Product of catalogue and service
A rich experience and a mighty production potential of the "System-Service" Group of companies start their way in 1976. It is then that "Tatneft" company has established the Almetyevsk base for production servicing of the electro-submersible installations (ACBPO EPU). The company has provided the practical realization of the unified technical policy in the field of electro-submersible repair and lease. Only in two years after creation the organization staff reached the first place in USSR, and remained leader on the number of the implemented installations of the centrifugal pumps for many more years. Later the production of isolated wires and cables for different purposes was set up. The equipment of the secondary granulated polyethylene was projected, produced and brought into operation.

In 2008 within the frames of the JSC "Tatneft" program on feeding out the servicing structures into independent organizations on the base of ACBPO EPU a LLC "Management company "System-Service" was organized. October 1, 2008 has become the official birthday of our company.

Today "System-service" Group of companies is developing dynamically, widening the horizons of production activity. As part of Group of companies there are: LLC "Perekryvatel", LLC "RINPO", LLC "Service NPO" и LLC "Tatneft-Cable".

The main activity of the company is providing services of well construction, oil recovery and formation pressure maintenance, production and repair of oilfield equipment and other production of domestic producers such as ZAO «NOVOMET-PERM», OAO "ALNAS" and others. The spectrum of service and production are certificated according to the international standard ISO 9001:2008.

Our partners - oil extracting enterprises of the Russian Federation, near and far abroad countries.

I invite you to cooperation and guarantee that in our face you will find a reliable and worthy partner.

Best regards,
Director, LLC "Management company "System-Service"
Ildar Mukhamadaev

For introduction to our production, we invite you to visit our enterprise.
Contact telephone number: marketing department tel./fax: +7 (8553) 31-84-71, 31-84-94; reception +7 (8553)45-89-13
WELL CONSTRUCTION

- Service support of the drilling bit run and hydraulic downhole motor
- Equipment for local strengthening of walls
- Tools of wellbore departure of the type BS
- Cement stage collar

If you have any further questions or offers, contact us via the following telephone numbers:
marketing department tel/fax: +7 (8553) 31-84-71, 31-85-67, 37-00-85;
reception +7 (8553) 45-89-13
Service support of the drilling bit run and hydraulic downhole motor

The experience and knowledge of specialists of LLC «Perekryvatel» about service support allow the customer to optimize selection of drilling bits and bottomhole assembly for specific mining and geological drilling conditions, reduce costs of mechanical drilling, reduce period of well construction and thereby accelerate putting into operation.

Superiority is reached at the expense of correct combination of hydraulic downhole motor and drilling bit in various stratigraphic columns, due to wide personnel experience and qualitative engineering service.

Drilling bits and downhole motors, made by the leading domestic and foreign companies, are used for rendering of services.

Specialists of drilling department carry out:

- Development of program and drilling mode;
- Service support of the drilling bit run;
- Service support of hydraulic downhole motor;
- Detailed report preparation of supported well in service;
- Development of proposal of efficiency increasing during well construction.

Service support
Development and realization of drilling bit program during the oil well drilling

Equipment delivery
hydraulic downhole motor, drilling bit

Comprehensive service
Equipment for local well casing

Purpose:
Equipment for local well casing is designed for isolation of absorption fluid zone in the formation open hole. It consists of profile liner (corrugated pipe) and installation tools.

Application:
Vertical, controlled directional and horizontal wells.

Principle of operation:
Technology of local well casing is that casing strings with diameter, more than borehole diameter, are shaped along the full length and decreased in cross-sectional dimension so that it allows freely to lower string into the wellbore. Diameter of trouble zone is increased by expandable underreamer to initial diameter (unshaped) of casing string. After lowering of profile liner into the well, profile liner is shaped to ingoing size and driven into a corner of expanded well by means of pressure created by drilling fluid pumping.

Advantages:
- the problem of isolation of absorption fluid zone is solved;
- exclusion of intermediate casings and liners;
- tubulars, cement, energy, and consequently total rig time is saved.

Technologies:
Depending on purpose of the equipment for local well casing there are various modifications for the purpose of:
- successive local isolation of trouble zones in the process of drilling-in;
- extension of casing string with ID 219, 245 mm. from bottom without loss of the wellbore diameter;
- isolation of aquifers from producing formations prior running-in of producing strings;
- isolation of separate sections in horizontal wells.

More than 40 patents of Russian Federation and 53 patents of foreign countries, in that number, he USA, Australia, Canada, China, India, Norway, Japan, Germany, Great Britain, Mexico, Italy, France, and other countries, have been obtained for this technology.

### Dimension types and specifications of profile liner for open borehole (uncased)

<table>
<thead>
<tr>
<th>Modification</th>
<th>Profile liner size, mm</th>
<th>Well diameter, mm</th>
<th>Differential pressure, MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>OLKS-295</td>
<td>273 D 270 s 8</td>
<td>295,3 d 300 d1 295,3 p 8 P1 13,4</td>
<td></td>
</tr>
<tr>
<td>OLKS-216</td>
<td>200 D 195 s 8</td>
<td>215,9 d 216 d1 215,9 p 12,5 P1 18</td>
<td></td>
</tr>
<tr>
<td>OLKS-216U</td>
<td>200 D 195 s 8</td>
<td>215,9 d 216 d1 215,9 p 13,5 P1 19,6</td>
<td></td>
</tr>
<tr>
<td>OLKS-144</td>
<td>136 D 134 s 5</td>
<td>143,9 d 160 d1 143,9 p 14 P1 17</td>
<td></td>
</tr>
<tr>
<td>OLKS-144U</td>
<td>136 D 134 s 5</td>
<td>143,9 d 160 d1 143,9 p 14 P1 17</td>
<td></td>
</tr>
<tr>
<td>OLKS-124</td>
<td>118 D 116 s 5</td>
<td>132 d 122 d1 120,6 p 16 P1 22</td>
<td></td>
</tr>
</tbody>
</table>

- **D** — profile liner diameter;
- **D1** — diameter of circumcircle, shaped part;
- **s** — wall thickness;
- **d** — well diameter after enlargement;
- **d1** — well diameter before profile liner installed;
- **d2** — profile liner after assembly;
- **d3** — drilling bit diameter after profile liner installed;
- **p** — profile liner pressure;
- **P1** — permissible profile liner internal pressure;
Cost-benefit analysis of profile liner-aided well construction, well depth - 3500 m

