	31-73-44	TUBING 73 GOST 633	TUBING 73 GOST 633

EQUIPMENT FOR SUCKER ROD PUMPING

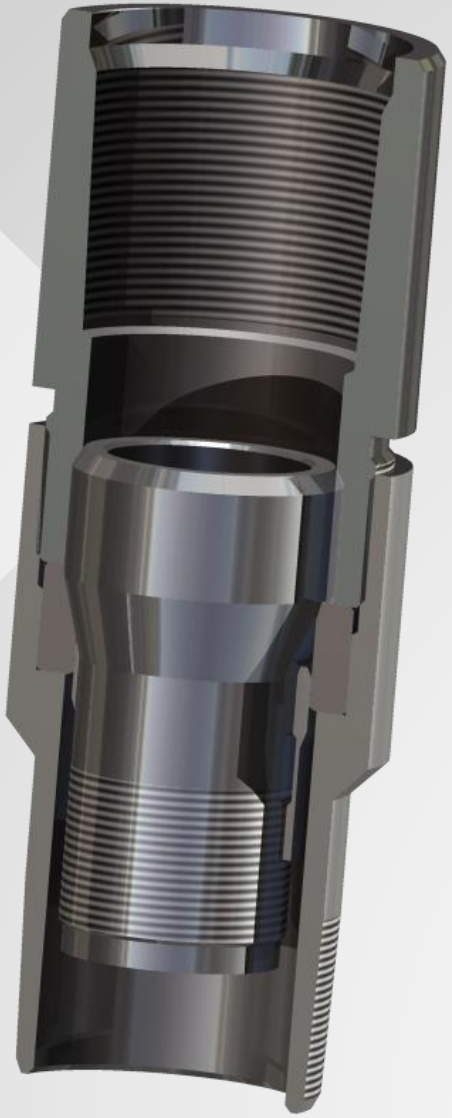
RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH

31-60-32 LOCKING SHOE

For installation and removal of the insert oil-well pump.

ADVANTAGES:

- ✓ **The insert oil well pump fixing reliability is improved.**
- ✓ **Leak-tightness (isolation) between production string cavity and the well cavity is assured.**
- ✓ **It allows for increasing the inner diameter of the cylinder and reducing the friction.**



EQUIPMENT FOR SUCKER ROD PUMPING

RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH

YAP 114-73-15, YAP 114-73-30, YAP 114-73-45 SAND ANCHOR

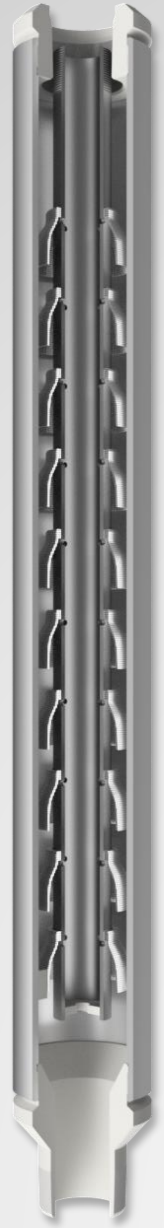
The sand anchor is intended to isolate coarse sand grains from the oil flow, while the sucker rod pump is operating. It is installed under packer below the pump level.

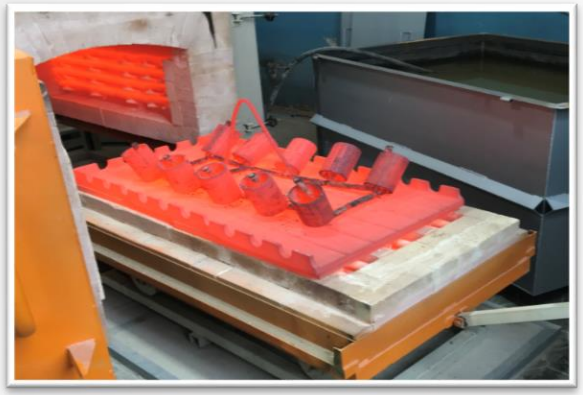
The anchor is operated on the principles of gravity settling of the solids in the upward flow of fluid. Due to low speed of the fluid flowing in the sand anchor cups, the sand is separated and falls down in the hopper made up of the tubing with plugged lower end, which is installed under the anchor.

The sand anchor is not serviceable during well operation.

ADVANTAGES:

- ✓ Low friction operation pattern
- ✓ Increased production rate of the well owing to higher volumetric efficiency of the pump
- ✓ Long operation period with no sand entering the pump
- ✓ Several sections can be interconnected
- ✓ High operational reliability and efficiency





TASK:
SAND CONTROL AND BRIDGING CONTROL

SOLUTION:
USING ANCHORS BY NPF KUBANNEFTEMASH

RESULT:
BRIDGING IS PREVENTED

EQUIPMENT FOR SUCKER ROD PUMPING

RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH

YAG 114-73-10 GAS ANCHOR

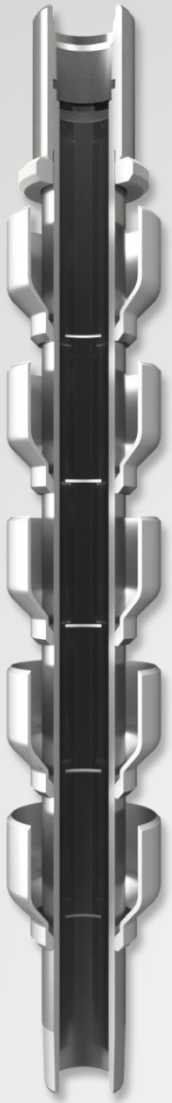
Gas anchor is intended for efficient separation of associated gas in the course of sucker rod pumping operation of wells, subject to production string diameter. It is ntended for washing out gravel residues from the filter assembly.

It is installed as a part of production string, below the suction valve of the sucker rod pumping unit.

Gas separation takes place in the anchor cups; at the same time gas is returned in the annulus, while the fluid moves up the central tube to the intake of the pump.

The anchor is installed directly under the pump. When the flow rate of the well exceeds production rate of one section, the appropriate number of sections can be connected accordingly. Plug the lower section from the bottom.

The gas anchor is not serviceable during the well operation.