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Using standard technology</th>
<th>With expandable system</th>
<th>economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor diameter, mm</td>
<td>508</td>
<td>340</td>
<td></td>
</tr>
<tr>
<td>Underconductor string, mm</td>
<td>406,4</td>
<td>243,8</td>
<td></td>
</tr>
<tr>
<td>Intermediate casing, mm</td>
<td>325,1</td>
<td>236,2</td>
<td></td>
</tr>
<tr>
<td>Production string diameter, mm</td>
<td>168</td>
<td>168</td>
<td></td>
</tr>
<tr>
<td>Bottomhole diameter</td>
<td>215,9</td>
<td>215,9</td>
<td></td>
</tr>
<tr>
<td>Total string weight, ton</td>
<td>599,1</td>
<td>179.5</td>
<td>419.6</td>
</tr>
<tr>
<td>Total cement weight, ton</td>
<td>487,2</td>
<td>97.6</td>
<td>389.6</td>
</tr>
<tr>
<td>Total cement volume, m³</td>
<td>448.6</td>
<td>143.7</td>
<td>304.9</td>
</tr>
<tr>
<td>Max. weight, hoisted, ton</td>
<td>197.8</td>
<td>132.7</td>
<td>65.1</td>
</tr>
</tbody>
</table>

Total construction time halves

Application of OLKS in Vietnam, Iran and China

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Application Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vietnam</td>
<td>2004-2005</td>
<td>Local well casing of rockslide and absorption fluid zone on wellbore 818BT (Vietnam) in 2001</td>
</tr>
<tr>
<td>Iran</td>
<td>2003</td>
<td>Casing Asmari, deposit Kupal (Iran) in 2003</td>
</tr>
<tr>
<td>China</td>
<td>2004-2005</td>
<td>Isolation of absorption fluid zone and rockslide on wellbore №L7-71</td>
</tr>
</tbody>
</table>

WATER SHUTOFF IN HORIZONTAL WELLS

Isolation of absorption fluid zone and rockslide on wellbore №3-8-n/n-216

Isolation of water inflow on wellbore № 2.5-283
Tools of wellbore departure of the type BS

Purpose:
Tools of wellbore departure of the type BS are applied for milling a window in production casing for sidetracking operations.

Structure:
Consist of hydraulic-anchor, whipstock with hydraulic system, mill and auxiliary tool.

Advantages:
- No need in cementing or plugged-back bottom for whipstock installation;
- Mill design is notable for its wear-resistance and high milling rate;
- Reliable and simple design anchor withstands more than 50 ton axial load;

Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>BS-140</th>
<th>BS-146</th>
<th>BS-168</th>
<th>BS-178</th>
<th>BS-194</th>
<th>BS-219</th>
<th>BS-245</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter of casing pipe, mm</td>
<td>139.7</td>
<td>146.1</td>
<td>146.3</td>
<td>177.8</td>
<td>191.7</td>
<td>219.1</td>
<td>244.5</td>
</tr>
<tr>
<td>(inch)</td>
<td>(5 ½)</td>
<td>(5 ¾)</td>
<td>(6)</td>
<td>(7)</td>
<td>(7 ¾)</td>
<td>(8)</td>
<td>(9)</td>
</tr>
<tr>
<td>Length of whipstock, mm</td>
<td>2500</td>
<td>2600</td>
<td>3000</td>
<td>3000</td>
<td>3320</td>
<td>3800</td>
<td>4000</td>
</tr>
<tr>
<td>Length of hydraulic-anchor, mm</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>Diameter of hydraulic-anchor, mm</td>
<td>116</td>
<td>118</td>
<td>137</td>
<td>154</td>
<td>155</td>
<td>180</td>
<td>200</td>
</tr>
<tr>
<td>Diameter of mill, mm</td>
<td>116</td>
<td>126</td>
<td>140/146</td>
<td>146/156</td>
<td>162/168</td>
<td>178/193</td>
<td>200/203</td>
</tr>
<tr>
<td>Angle</td>
<td>2.0...2.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight, kg</td>
<td>250</td>
<td>300</td>
<td>440</td>
<td>540</td>
<td>650</td>
<td>720</td>
<td>1600</td>
</tr>
</tbody>
</table>

Process of milling a window in the casing string (according to the picture):
1. The assembled at wellhead system is lowered into prepared wellbore on selected depth. Whipstock is orientated by geophysical equipment.
2. An anchor, fixing the whipstock in the casing string, reveals by means of flushing fluid pumping. A screw, connecting milling bit with whipstock, is cut by means of straining of drilling tool.
3. Milling a window in the casing string by mill rotation.
4. Sidetracking by bit according to the predictable depth.
Cement stage collar (MSC)

Purpose:
Cement stage collar is designed for two-stage cementing of casings in order to reduce hydrostatic pressure on weak zones and enable selective cementing of specific formations.

Application:
Vertical, deviated and horizontal wells.

Advantages:
• In comparison with analogs, more effective and reliable opening of circulating holes is used;
• Closure mechanism of the locking sleeve ensures 100% of hermeticity after drilling of the locking plug and MSC sleeve;
• There is assortment of shear bolts for different pressure of opening circulating holes;
• Operation of the stage collar cementing is simple and reliable.

Structure:
Cement stage collar, stop-ring, locking cap, squeezing tool.

Specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread diameter, mm</td>
<td>102</td>
</tr>
<tr>
<td>Max. OD, mm</td>
<td>116</td>
</tr>
<tr>
<td>Drill-out I.D, mm</td>
<td>86</td>
</tr>
<tr>
<td>Opening pressure, MPa</td>
<td>from 15 to 20</td>
</tr>
<tr>
<td>Stage (discreteness) of pressure settling, opening, MPa</td>
<td>1,0</td>
</tr>
<tr>
<td>Closing pressure, MPa</td>
<td>5,0</td>
</tr>
<tr>
<td>Overall Length, mm</td>
<td>365</td>
</tr>
<tr>
<td>Weight, max, kg</td>
<td>13</td>
</tr>
<tr>
<td>Differential pressure for stop-ring, min., MPa</td>
<td>3</td>
</tr>
</tbody>
</table>

Principle of operation (in design):

1. Cement collar installed in the casing string is run to the bottom, stop-collar is installed in the casing string at least one joint above the string shoe. After cement is mixed and pumped (measured cement volume in accordance with collar height), before pumping of displacing fluid, the squeezing plug is launched.
2. The squeezing plug comes up to the stop-collar and fixes, thereby it ensures hermeticity of string.
3. After fixation of the squeezing plug, collar radial-holes are opened by means of increasing pressure. Process of cement solidification, first stage.

4. After cement is pumped (for the second stage, above the MSC) and before squeezing fluid is pumped, locking plug is launched.
5. The locking plug comes up to the sleeve (located inside of MSC), cuts all pins of the sleeve by means of increasing pressure. Sleeve lands and effects a seal in the MSC collar (closes radial holes of collar). Process of cement solidification (waiting-on-cement WOC), second stage.
6. After WOC, the locking plug and squeezing plug (made from rubber), all internal elements of MSC collar and stop-collar (made from aluminium) are drilled by drilling bit.
PRODUCTION AND REPAIR of oilfield equipment

- Electric centrifugal submersible pumps
- Gas separators
- Hydroprotectors
- Submersible electric motors
- Horizontal surface pumping system
- Small block water injection stations
- Rubber technical goods
- Maintenance of screw pumps, turbodrills, hydraulic and screw downhole motors
- Maintenance of transformers TMPN, rated power 63-1000 kVA
- Maintenance of ESP
- Switchboard with variable speed drive «RUMB PK-06PH»
- Soft start type switchboard «RUMB»
- Direct start type switchboard «RUMB»
- Dual completion systems

If you have any further questions or offers, contact us via the following telephone numbers:
marketing department tel/fax: +7 (8553) 31-84-71, 31-85-67, 37-00-85;
reception +7 (8553) 45-89-13
Electric submersible pumps (ESP)

**Purpose:**
Electric Centrifugal Submersible Pumps (ESP) are applied for formation fluid pumping out, and also in systems of reservoir pressure maintenance. A-ESP allow to pump out fluid with rated capacity in the operating range from 30 up to 1250 m³/day, and head up to 3600 m.

**Design:**
Depending on the cross-section dimension pumps are made in 3 sizes: 5, 5А and 6. The series conditionally define the minimum inner diameter of the casing string, for series: 5 - 123,7 mm; 5А - 130 mm; 6 - 148,3 mm. Pump housing diameter is 92, 103 и 114 mm.

Pumps consist of top section (with fishing head for tubing joining), middle pump sections, intake module, gas separator, check and bleeder valves.

**Conditions of formation fluid:**

- formation fluid — composition of mixed oil, associated water and oil gas;
- max. fluid density — 1400 kg/m³;
- single-phase fluid kinematic viscosity, — 1 mm²/s;
- PH value of associated water рН — 6,0 - 8,5;
- max. mass concentration of solid particles for pumps:
  - Of standard design — 0,1 g/l (0,01 %);
  - Corrosion-resistant design — 0,2 g/l (0,02 %);
  - Wear-resistant and corrosion-and-wear-resistant design — 0,5 g/l (0,05 %);
  - Improved corrosion-and-wear-resistant design — 1,0 g/l (0,10 %);
- Hardness on the Moh’s scale for pumps:
  — standard, corrosion-resistant, corrosion-and-wear-resistant ESP — 5;
  — wear-resistant, corrosion-and-wear-resistant design — 7;
- H2S content for pumps — 99 %;
- max. content of free gas, pump suction — 25 %;
- by volume, with gas separator installed — 55 %;
- max. concentration of hydrogen sulfide for pumps:
  - standard, corrosion-resistant ESP — 0,01 g/l (0,001 %);
  - corrosion-resistant and corrosion-and-wear-resistant, improved corrosion-and-wear-resistant ESP — 1,25 г/л (0,125 %);
  - temperature of pumped-out fluid up to 90 °С (as requested up to 150 °С);
- max. hydrostatic pressure around hanger, МPh – 40.

**Specifications**

<table>
<thead>
<tr>
<th>Pump</th>
<th>Rated capacity in the operating range m³/day</th>
<th>Head, max, m</th>
<th>Motor load break, max, kW</th>
<th>Efficiency, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESP(K)5-30</td>
<td>20-40</td>
<td>350</td>
<td>33,34</td>
<td>35</td>
</tr>
<tr>
<td>ESP(K)5-45</td>
<td>12-70</td>
<td>360</td>
<td>48,51</td>
<td>37,8</td>
</tr>
<tr>
<td>2222(24)НЖ(К)5-45</td>
<td>15-70</td>
<td>360</td>
<td>49,61</td>
<td>37</td>
</tr>
<tr>
<td>ESP(K)5-50</td>
<td>25-80</td>
<td>350</td>
<td>50,41</td>
<td>39,5</td>
</tr>
<tr>
<td>2222(24)НЖ(К)5-50</td>
<td>25-80</td>
<td>330</td>
<td>47,35</td>
<td>39,5</td>
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<tr>
<td>ESP(K)5-60</td>
<td>35-80</td>
<td>350</td>
<td>55,22</td>
<td>44</td>
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<tr>
<td>2222(24)НЖ(К)5-60</td>
<td>35-80</td>
<td>365</td>
<td>56,17</td>
<td>44</td>
</tr>
<tr>
<td>ESP(K)5-80</td>
<td>60-115</td>
<td>3450</td>
<td>60,74</td>
<td>51,5</td>
</tr>
<tr>
<td>2222(24)НЖ(К)5-80</td>
<td>60-115</td>
<td>350</td>
<td>63,17</td>
<td>51,5</td>
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<tr>
<td>2222(24)НЖ(К)5-80</td>
<td>35-110</td>
<td>3100</td>
<td>66,68</td>
<td>42</td>
</tr>
<tr>
<td>ESP(K)5-125</td>
<td>102-165</td>
<td>3400</td>
<td>89,16</td>
<td>54</td>
</tr>
<tr>
<td>2222(24)НЖ(К)5-125</td>
<td>102-165</td>
<td>3350</td>
<td>88,56</td>
<td>54</td>
</tr>
<tr>
<td>ESP(K)5-160</td>
<td>125-205</td>
<td>3350</td>
<td>100,18</td>
<td>61</td>
</tr>
<tr>
<td>2222(24)НЖ(К)5-160</td>
<td>125-205</td>
<td>3500</td>
<td>103,46</td>
<td>61</td>
</tr>
<tr>
<td>ESP(K)5-200</td>
<td>150-265</td>
<td>2600</td>
<td>117,88</td>
<td>50</td>
</tr>
<tr>
<td>2222(24)НЖ(К)5-200</td>
<td>150-265</td>
<td>2550</td>
<td>116,84</td>
<td>50</td>
</tr>
<tr>
<td>ESP(K)5A-250</td>
<td>190-340</td>
<td>3500</td>
<td>161,84</td>
<td>61,5</td>
</tr>
<tr>
<td>2222(24)НЖ(К)5A-250</td>
<td>190-320</td>
<td>2750</td>
<td>137,17</td>
<td>57</td>
</tr>
<tr>
<td>ESP(K)5A-400</td>
<td>300-440</td>
<td>2550</td>
<td>194,17</td>
<td>59,5</td>
</tr>
<tr>
<td>2222(24)НЖ(К)5A-400</td>
<td>300-440</td>
<td>2450</td>
<td>198,93</td>
<td>56</td>
</tr>
<tr>
<td>ESP(K)5A-500</td>
<td>430-570</td>
<td>2500</td>
<td>262,05</td>
<td>54</td>
</tr>
<tr>
<td>2222(24)НЖ(К)5A-500</td>
<td>430-570</td>
<td>2450</td>
<td>259,89</td>
<td>52</td>
</tr>
<tr>
<td>0232(24)НЖ(К)5A-700</td>
<td>600-850</td>
<td>2100</td>
<td>283,55</td>
<td>59</td>
</tr>
<tr>
<td>0232(24)НЖ(К)5A-800</td>
<td>700-920</td>
<td>1900</td>
<td>301,14</td>
<td>56</td>
</tr>
<tr>
<td>ESP(K)6-800</td>
<td>550-920</td>
<td>1850</td>
<td>303,81</td>
<td>56</td>
</tr>
<tr>
<td>ESP(K)6-800</td>
<td>550-920</td>
<td>1750</td>
<td>285,11</td>
<td>56</td>
</tr>
<tr>
<td>2045СП(К)6-1000</td>
<td>850-1200</td>
<td>2050</td>
<td>391,87</td>
<td>60</td>
</tr>
<tr>
<td>2045СП(К)6-1250</td>
<td>1070-1380</td>
<td>1700</td>
<td>457,02</td>
<td>56</td>
</tr>
</tbody>
</table>