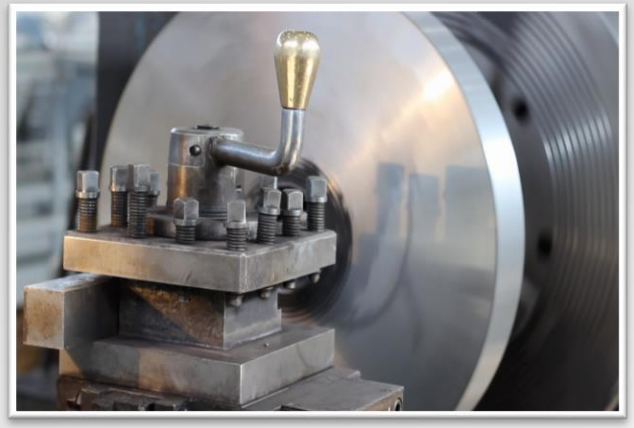


ADVANTAGES:

- ✓ Efficient operation is ensured at the gas/oil ratio.
- ✓ Efficient separation of associated gas during well operation by sucker rod pumping.
- ✓ Several sections can be interconnected.
- ✓ High operational reliability and efficiency

DESIGN AND TECHNOLOGY ARE COPYRIGHT PROTECTED:
RU 2269649 C2, Feb. 10, 2006

TASK:	SOLUTION:	RESULT:
GAS SHOW CONTROL	USING ANCHORS BY NPF KUBANNEFTEMASH	PUMP FAILURE IS PREVENTED



EQUIPMENT FOR SUCKER ROD PUMPING

YAGP 114-73-15, YAGP 114-73-30, YAGP 114-73-45
GAS-SAND INSERT ANCHOR

Gas-sand insert anchor is intended for efficient separation of associated gas and mechanical impurities in the course of sucker rod pumping operation of wells. It is installed as a part of production string, below the suction valve of the sucker rod pumping unit.

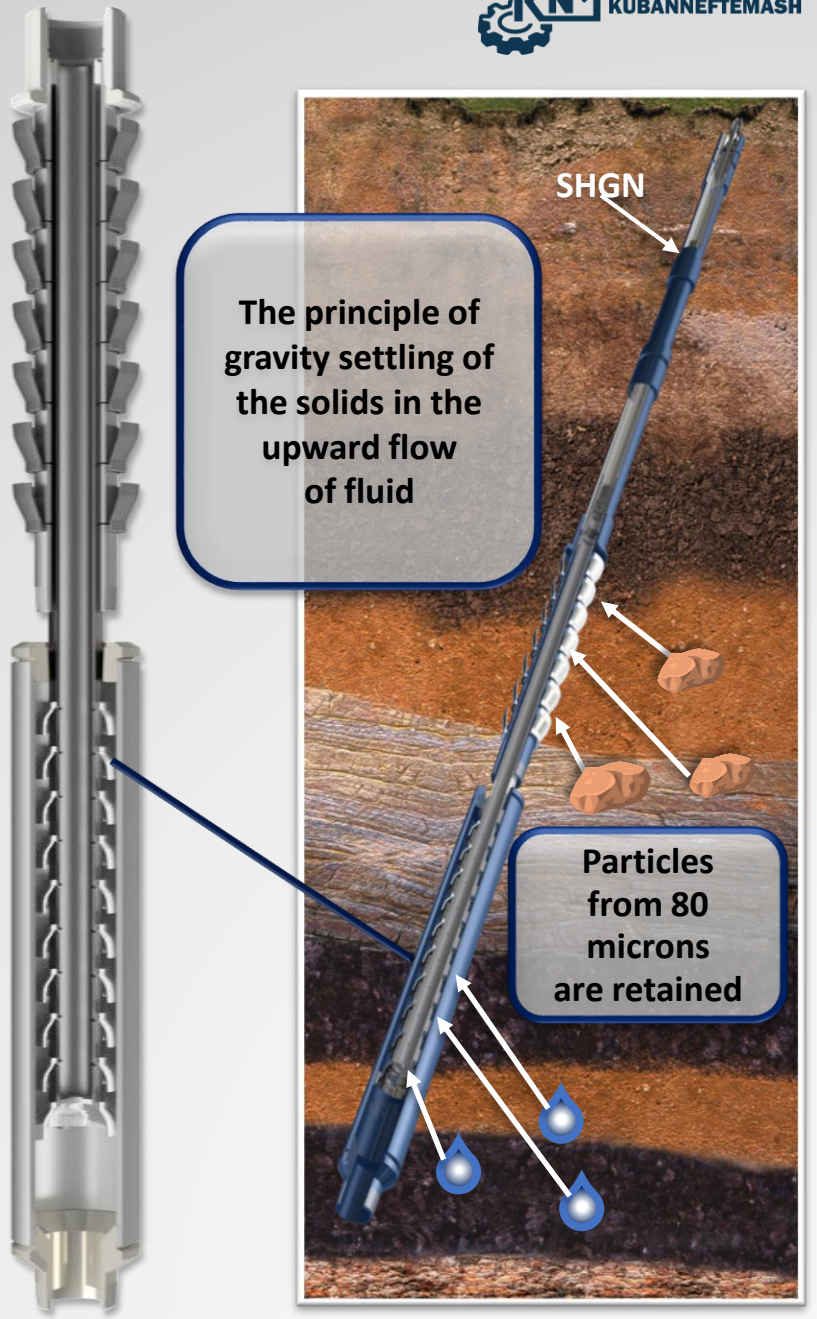
Gas separation occurs in the gas part cups of the gas-sand anchor; at the same time gas is returned in the annulus, while fluid enters the sand part of the gas-sand anchor. Due to low speed of the fluid in the sand part of the anchor cups, the sand is separated and falls down in the hopper made up of the tubing with plugged lower end, which is installed under the anchor. This operation pattern is characterized by low friction and it assures long operation period with no sand entering the pump.

For under 15 m3/day production YAGP 114-73-15 gas-sand insert anchor shall be installed. For up to 30 m3/day production YAGP-114-73-30 gas-sand insert anchor shall be installed. For up to 45 m3/day YAGP-114-73-45 gas-sand insert anchor shall be installed.

The gas-sand insert anchor is not serviceable during well operation.

ADVANTAGES:

- ✓ Production rate of the well is increased owing to increased volumetric efficiency of the pump.
- ✓ It makes it possible to increase accumulated running time of the pump by seven times.
- ✓ Gas factor in the recovered oil is reduced
- ✓ Several sections can be interconnected
- ✓ High operational reliability and efficiency



EQUIPMENT FOR SUCKER ROD PUMPING

RESEARCH & PRODUCTION COMPANY KUBANNEFTEMASH

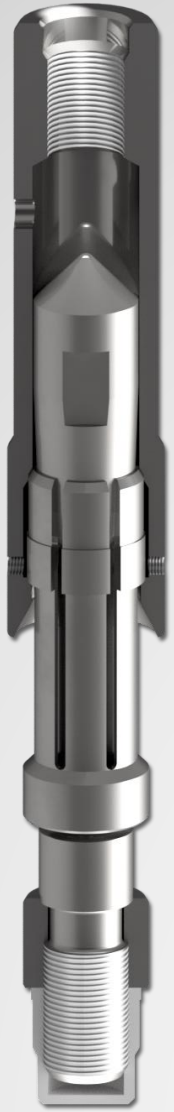
Automatic coupling device 165

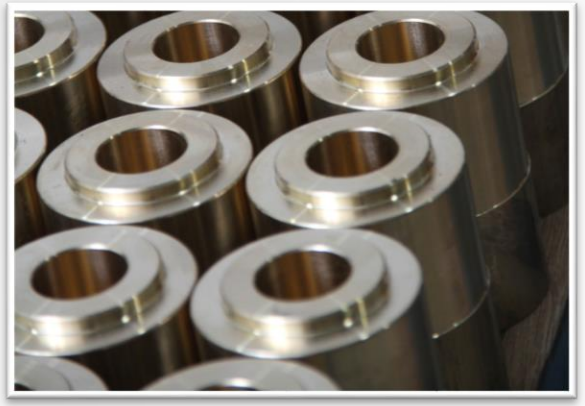
The automatic coupling device is intended for automatic engagement of sucker rod strings and plunger rod of non-inserted sucker rod pump, after the pump and plunger assembly runs in the well. The automatic coupling device is used as equipment in the course of sucker rod pumping operation of oil wells equipped with non-inserted sucker rod pumps.

The use of automatic coupling device allows run-in-hole of the non-inserted sucker rod pumps and plunger assembly. Geometrical dimensions of the liner and the collar of the automatic coupling device are selected in such a way that the liner would get in the collar irrespective of their potential mutual arrangement inside the tubing. At the reverse running of the rods up the string the inner taper surface of the rod engages the taper surface of the liner. At the same time the collet pads are locking between the collar and the liner both, during downward and upward movement. The pump plunger and the sucker rod string engage.

ADVANTAGES:

- ✓ The automatic coupling device malfunction factor is excluded.
- ✓ No special skills are needed to disassembly the automatic coupling device and remove the collet in a simple convenient way by the disassembly tool provided; damage and breaking of the collet pads pressed out from automatic coupling deviced are excluded.
- ✓ Since the collet is located inside the coupling, the damage to the collet pads is excluded, when it moves inside the tubing.
- ✓ Clogging of the collet with mechanical impurities is excluded.





EQUIPMENT FOR UNDERGROUND GAS STORAGE

PPKH DOUBLE PACKER WITH ROTARY DRIVE

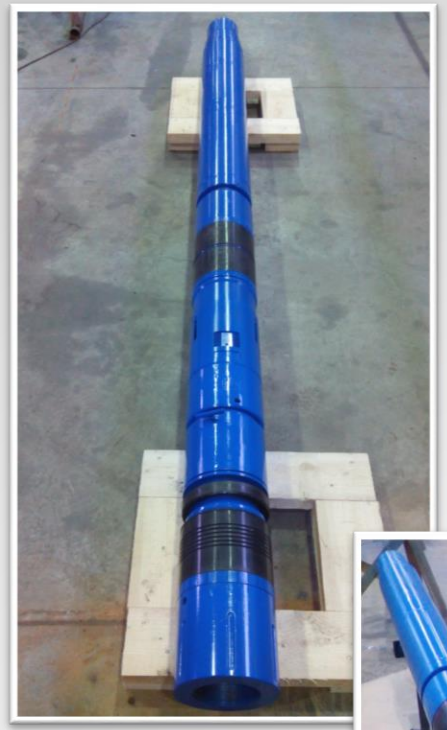
It is intended for sealing the casing/tubing annulus above the sand filter if installed in the gas wells and oil wells of the oil and gas fields and in the underground gas storage facilities, in vertical and directional wells.

Integrated packer control: the packer is seated by means of rotation to the right with the axial movement, while there is no axial load applied to the tool.

Deinstallation (packer removal) and disconnection from the filter assembly is performed by rotation to the left, when the packer is removed during subsequent repair of well.
Nominal bore of the casing (operational) strings, mm: 140x6.2; 146; 168; 245.

ADVANTAGES:

- ✓ The increased operational reliability and efficiency of well operation is ensured.
- ✓ Leak-tight joint with filter assembly is excluding spontaneous disconnection and travelling along production string in the course of well operation.
- ✓ Production string and packer are leak-tight connected by the operational adapter.
- ✓ Pressure can be maintained in both directions.
- ✓ Integrated control of the packer



SAND CONTROL EQUIPMENT

PZFM GRAVEL-PACK PACKER

It is intended for casing/tubing annulus separation. It is used in conjunction with sand control equipment in order to maintain the gravel, when the gravel bottom-hole filters are constructed in the oil and gas production wells: both in the wells with 168 mm casing strings and in the uncased wells. It is used in production wells of the oil and gas fields.

The packer is seated by means of production string weight transfer over the bayonet to expanding taper, while the packing assembly is deformed till it contacts the wall of production string.

It is required to hold packer by collar, while it is screwed up with the tool. The packer screwed to the tool is lowered till the thread of the catcher-collar bumps in the thread of the left disconnector.

Nominal diameters of the casing (operational) strings, mm: 140; 146; 168.

ADVANTAGES:

- ✓ High level reliability
- ✓ Seated without rotation
- ✓ Mechanical packer is a repairable, single-function product.

SAND CONTROL EQUIPMENT

RESEARCH & PRODUCTION COMPANI KUBANNEFTEMASH

KTSP-118-73 CIRCULATION VALVE

Circulation valve is used as a part of downhole equipment in the course of field development, well killing, flushing and operation from the tubing volume in case there is a stopped pump installed below circulation valve.

It allows both blocking connectivity between the tubing annulus and casing annulus, and creating it repeatedly over and over again. KTSP-73 circulation valve is open when overpressure is delivered into the tubing annulus allowing fluid to flow from the tubing annulus into the tubing.

KTSP-118x73 full-bore circulation valve is a unitary assembly, which is completely ready for use and can be adjusted and configured.

ADVANTAGES:

- ✓ It allows for arranging the interconnection in a most simple way between the annulus and the inner cavity of the tubing.
- ✓ The opening pressure is adjustable.
- ✓ High operational reliability

SAND CONTROL EQUIPMENT

VALVE SHOE

INTENDED USE:

- Directing downhole equipment (filter assembly) during run-in-hole; drilling in the equipment (filter assembly).
- Creating support for the downhole equipment (filter assembly) at the bottom-hole of the well.
- Preventing bottom-hole equipment from turning, when the string (drilling pipe or tubing string) is rotating, while disconnector is detached from bottom-hole equipment and packer is connected to the bottom-hole equipment.
- Providing the sand plug washout at the bottom-hole of the well, when circulation fluid is supplied through circulation port of the shoe

ADVANTAGES:

- ✓ Combined element of the casing string equipment
- ✓ Preventing the sand from entering the inner cavity of the bottom-hole equipment during operation.
- ✓ Facilitating run-in-hole of equipment

DRILLING AND WORKOVER EQUIPMENT

RGM-138/280 HYDRO-MECHANICAL REAMER

It is intended for expanding the open hole of the well up to Ø280 mm at the downward motion in any borehole interval.