**Designation:**

1  — 0 — no axial thrust bearing unit in sections;
2  — stages made from carbide, silicon or silicicated graphite.
3  — short hub impellers, separate shaft protection sleeve;; 1 — elongated hub impellers; 2 — double-bearing stages; 3 — impellers made of polymeric material;;
4  — electric drive centrifugal pump.
5  — C — corrosion-resistant, К — corrosion-and-wear-resistant; standart - no letter.
6  — size-series 5, 5А and 6.
7  — rated capacity in the operating range, m³/day.
Gas separators

Purpose:
Gas separators are applied to separate liquid components of the well stream from gaseous elements resulting in stable operation of ESP.

Application:
Gas separator is installed instead of the intake module or after the intake module in case of the gas separator with no intake screen and forces the separated gases to migrate up the annulus.

Design:
Gas separators made corrosion-resistant. The friction pairs in radial and axial bearings are made of hard alloy. The axial bearing is made of ceramic. End parts and protection sleeves of the housings are made of stainless steel to protect against abrasive effect of the fluid. Gas separator components are made of corrosion-resistant steel and Ni-resist iron of improved corrosion and wear resistance up to 190-240 HB.

Formation fluid parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free gas content at pump intake, max, %</td>
<td>55</td>
</tr>
<tr>
<td>Pumped fluid temperature, °C</td>
<td>120*</td>
</tr>
<tr>
<td>pH – value</td>
<td>6,0-8,5</td>
</tr>
<tr>
<td>Mass concentration of solid particles, max, g/l</td>
<td>1,0</td>
</tr>
<tr>
<td>Particles hardness on the Moh’s scale, max</td>
<td>7</td>
</tr>
<tr>
<td>H2S content, max</td>
<td>1,25</td>
</tr>
<tr>
<td>Associated water content, max, %</td>
<td>99</td>
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<tr>
<td>Fluid gravity, max, kg/m³</td>
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</tr>
<tr>
<td>Single-phase fluid kinematic viscosity, at which gas separator (dispenser) operation is provided with no head and efficiency changes, max, mm²/c</td>
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</table>

*Up to 150 °C as requested

Designation:

<table>
<thead>
<tr>
<th>2</th>
<th>X</th>
<th>GSA</th>
<th>(O,H)</th>
<th>X-</th>
<th>X</th>
<th>MX-</th>
<th>E</th>
<th>TS3631-015-878671B2-2009</th>
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</tbody>
</table>

1 — tandem gas separator, including two housings, sequentially joined through the intermediate housing; no cipher – gas separator in one housing;  
2 — connection type;  
3 — gas separator, made by LLC "RINPO";  
4 — gas separator consist of: O — shaft axial bearing unit (no "O" in case of availability of the shaft axial bearing); H — base with intake screen (It is needed to use gas separator with intake module if using base without intake screen);  
5 — gas separator size-series 5, 5A, 6;  
6 — design version;  
7 — modification number;  
8 — evolvent intersection connection of shafts

Technical features:

<table>
<thead>
<tr>
<th>Gas separator</th>
<th>Capacity in the operating range, m³/day</th>
<th>Rated capacity, m³/day</th>
<th>Separation coefficient</th>
<th>Connection type, mm</th>
<th>Motor load brake max, kW</th>
<th>Housing diameter, mm</th>
<th>Mount length, mm</th>
<th>Weight, kg</th>
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<td>25-200</td>
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Hydroprotectors

**Purpose:**

Hydroprotectors are designed to prevent fluid penetration into motor, to prevent oil leakage from motor side and motor overheating during the operation. Hydroprotector is installed between the intake module (or gas separator) and SEM.

**Hydroprotector design:**

- monoblock-type design of all the hydroprotectors;
- each type of hydroprotector can be made corrosion-resistant (C);
- each type of hydroprotector can be made heat-resistant (T) and high heat-resistant (T1), to operate in fluid at temperature up to 120°C and 170°C, respectively;
- application of face seals made by the leading domestic and foreign companies;
- check valves relieve free gas and excess pressure out of the SEM oil chamber in the process of ESPs operation;
- hydroprotectors shafts made of high-strength steel.

**Designation:**

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<th>H</th>
<th>C</th>
<th>X</th>
<th>X</th>
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</table>

1 — Number of bladders;
2 — H - Hydroprotector, made by LLC "RINPO";
3 — C - Corrosion-resistant (no °C in standard design);
4 — Heat-resistance design (no °C at formation fluid temperature up to 90 °C, T - at formation fluid temperature up to 120 °C, T1 - at formation fluid temperature up to 170 °C);
5 — Size series (5, 5A, 6);
6 — Design number;
7 — M-Advanced design.

Example of the hydroprotector model designation at formation fluid temperature up to 170 °C, 5-series, one bladder, design №7, advanced: 1Т137М ТУ3381-014-87867182-2009.

**Hydroprotector specifications**

<table>
<thead>
<tr>
<th>Hydroprotector</th>
<th>Transferred load, kW</th>
<th>Housing diameter, mm</th>
<th>Fitting length, mm</th>
<th>Motor load break, kW</th>
<th>Oil volume, l</th>
<th>Axial load to bearing, max, kg</th>
<th>Weight, kg</th>
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<td>2195</td>
<td>0,6</td>
<td></td>
<td>4,9</td>
<td>800</td>
</tr>
</tbody>
</table>

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**Note:**

- **Housing diameter** affects the pressure drop and fluid flow rate.
- **Fitting length** is crucial for ensuring proper fluid flow and pressure regulation.
- **Motor load break** ensures safe operation and protection against overloading.
- **Oil volume** is important for maintaining proper fluid levels and lubrication.
- **Axial load to bearing** affects the stability and longevity of the hydroprotector.
- **Weight** indicates the physical size and mass of the hydroprotector.
Submersible electric motors (SEM)

Application:
Submersible oil-field electric motors (SEM) are applied as drives of centrifugal and screw pumps in order to pump out formation fluid from oil-well. 20 modifications of electric submercible motors of different rated capacities ranging from 12 up to 140 kW are produced that allows us to size the most optimum combinations of a motor and a pump for the unit operation with the highest possible efficiency.

Design:
Submersible electric motors designed according to the mounting arrangement 1M 3631, GOST 2479. Design – single- or two-section. Application of special electrical materials allows SEM operation at the formation fluid temperature up to 120°C. The assembled motor is tested at the testing station under conditions close to real field conditions with electrical and mechanical parameters monitoring.

Starting, SEM management and protection under emergency state are operated from control station. Designed to prevent the entry of formation fluid into the inner cavity of the electric motor, compensation of oil leak and temperature during the operation, torque transfer from the motor shaft to the pump shaft operated by protector or hydroprotector with appropriate oversll and mountings dimensions and technical features.

Assembling:
As required SEM are completed by telemetry systems, which allows to get information about real-time installation functioning state and well condition, to power-down the installation in time. Signal transmission from downhole telemetry system to control station is operated by means of power cable.

Wellbore pressure; Formation fluid temperature; SEM oil pressure; SEM temperature; SEM vibration.

Designation:
3R X XX XXX -XXX XX 85 X TS 3381-014-87807182-2009 1 2 3 4 5 6 7 8 L – Submersible motor;
A – Section design – C, no C – single-section;
B – Corrosion-resistance design: C – Corrosion-resistant; T – Heat-resistant; no letter – standard design;
D – Rated capacity, kW;
E – Housing diameter, mm;
F – Modification code М1, М2 etc.;
G – Climatic version and location category according to GOST 15150;
H – Direction of shaft rotation: L – left-handed rotation; no L – right-handed rotation.

<table>
<thead>
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<th>SEM in 103mm-size specifications</th>
<th>Electric motor type</th>
<th>Rated capacity, kW</th>
<th>Rated voltage, V</th>
<th>Rated current, A</th>
<th>Effi-</th>
<th>Slip, %</th>
<th>Well</th>
<th>Cooling fluid velocity, m/sec</th>
<th>Shaft</th>
<th>Insulation resistance at t=(115±15) °C, MΩ</th>
<th>Length, mm</th>
<th>Weight, kg</th>
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Max. housing diameter - 110 mm
Stator winding insulation resistance at, t=(20±10) °C, - 1000 Mohm.

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<th>Rated voltage, V</th>
<th>Rated current, A</th>
<th>Effi-</th>
<th>Slip, %</th>
<th>Well diameter, mm</th>
<th>Cooling fluid velocity, m/sec</th>
<th>Shaft torque, kgf•m</th>
<th>Insulation resistance at t=(115±15) °C, MΩ</th>
<th>Length, mm</th>
<th>Weight, kg</th>
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</tbody>
</table>

Max. housing diameter - 117 mm

Note - Stator winding insulation resistance at, t=(20±10) °C, - 1000 Mohm.
**Horizontal surface pumping system**

We carry out current and comprehensive repair, test and maintenance of horizontal water injection pumps.

**Purpose:**
Horizontal water injection centrifugal pumping systems are intended for injection of fresh water, stratal water and field waste water into oil formations in the reservoir pressure maintenance systems.

**Purpose of GNU basic units:**
SEM is designed for twisting as pump drive. Multiplier is applied for increasing the torque of a pump shaft and torque distribution between pump sections during simultaneous operations.

Centrifugal pump, ESP type, is energy transforming machine capable to transform mechanical energy in hydraulic of a liquid. Pump section joints to a flange of suction chamber for pumping liquid. Cooling system prevents overheating and premature deterioration of bearing units of the thrust chamber and multiplier. Pump cradle made as base for attaching point of GNU units and for protective shroud of rod.

**liquid content specification:**
- salinity up to 250 000 mg/l;
- pH value 5,4-7,5 pH;
- content of dissolved gas:
  - H2S – up to 270 mg/l,
  - CO2- up to 300 mg/l;
- oil – up to 200 mg/l;
- mass concentration of solid particles – up to 50 mg/l, size up to 200 micron.
- from 1,00 to 1,18 mg/cm³ temperature range from +5°C up to +80°C.

**Modifications of GNU**

Horizontal pump installations (GNU) are designed in various modifications to ensure individual customer requests. Modifications of GNU are notable for availability of complementary modules and units: multiplier, cooling system of the thrust chamber and of multiplier.

**GNU types:**
- single-sectional;
- single-sectional with multiplier and cooling system of the thrust chamber and of multiplier;
- two-sectional with multiplier and cooling system of the thrust chamber and of multiplier;
- single-section with variable speed drive (VSD, which provides precise pump system to ensure the widest possible operating range)

**Using of variable speed drive allows:**
- regulation of pump parameters (at the expense of rate adjustment);
- soft start and gradual deceleration of pumping unit;
- protects motor against current overloading;
- to avoid impact load of the thrust chamber;
- to avoid power loss of system;
- to reduce the electricity charges by means of maintenance ESP in max. efficiency (automatic regulation of the motor speed).
### Horizontal Pump Specifications

<table>
<thead>
<tr>
<th>№</th>
<th>GNU series</th>
<th>Pressure P, MPa</th>
<th>Q_{min}, m³/h</th>
<th>Q_{nom}, m³/h</th>
<th>H_{min}, m</th>
<th>H_{nom}, m</th>
<th>Overall dimensions, LxWxH, cm</th>
<th>Weight, kg</th>
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<tbody>
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GNU designed for unit weight ρ=1.1 g/cm³, pressure at pump suction from 0.5 to 4MPa.
* under the completion of development

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**Small block water injection station (MBKNS)**

We offer the comprehensive work package of small block water injection station (MBKNS) construction, including development of requirements specification, development of design documentation and startup-set up operations on Customer’s facilities. Small block water injection station is off-the-shelf solution of maintenance of reservoir pressure system, without capital construction of water injection station.