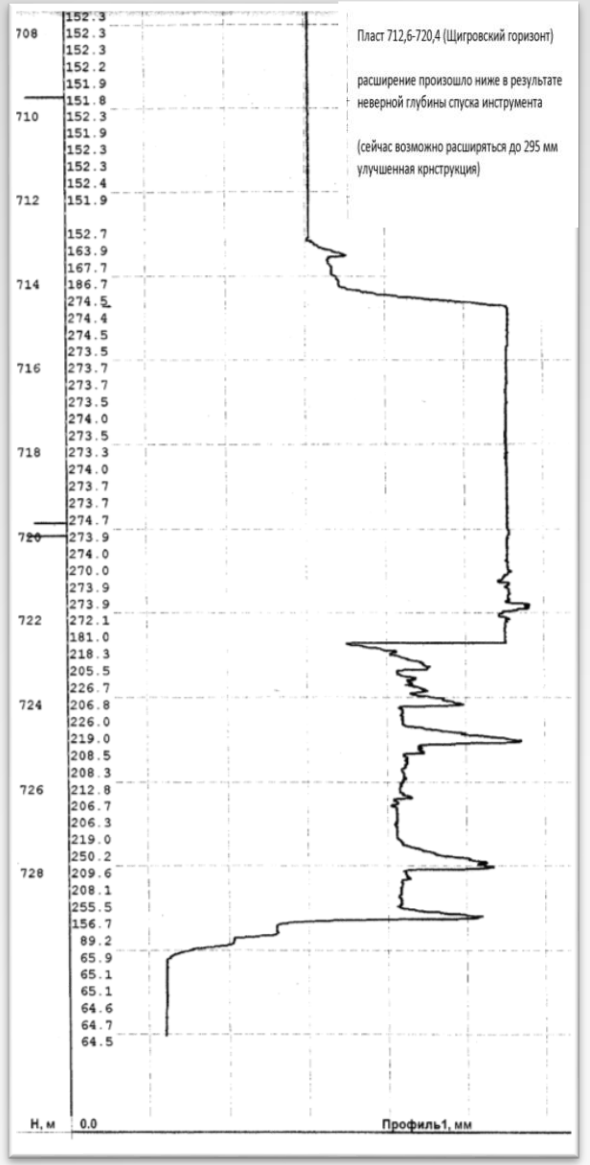
The blades of expander are brought in operating position by means of a rod driven by the flow of fluid injected by the mud pump.

During expansion the blades remain extended under overpressure in operating chamber.

The blade accessories are flushed and cooled by the flow of fluid through replaceable nozzle.

ADVANTAGES:

- ✓ **High operational reliability**
- ✓ **Stable and balanced design**
- ✓ **Borehole diameter can be doubled if compared with the initial diameter.**
- ✓ **Alignment of expanded borehole with the initial one**



DRILLING AND WORKOVER EQUIPMENT

UV 139, UV 168 CUTTING TOOL

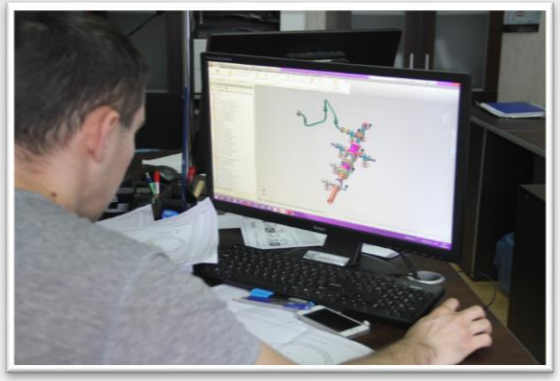
It is intended for milling out a casing string section in any borehole interval for subsequent side track drilling, and for cutting off pipes.

The tool contains extendable cutters, extending when the drilling mud is pumped. When the tool is rotating and is driven downward, the cutters cut through the casing wall and extend till they bump into the stopper, while the cylindrical part of the lock goes out of the housing. Cutting of the casing string is continued, while the tool is uniformly driven downwards.

When the cutters are lifted off the bottom-hole and the circulation fluid supply stops, the spring returns the piston with a pusher to their original position; at the same time the cutters get free and take the run-in position.

ADVANTAGES:

- ✓ **High operational reliability**
- ✓ **Blades are easily replaceable at the drill site.**
- ✓ **A set of centralizers is available for various casing pipe wall thickness.**



DRILLING AND WORKOVER EQUIPMENT

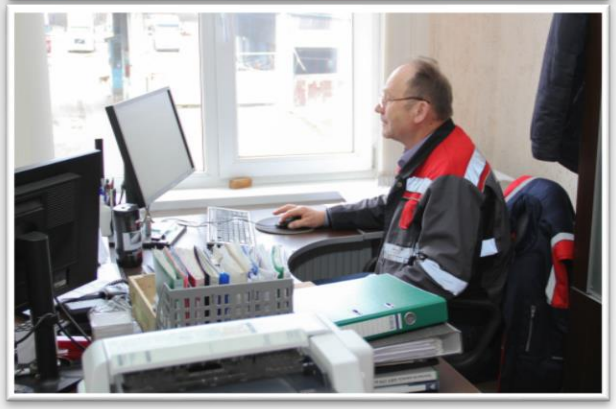
UVS-140 VIBRATORY DOWNHOLE HAMMER

It is intended for recovery operations in order to retrieve the filters stuck in bulk material during workover of well.

UVS-140 hammer generates mechanical vibrations in the retrievable filter under the impact of fluid supplied in the filter, creating fluidized state of the holding rock. When the captured filter loses connection with the gravel-sand cushion, it can be completely removed by means of a drilling rig.

ADVANTAGES:

- ✓ **High level operational reliability and efficiency**
- ✓ **It allows for shortening the workover period and reducing the cost of the workover operations.**
- ✓ **Stable and trouble-free operation of the tool is ensured by the reliable alignment of the outlet valve.**
- ✓ **The loose material, which is washed out of the stuck-zone, is prevented from entering the through channel.**
- ✓ **Increased operational reliability of the spring-loaded intake valve**
- ✓ **The operating fluid pressure can be varied in order to assure the hammer operation in a wide range of frequency.**
- ✓ **There is no resistance, when the piston is moving upward, and the impact force is damped.**



SERVICES

RESEARCH & PRODUCTION COMPANI KUBANNEFTEMASH

METAL WORKING:
- ✓ Lathe work;
- ✓ Milling work.

METAL COATINGS:
- ✓ Chrome plating;
- ✓ Phosphatizing.

PRODUCTION OF INDUSTRIAL RUBBER GOODS AND PRESS MOULDS:
- ✓ Production according to Customer's drawings and Technical Assignment;
- ✓ Engineering.