**Consist:**

Construction MBKNS is built-up construction, consists of several separate blocks with installed equipment. Walls of block designed as “sandwich” panels with heat insulation material, made from incombustible material. Construction is equipped with artificial lighting, telpher, automatic heating system and balanced system of ventilation with gas analyzer, fire-extinguishing installation.

**MBKNS consists of modules:** process module and hardware module.

**Process module contains:** GNU, assembled on fixed frame and connected with supply line and pressure line.

**Plumbing fitting consists of:** pipe valve, flow meter, pipeline outlet, flange, coarse filter and fine filter.

**Discharge pipe fitting includes:** back valve and electrovalve.

Hardware module contains switchboard with variable speed drive, or with soft starter.

**After MBKNS is based,** we carry out starting up and adjustment operations, including:

- hydraulic piping MBKNS;
- electrical piping MBKNS;
- control station adjustment;
- MBKNS control equipment adjustment;
- GNU launch, selection of operational mode and operational control of GNU;
- guarantee maintenance of equipment;
- personnel training and facilities operation consulting.

**Advantages of MBKNS:**

- available to reset on other places;
- wide range of parameters;
- max. level of customization, conformity with the current technological normative documents;
- high reliability level and maintenance workability.
Rubber technical goods

About Company

Cable production

Service of oilfield equipment

Production and Repair of oilfield equipment

Well construction

LLC «MC «SYSTEM-SERVICE»

Maintenance of screw pump, turbodrill, screw bottomhole motor

Purpose and application:

Bottomhole motors are applied for vertical, deviated well-drilling, and also for well-workover operation and sidetracking. Optional, bottomhole motors are completed with a bit, bit sub and float valve.

Maintenance shop for screw bottomhole motor and turbodrill

We provide professional service of bottomhole motors with diameters from 76 mm to 240 mm, from such producers as:

- LLC “VNIIBT-Drilling tools”;
- JSC “Kungur mashzavod”;
- LLC “Firm «Radius-Service”;
- CJSC “NGT”;
- “NOV” (Canada).

At the present LLC «УК «System-Service»» manufactures more than 700 rubber technical goods, which are used in pieces and units of oilfield equipment.

Modern processing facilities and high professional level of staff allow us to produce high-performance equipment according to the customization demands, according to the standarts of GOST. The comprehensive range of products you can find on site www.sistemaservis.ru

Rubber technical goods, manufactured at a plant

Maintenance shop for screw bottomhole motor and turbodrill

Rubber technical goods

Maintenance shop for screw bottomhole motor and turbodrill

Rubber technical goods, manufactured at a plant

Maintenance shop for screw bottomhole motor and turbodrill

Industrial zone
Maintenance of transformers TMPN, rated power from 63 to 1000 KVA

Purpose:
Three-phase oil power transformers, product line TMPN, are applied for ESP ac supply, voltage 380V or 6000 V, frequency 50 Hz. The transformers are intended for operation under the temporary (from -45°C to 40°C) or cold (from -60°C to +40°C) climate conditions.

Services:
- current repairs, maintenance and testing of transformers;
- repairs and production of transformer winding;
- transformer oil charge;
- transformer oil recovery;
- substitution and restoration of inputs VN, NN;
- all types of switches substitution;
- repair of transformator parts.

Centrifugal pump repair

Purpose:
Centrifugal pumps are designed for pumping out formation water with max. content of mechanical impurity - 0.1% according to a weight, max. size of solid particle - 0.1 mm.

Pump repair technology:
- polymeric coating of runners and guide vanes;
- production of component part and pumping assembly;
- hardening of pumping parts using the method of gas-nad-flame spraying;
- run on pumps after extensive repairs.

Specifications

<table>
<thead>
<tr>
<th>Modification</th>
<th>Rated capacity, m³/hour</th>
<th>Head, m</th>
<th>Rotation frequency, rpm</th>
</tr>
</thead>
<tbody>
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<td>40</td>
<td>1000</td>
<td>1400</td>
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<td>CNS63</td>
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<td>1900</td>
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<tr>
<td>CNS180</td>
<td>180</td>
<td>1900</td>
<td>3000</td>
</tr>
</tbody>
</table>

| CNS540       | 40                      | 1000   | 1400                   |
| CNS563       | 63                      | 1400   | 1800                   |
| CNS 80       | 80                      | 1900   | 1900                   |
| CNS180       | 180                     | 1900   | 3000                   |
Injection Station Automation System

Purpose and application:
Injection Station Automation System is used to control horizontal pump units (HPU) equipped with electric motors with a power of up to 1,000 kVA, and supply voltage of 0.4 to 0.6 kV for the injection of process fluid into formation.

Components:
The system consists of the RUMB KSU-06 Controller and additional modules installed on a DIN rail and designed to receive signals from sensors and other equipment of an injection station, generate control signals and protect the electronic components of the automation system against high-voltage spikes. The composition of the system is defined after the technical specifications for the system are agreed.

Functionality:
- ESP/HPU protection against abnormal operating conditions;
- controlling and monitoring the condition of HPU and injection stations;
- monitoring the condition of the thrust chamber;
- control of the oil pump and fan of the thrust chamber;
- condition monitoring of multiplicator;
- control of the multiplier fan;
- monitoring the pressure in the hydraulic system of the injection station;
- fluid metering at the injection station inlet;
- controlling and monitoring the condition of motor operated valves at the injection station outlet;
- monitoring the condition of the built-in protection cell of the high-voltage motor of HPU;
- monitoring the condition of a gas detection system;
- monitoring the condition of the thrust chamber;
- control of the oil pump and fan of the thrust chamber;
- condition monitoring of multiplicator;
- energy-use metering;
- establishing different access levels for personnel by means of proximity access identifiers;
- software update in the field by means of the RUMB UPI-06 Data Transfer Device.

Involving frequency converter:
- smooth acceleration and smooth deceleration of the HPU;
- manual regulation of the motor power supply frequency;
- automatic maintenance of a selected process parameter (for instance, the pump discharge pressure) at a set level by means of a built-in PID regulator;
- control of frequency converter microclimate.