HEAT TREATMENT

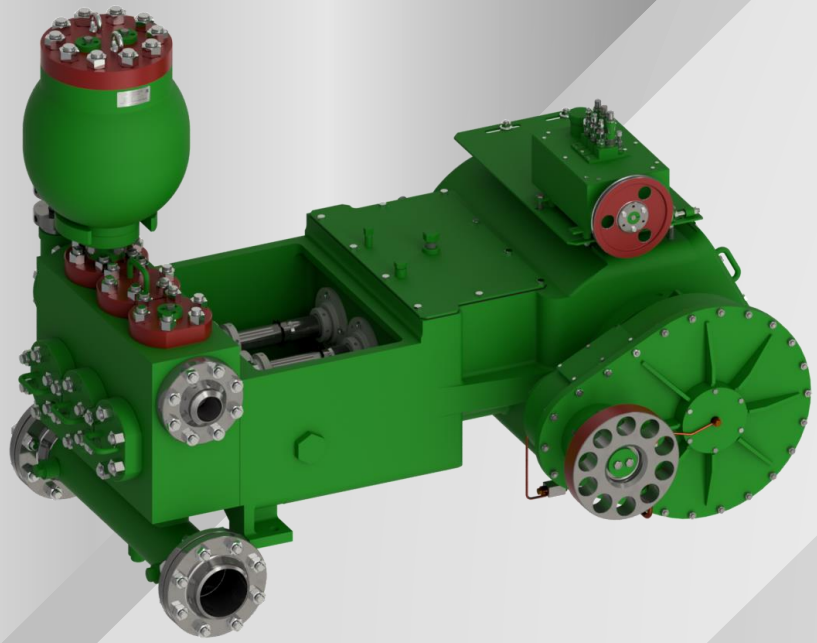
PLUNGER PUMP REPAIR AND RUN ON

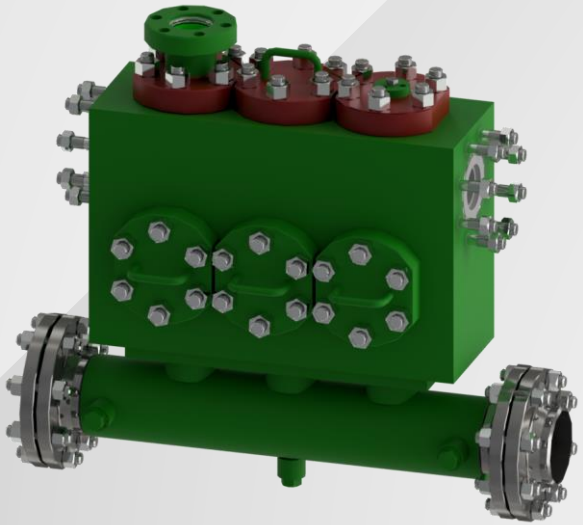
NON-DESTRUCTIVE TESTING LABORATORY SERVICES:
- ✓ UT;
- ✓ Tensile tests;
- ✓ Impact tests;
- ✓ Chemical composition analysis of steel;
- ✓ Metallographic studies;
- ✓ Metal and rubber hardness test;
- ✓ Visual inspection;
- ✓ Dye-penetrant method;
- ✓ Leak-tightness control.

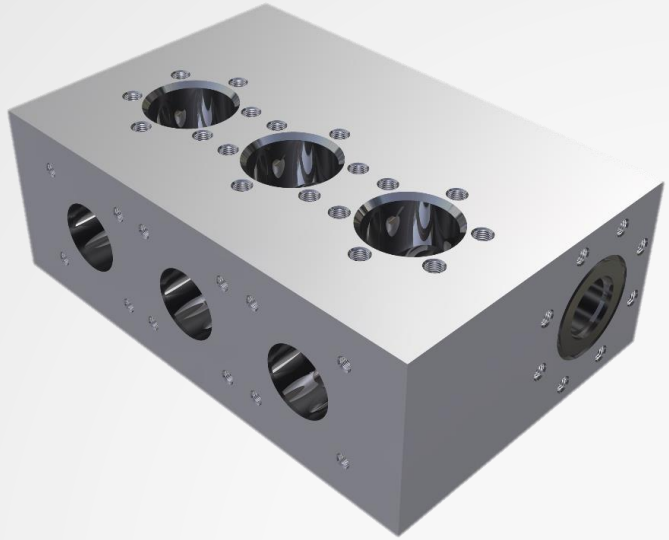
SERVICES

PLUNGER PUMP REPAIR AND RUN ON

NPF Kubanneftemash LLC performs repairs and run on of the triplex plunger ANT pumps.



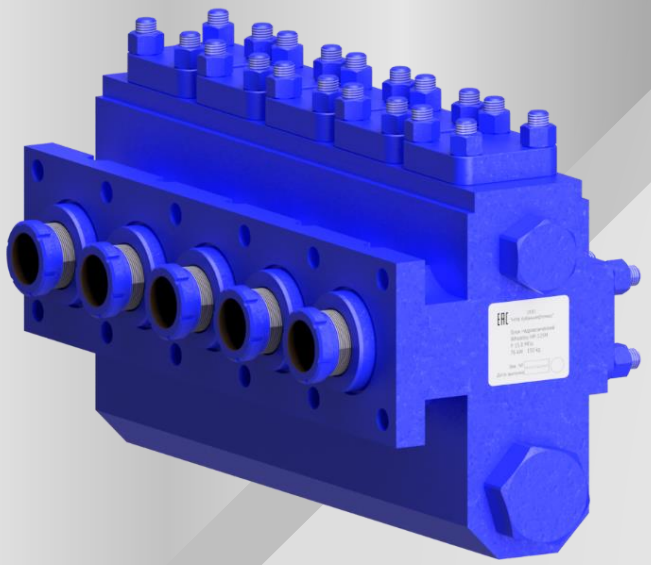


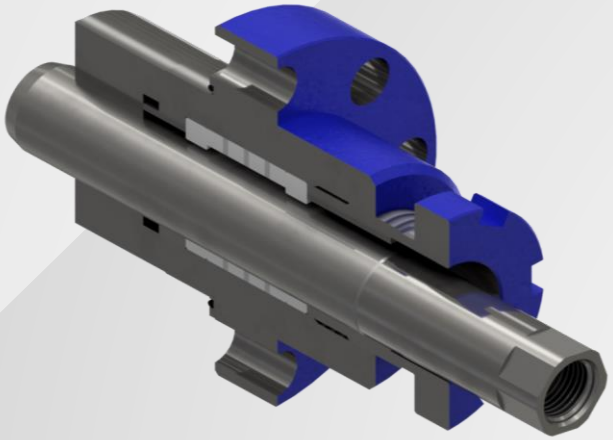


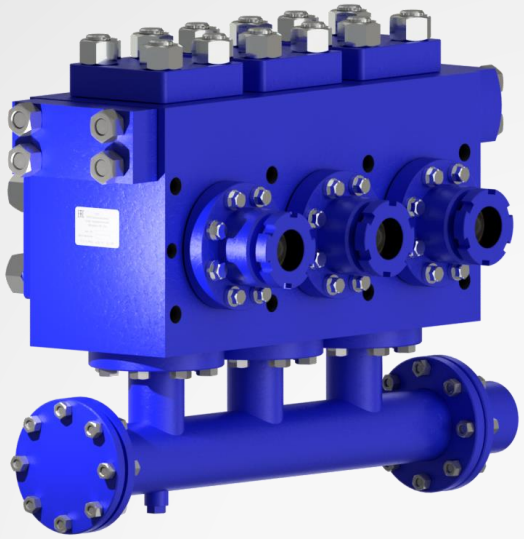
SERVICES

SPARE PARTS OF PLUNGER PUMPS

NPF Kubanneftemash LLC manufactures the import-substituting spare parts for motor-driven Wheatley feed water pumps and the spare parts for motor-driven ANT 150, ANT 370 triplex plunger pumping units.