Communication capabilities:
- data transfer between the controller memory and a personal computer by means of the RUMB UPI-06 Data Transfer Device;
- operation as part of a remote control system; adaptation to any remote control system protocol, any well pad controllers, antenna-feeder devices, GSM/GPRS wireless modems and satellite communication equipment;
- transmitting info from CS to the higher level.

Switchboard with frequency converter «RUMB RK-06PH»

Purpose and application:
Control stations are applied for joint operations with electrical centrifugal pump for oil extraction, formation water pumping, water intake etc. Control systems are designed for control and protection of submersible electric motors.

Functionality:
- smooth acceleration;
- smooth deceleration;
- ESP wedging;
- changing the direction of rotation;
- prevention of operation at resonance frequencies;
- jarring mode to reduce deposition on the working surfaces of the pump;
- manual regulation of the motor power supply frequency;
- automatic regulation of the motor power supply frequency by means of a PID algorithm to maintain the value of a selected process parameter;
- protection against abnormal operating conditions;
- operating history storage in a nonvolatile memory;
- periodic operation with predetermined running and idling time periods;
- periodic operation on a given schedule;
- periodic operation in accordance with the value of a process parameter;
- energy-use metering;
- injected water metering;
- establishing different access levels for personnel by means of proximity access identifiers;
- microprocessor software update in the field by means of the RUMB UPI-06 Data Transfer Device.

Additional Sensors:
- downhole ESP monitoring systems of various manufacturers;
- analog or digital annular pressure sensor;
- analog or digital tubing-head pressure sensor;
- analog or digital gathering-line pressure sensor;
- stationary echo sounder;
- two pulse fluid meters;
- one or two contract pressure gage.

Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limiting line-to-line supply voltage, V</td>
<td>from 152 to 720</td>
</tr>
<tr>
<td>Operating temperature range of repair components, °C</td>
<td>from -60 to +60</td>
</tr>
<tr>
<td>Rated line-to-line supply voltage, V</td>
<td>from 285 to 475</td>
</tr>
</tbody>
</table>
**ESP Switchboard with a soft starter "RUMB"**

**Purpose and application:**
Control systems are intended for hand-operated, automatic and remote monitoring, control and protection of the ESP systems. Control station is manufactured as three-phase thyristor switch with multitasking control system, based on microprocessor controller with advanced interface.

**ESP Switchboard with a soft starter ensures:**
- SEM switching on and shutdown in straight multiple mode (launching through a vacuum contactor) and soft start;
- "jogging mode";
- SEM deceleration, by removing of control pulses from the thyristor switch;
- continuous work of SEM with rated current, within the range of control station current;
- SEM control in manual or automatic mode;
- selection of operating mode with automatic periodic ESM switching on and shutdown according to the program;
- restraint on SEM switching on caused by turbine overspeed, exceeding of acceptable.

**Protection against abnormal operating conditions:**
- restraint on SEM switching on during the supply voltage recovery with incorrect phase sequence;
- restraint on SEM switching on caused by power supply overvoltage or undervoltage;
- emergency shutdown caused by phase overloading with selection of max. phase current, restraint to reset;
- emergency shutdown caused by supply voltage deviation more than 20 % and less than 20%, if deviation brings to inadmissible current overloading, with automatic ESP switching on after recovery;
- emergency shutdown caused by phase underloading.

**Additional Sensors:**
- downhole ESP monitoring systems of various manufacturers;
- analog or digital annular pressure sensor;
- analog or digital tubing-head pressure sensor;
- analog or digital gathering-line pressure sensor;
- stationary echo sounder;
- two pulse fluid meters;
- one or two contract pressure gage.

**Functionality:**
- ESP/HPU protection against abnormal operating conditions;
- operating history storage in a nonvolatile memory;
- periodic operation with predetermined running and idling time periods;
- periodic operation on a given schedule;
- periodic operation in accordance with the value of a process parameter;
- energy-use metering;
- injected water metering;
- establishing different access levels for personnel by means of proximity access identifiers;
- software update in the field by means of the RUMB UPI-06 Data Transfer Device.

**Monitored Parameters:**
- total power consumption;
- active power consumption;
- phase total current of secondary circuit TMPN;
- active current of secondary circuit TMPN;
- average total current of secondary circuit TMPN;
- phase current of primary circuit TMPN;
- phase voltage of primary circuit TMPN;
- line voltage of primary circuit TMPN;
- average line-to-neutral voltage;
- ESP motor load as a percentage of the rated load;
- power factor (cos φ);
- insulation resistance of system "cable-electromotor";
- phase voltage unbalance;
- line current imbalance;
- motor torque;
- power consumption;
- suction pressure;
- suction temperature;
- temperature of the housing of centrifugal (main) pump;
- SEM vibration (vibration speed);
- pressure at pump intake;
- discharge pressure;
- suction pressure;
- fluid level;
- produced fluid quantity.

**Specifications**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>3x380 (±25%), 50 Hz ±2%</td>
</tr>
<tr>
<td>Rated output voltage</td>
<td>3x380 (±2%)</td>
</tr>
<tr>
<td>Control system</td>
<td>RUMB</td>
</tr>
<tr>
<td>Communication channel</td>
<td>RS 232, RS 485</td>
</tr>
<tr>
<td>Operating temperature range, °C</td>
<td>from -60 to +50</td>
</tr>
<tr>
<td>International Protection Code</td>
<td>IP43</td>
</tr>
</tbody>
</table>
ESP Switchboard with a direct-on-line starter "RUMB"

Application:
Switchboards with a direct-on-line starter "RUMB" are applied controlling and protecting an electric submersible pump (ESP) for oil extraction. Control station is designed with multitasking control system based on microprocessor controller, and convenient interface.

Switchboard with a direct-on-line starter ensures:
- Control in a manual or automatic mode. In manual mode station is operated by operator from the control console. In automatic mode automatic reset of control station after protective actions is available, and there is operational mode with timer.
- Control and protection of SEM. Switchboard with a direct-on-line starter «RUMB» allows to control of electric mains voltage, currents, isolation resistance of the system "power cable — SEM" and automatic switching off provided when parameters are within the working range.

The most complicated aspect of engaging – turbine rotation. Recording controlled parameters of SEM rotation frequency and reasons for SEM switching off in real time saving records, because of emergency mode.