NDT LABORATORY SERVICES

RESEARCH & PRODUCTION COMPANI KUBANNEFTEMASH

Laboratory test	Equipment	Description of test
Ultrasonic Testing	Ultrasonic testing equipment UDZ-304VD	Non-destructive testing of products for such defects as discontinuity and lack of uniformity of materials, finished products, semi-finished products and welded (soldered) joints.
Stress Rupture Test	Stress rupture test machine MR-500	Control of relative elongation σ_{τ}, $\sigma_{\in}$, of metal specimens, including reinforced steel, rolled sheets and round steel bars, welded joints, at normal temperature.
Impact Test	Pendulum impact tester IO-5003-0.3	Control of potential energy absorbed by fractured specimens supported on both ends during bending impact strength test at normal temperature.
Chemical Composition Analysis of Steel	Spectrometer FOUNDRY-MASTER	Test to determine basic and additional elements in metals and alloys
Metallographic Studies	METAM AV-41 Metallographic microscope	Micro-structure analysis of metals, alloys and other opaque objects in reflected light in bright field, illuminated directly and obliquely, in dark field, in polarized light and by differential interference contrast method.
Metal and Rubber Hardness Test	TR-5006.-02 Rockwell Hardness Tester TSH-2M Brinell Hardness Tester NOVOTEST T Vickers Hardness Tester Shore Hardness Tester 2033TIR SHORE A. Hardness Tester	Rockwell, Brinell, Vickers Metal Hardness Test. Shore Rubber Hardness Test.
Visual (VIC)	TKA-PKM Luxometer Base VIC kit	Non-destructive testing by visual and instrument control method.
Dye Penetration Test Method	Sherwin DP-55 Penetrant Sherwin DR-60 Cleaner Sherwin D-100 Developer	This type of test allows for detecting the following exposed defects: cracks, pores, holes, lack of penetration, inter-crystalline corrosion and other discontinuities.
Leak-tightness Control	Leak test plant NDT Expert	The main types of facilities to be inspected are tanks, boilers, steel and plastic pipelines, fuel tanks, liners and other one-sided access facilities.

INNOVATIONS

HEAT-INSULATED OIL PIPELINE
(with screen-vacuum (multi-layer) thermal insulation)

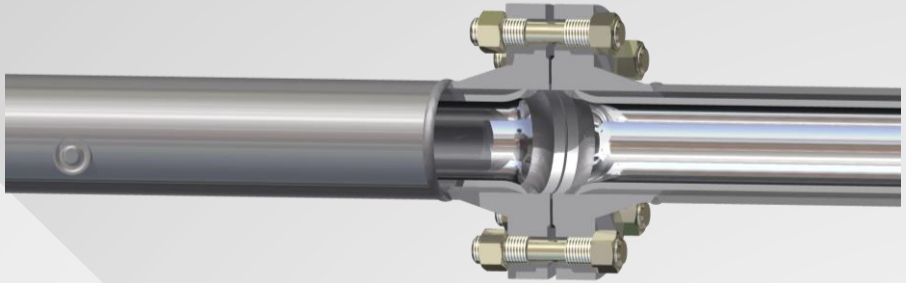
The same production technology was used for the heat-insulated oil pipeline manufacture, which is used by NPF Kubanneftemash LLC for the heat-insulated tubing manufacture.

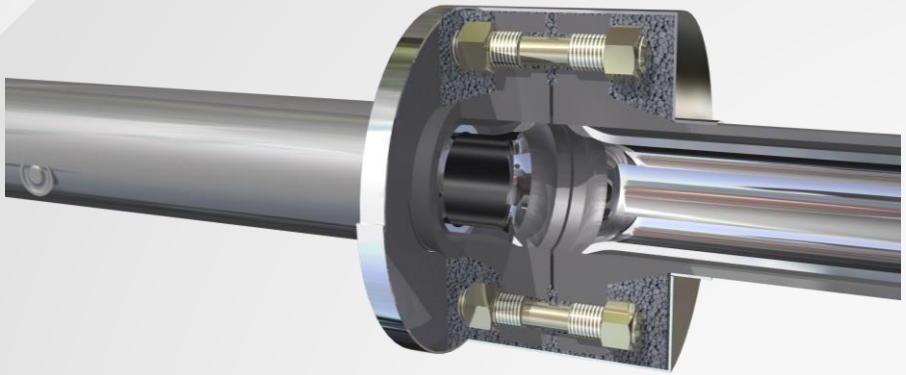
Connection is flanged type as per GOST 33259.

The oil pipeline parameters are selected with due consideration of the Customer's individual requirements.

ADVANTAGES:

- ✓ Compact overall dimensions
- ✓ There is no casing on the pipe.
- ✓ The operation safety is ensured by reducing the surface temperature down to rated one as per SP 61.13330.2012 Code of practice.
- ✓ The design withstands repeated thermal cycling.





INNOVATIONS

2M HEAT-INSULATED TUBING INTENDED FOR OIL MINING

The heat-insulated tubing is included in the heat-resistant equipment system and is intended for the thermal energy conservation, while the heat-transfer agent is moving from wellhead to bottom-hole. Thermal conductivity factor of the tubing is 0.006 W/(m·K) at 350°C temperature inside the tubing.

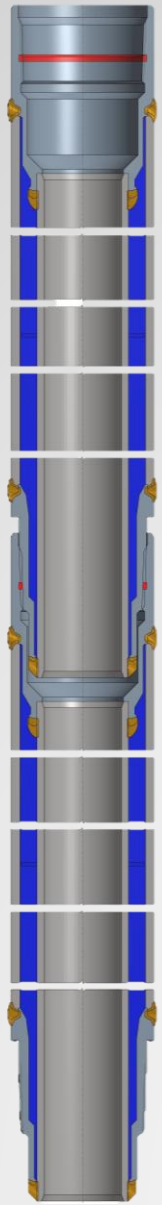
2 m long tubes are used in the following wells:

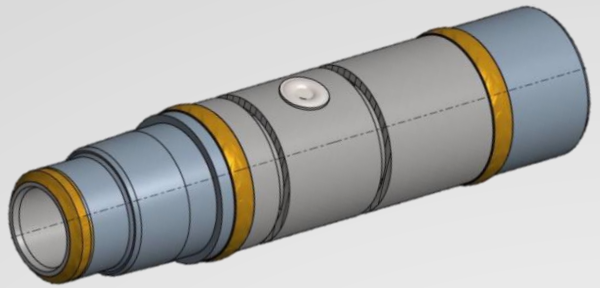
- ✓ **Steam supplying wells**
- ✓ **Steam injecting wells**
- ✓ **Production wells**

Tubing parameters are individually selected subject to the Customer's requirements.

ADVANTAGES:

- ✓ **Preventing destruction of the set cement in the well**
- ✓ **Preserving ecological balance and preventing the air heating in the mine**
- ✓ **Reduced specific steam consumption**
- ✓ **Wide thermal influence based on temperature maintenance of the injected heat-transfer agent**
- ✓ **Increased efficiency of the thermal-mining oil field development**
- ✓ **High oil recovery of the reservoir based on practical use of this heat-insulated tubing**





INNOVATIONS

THERMAL PACKER WITH A SWITCH OF FLOWS

PTK3Kpp (⌀ 168 mm string), PTK4Kpp (⌀ 178 mm string)

Thermal packer with a switch of flows is intended for sealing the casing/tubing annulus in the casing string with a possibility to connect and separate the casing/well bore annulus above and under the packer.

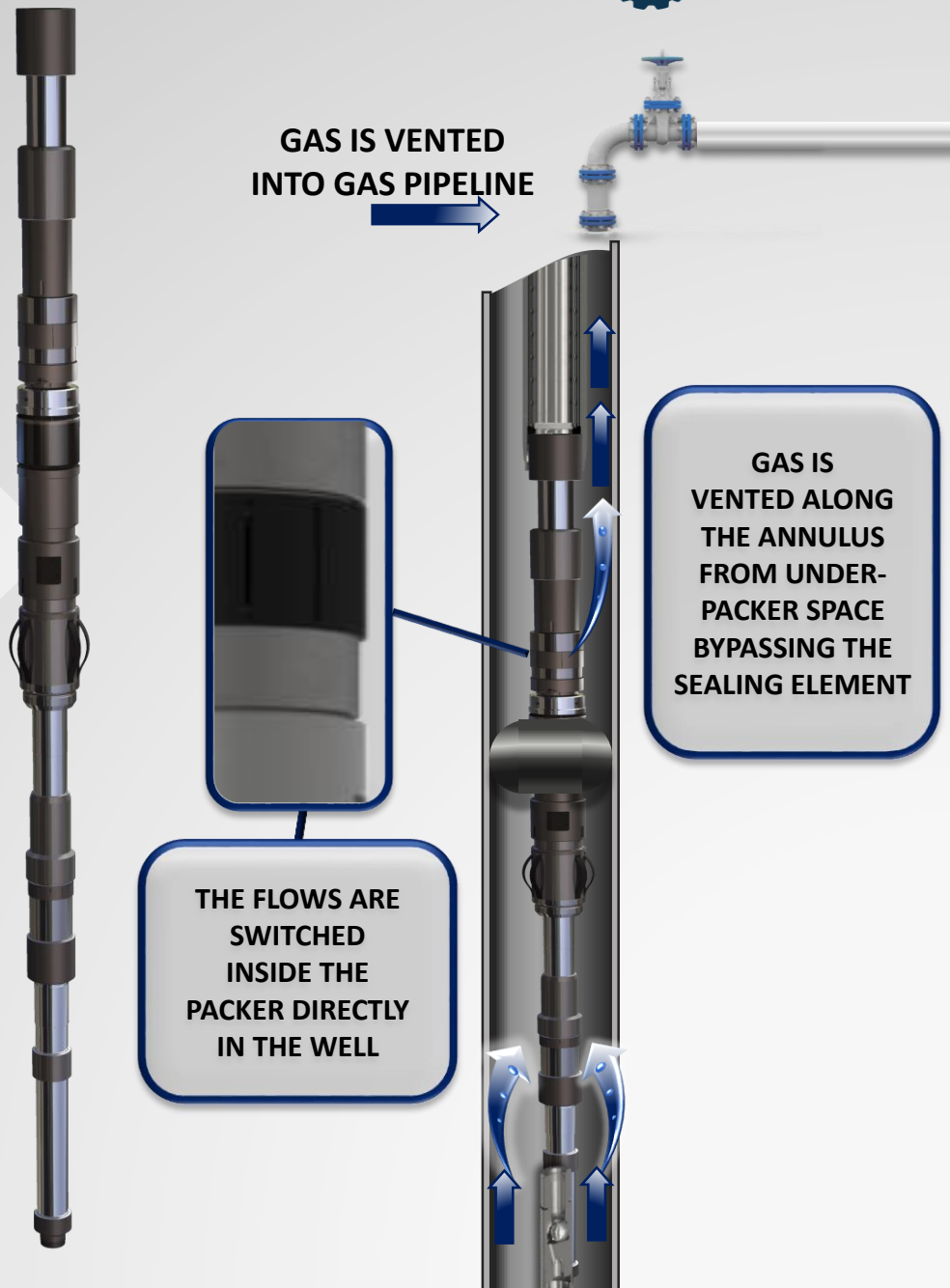
The packer is operated based on mechanical principle.
At the Customer's request it is possible to design a packer with hydraulic flow switch.
Operating fluid temperature Tmax is not exceeding 356°C
Operating pressure Pmax is not exceeding 17.7 MPa

ADVANTAGES:

- ✓ **In the course of oil recovery the gas from under the packer space can be vented along the annulus.**
- ✓ **The casing string leak-tightness during long-term operation is highly reliable.**
- ✓ **Connecting channel between the spaces above and under the packer can be flushed in the course of oil recovery, without the need to retrieve the equipment.**
- ✓ **Mode switching (steam injection / oil production) is possible without retrieval from the well and without any additional accessories.**

DESIGN AND TECHNOLOGY ARE COPYRIGHT PROTECTED:

Application: 2021125451, Aug. 30, 2021.



INNOVATIONS

PG HYDRAULIC PACKER FOR Ø178 MM CASING STRING.

Hydraulic packer is designed for operation in the presence of high hydrogen sulfide and carbon dioxide concentrations in extracted products (corrosion-resistant version is K3, CO_2 and H_2S are up to 25% as per GOST 13846). It is intended for sealing the casing/tubing annulus of the casing string of DN 178 mm nominal diameter.

It is intended for vertical and directional wells.

The maximum pressure is 51 MPa.

The maximum temperature is 120°C.

Packer length is 2,000 mm.

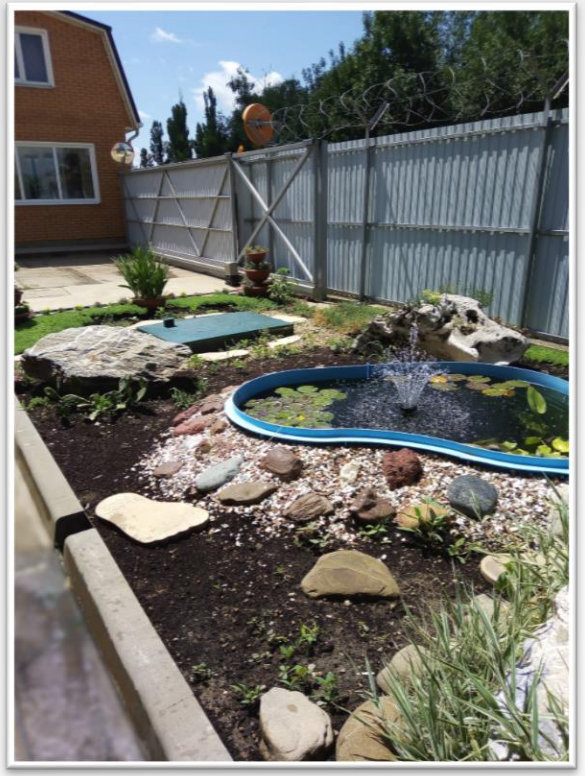
The outside diameter of the packer is 145-150 mm.

The inner diameter of the packer is 59 mm.

Coupling threads:

- **Top is NKT89V tubing collar, GOST 633-80**
- **Bottom is NKT89V nipple GOST 633-80**

***Optionally equipped with a compensator.**



INNOVATIONS

WELLHEAD STUFFING BOX WITH SELF-ALIGNING HEAD

The wellhead stuffing box is used to seal the polished rod in the wellhead assembly.

The wellhead stuffing box with self-aligning head consists of the wellhead stuffing box and the self-aligning head. The wellhead stuffing box is fitted with two seals, the top and bottom seals. The top seal is used for stuffing box packing along the polished rod during sucker rod pumping unit operation and it represents operating seal. The bottom seal enables the top seal replacement without killing the well. The top and bottom seal consists of reinforced chevron rings.

The self-aligning head represents a sliding support of the stuffing box and compensates the polished rod displacement from the axis of wellhead assembly during the sucker rod pumping unit operation. The stuffing box self-adjustment along the polished rod allows for the reduced collar wear and the increased service life of the wellhead stuffing box.

Operating pressure is 4 MPa, when the sucker rod pumping unit is running.

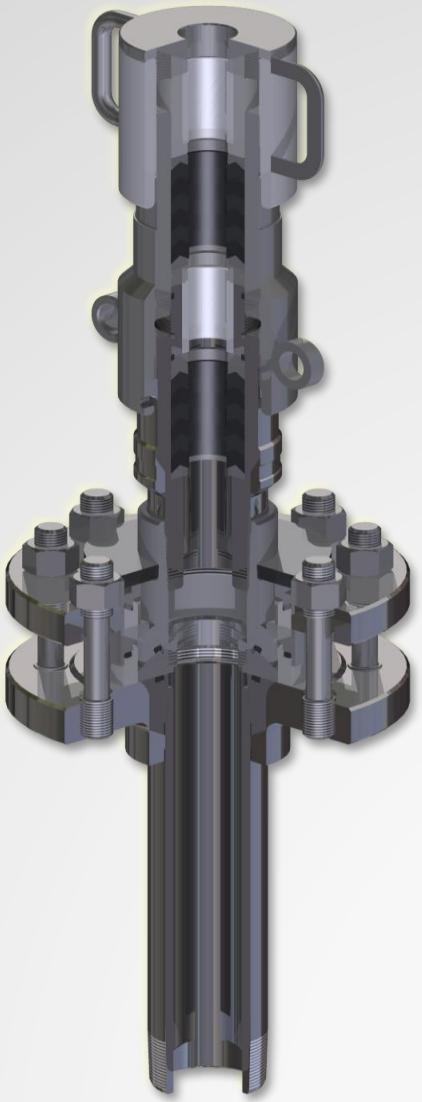
Operating pressure is 4 MPa, when the sucker rod pumping unit is shutdown.

Maximum temperature for standard design version is 120°C.

Maximum temperature for heat-resistant version is 250°C.

Climate version as per GOST 15150-69 is KHL (cold climate).

Corrosion-resistant version is K1 (CO_2 is below 6%).



INNOVATIONS

25-175-RHAM 7-11-0-11 SUCKER ROD PUMP

25 – 175 – RHAM 7 – 11 – 0 – 11 pump is intended for reservoir fluid pumping out from the deep oil wells located in moderate and cold climate areas.
The stroke is equal to 2,500 mm.
The pumped fluid temperature is not exceeding T=300°C.

Theoretical delivery at 10 strokes per minute is 53.80 m3/day.

ADVANTAGES:

- ✓ **It contributes to significant increase in the oil production gain index.**
- ✓ **The steam is injected without pulling out the pump from the well in case of using in combination with a thermal packer.**
- ✓ **The pump durability is increased, and the issue of the pump plunger jamming due to constant contact of the plunger and the cylinder is eliminated; that is the plunger length significantly exceeds the cylinder length, and at the same time practically no mechanical impurities enter the plunger gap.**
- ✓ **The inter-overhaul period for the wells is increased by 2.2 times on the average.**
- ✓ **The coating of the plunger and the inner channel of the cylinder are wear-and-corrosion resistant.**

ADDITIONAL EQUIPMENT

At the Customer's request the pumps can be supplied complete with additional equipment:

- **Locking shoe**
- **Gas-sand insert anchor**
- **Sand filter**

INNOVATIONS

25-225x175 TNM-11-14 DIFFERENTIAL OIL WELL PUMP

25-225x175 TNM-11-14 differential oil well pump is intended for recovery of high viscosity oil.
The plunger stroke is 3,000 mm.
The pumped fluid temperature is not exceeding T=300°C.
Theoretical delivery at 10 double strokes per minute is 76.6 m3/day.

ADVANTAGES:

- ✓ High operational reliability in the course of recovery of high viscosity oil with high free gas content.
- ✓ Steam is injected without the pump retrieval from the well.
- ✓ Design of the pump, with short cylinders and long rods, improves the ability to clean the plunger surface from deposits, thereby reducing the rod displacement force in both directions.
- ✓ Cobalt alloys of valve pairs and high-alloy chrome-bearing steels of the valve unit parts contribute to trouble-free operation in the oil environment.
- ✓ Spring-loaded discharge valve and poppet-type self-adjusting valve with a special hanger of the bottom plunger allow for using the pump to be used in the directional wells.
- ✓ The pump is attached to the tubing string by a threaded joint. The plunger is lifted with a sucker rod string, thus the steam treatment of the reservoir or inspection of the plungers and valve parts can be performed without cylinder disassembly.
- ✓ The coating of the plunger and the inner channel of the cylinder is wear-and-corrosion resistant.

ADDITIONAL EQUIPMENT

At the Customer 's request the pumps can be supplied complete with:
• Automatic coupling device • Gas-sand insert anchor • Sand anchor • Sand filter

TASKS:
WAX CONTROL
AND SAND CONTROL

SOLUTION:
A PUMP WAS DESIGNED
TO ADDRESS THESE TASKS

RESULT:
HIGH OPERATIONAL RELIABILITY AT
25 MPa*s VISCOSITY
UP TO 2.5 g/l MECH. IMPURITIES CONTENT

INNOVATIONS

EMERGENCY SERVICE FISHING TOOLS FOR Ø114 MM STRING

Emergency service fishing tools are designed for ø114 mm string.

Casing spear (TV) and releasing spear (TVO) are intended for retrieval of failed tubing string from the well, either piece by piece, by unscrewing, in case it stuck, or as one piece, by reciprocation.

Smooth-face fishing tap is intended for catching the tubular elements of the string by their inner surfaces with further extraction during the downhole fishing operations.

The fishing tap is intended for catching the tubular elements of the strings by screwing in their inner surface with their further extraction in the course of the downhole fishing operations.

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OUR COMPANY OFFERS FULL RANGE OF SERVICES;
AT THE CUSTOMER'S REQUEST WE DESIGN, MANUFACTURE AND CERTIFY ANY NON-STANDARD EQUIPMENT.
DELIVERY OF ALL EQUIPMENT CAN BE ACCOMPANIED BY SERVICE MAINTENANCE
AND SCIENTIFIC-AND-TECHNICAL SUPPORT.

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