Functionality:
- ESP protection against abnormal operating conditions;
- operating history storage in a nonvolatile memory;
- periodic operation with predetermined running and idling time periods;
- periodic operation on a given schedule;
- periodic operation in accordance with the value of a process parameter;
- energy-use metering;
- injected water metering;
- establishing different access levels for personnel by means of proximity access identifiers;
- software update software update in the field by means of the RUMB UPI-06 Data Transfer Device.

Additional Sensors
- downhole ESP monitoring systems of various manufacturers;
- analog or digital annular pressure sensor;
- analog or digital tubing-head pressure sensor;
- analog or digital gathering-line pressure sensor;
- stationary echo sounder;
- two pulse fluid meters; one or two contract pressure gage.

Protection against abnormal operating conditions:
- restraint on ESP switching on during the supply voltage recovery with incorrect phase sequence;
- restraint on ESP switching on caused by power supply overvoltage or undervoltage;
- emergency shutdown caused by phase overloading with selection of max. phase current, restraint to reset;
- emergency shutdown caused by supply voltage deviation more than 20% and less than 20%, if deviation brings to inadmissible current overloading, with automatic ESP switching on after recovery;
- emergency shutdown caused by phase underloading, with delay for probe triggering;
- emergency shutdown and restraint on switching on caused by supply voltage unbalance;
- emergency shutdown caused by exceeding of selected settings of SEM current imbalance;
- adjustable protection against overloading and underloading, against voltage reduction and rising;
- adjustable delay autoreclosing mode for various protection modes;
- option to select autoreclosing mode and autoreclosing mode with blocking.

Monitored Parameters:
- apparent power consumption;
- active power consumption;
- phase total current of secondary circuit TMPN;
- active current of secondary circuit TMPN;
- average total current of secondary circuit TMPN;
- phase current of primary circuit TMPN;
- phase voltage of primary circuit TMPN;
- line voltage of primary circuit TMPN;
- average phase voltage of primary circuit TMPN;
- ESP motor load as a percentage of the rated load;
- power factor (cos φ);
- insulation resistance of system "cable-electromotor";
- phase voltage unbalance;
- phase current unbalance;
- motor rotational frequency;
- power consumption;
- pressure at pump intake;
- fluid temperature at pump intake;
- SEM winding temperature;
- axial and radial vibration acceleration of the ESP motor;
- pressure drop on the trunk-line inlet filter;
- discharge pressure;
- suction pressure;
- fluid level;
- produced fluid quantity.

The specification conforms to the specification of control station with soft starter.
DUAL COMPLETION SYSTEMS (ORE)

We carry out the equipment selection for dual well completion, delivery, leasing and technical support of application. Application of dual completion systems is realized since 2005. As of today, more than 1000 installations ORE on deposits of JSC “Tatneft”, and also small oil companies of republic of Tatarstan and LLC “LUCOIL-Komi”, are introduced.

Design of dual-completion system:
- ECN-SGN;
- UVSN-UVSN;
- EVN-SGN;
- ORZiD.

Purpose:
Completion production systems are used to produce oil from two or more producing zones by a single wellbore.

Application:
- Wells penetrating several producing zones with differing reservoir properties and characteristics of reservoir fluids;
- Watered-out producers operating under conditions of high pressure differential;
- Draining low-yielding zones, when drilling separate wells would be uneconomical;
- Wells with widely spaced development targets.

Technical efficiency:
- Improved production economics;
- Cost saving due to reduced drilling metrage.

Advantages:
- enhanced oil recovery and well production rate at the expense of complementary involvement of permeability barrier;
- efficiency and intensity increasing of deposit development by means of separate involvement of various penetrable beds;
- drilling cost savings;
- adjustment process acceleration of pumping in time and according to the well profile;
- increasing profitable period of wellbore operation;
- reduction of operating costs;
- operational efficiency of formation pressure, deviation and speed control filtration of formation fluids.

Operating limits:
- Pipe size from 146 мм;
- min. amount of targets in wellbore - 2;
- min. space between pay zones - 3 m;
- production string hermeticity;
- max. drift angle - 2° at 10 m;
- absence of cement coating over internal diamater of production string, absence of packers.

---

ORE systems.
Scheme of ECN-SGN

Sucker-rod/ESP systems for dually-completed wells.

---

Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>3УКП-ЯПН1 146</th>
<th>3УКП-ЯПН1 168</th>
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<tbody>
<tr>
<td>Pipe size (mm)</td>
<td>146</td>
<td>168</td>
</tr>
<tr>
<td>Diameter of installation substructure, mm, max</td>
<td>124</td>
<td>147</td>
</tr>
<tr>
<td>Max. housing diameter of CP, mm</td>
<td>92</td>
<td>103</td>
</tr>
<tr>
<td>Max. housing diameter of SEM, mm</td>
<td>103</td>
<td>117</td>
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<td>SEP control station type and brand approved in Russian Federation</td>
<td>approved in Russian Federation</td>
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<tr>
<td>Tubing ГОСТ Р 52203-2004</td>
<td>60; 73</td>
<td>60; 73; 89</td>
</tr>
<tr>
<td>Operating environment</td>
<td>oil, formation water</td>
<td></td>
</tr>
<tr>
<td>Max. temperature of operating environment, К (°C)</td>
<td>393(120)</td>
<td></td>
</tr>
</tbody>
</table>
**Purpose:**
Dual completion production systems are used to produce oil from two or more producing zones. (UECN operates the upper oil-producing interval, SGN operates the lower aquifer) UORE ESV–146 (168). Systems are designed for dual completion operation of two shared targets with the opportunity of separated lifting and transportation of production, as required.

**Operating limits:**
- min. nominal diameter of string -146 mm;
- min. amount of targets in wellbore - 2;
- wells with widely spaced development targets;
- production string hermeticity and absence of outer hydrodynamical connection between targets;
- max. drift angle - 2° at 10 m;
- absence of cement coating over internal diameter of production string, absence of packers.

### Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>String diameter, mm</td>
<td>146, 168</td>
</tr>
<tr>
<td>Diameter of installation substructure, mm, max</td>
<td>124, 147</td>
</tr>
<tr>
<td>Tubing diameter according to the GOST R 52203, mm</td>
<td>60, 73; 89; 102</td>
</tr>
<tr>
<td>Nominal size of rods SN or SNP no GOST 51161, mm</td>
<td>16, 19, 22; 25</td>
</tr>
<tr>
<td>Sucker-rod pump type and brand according to the GOST R 51896-2002, mm</td>
<td>rated diameter 106, 125, 150, 175, 225 RHB C</td>
</tr>
<tr>
<td>Nominal diameter of SEM according to the GOST 30195, mm</td>
<td>96, 103; 96, 103; 117</td>
</tr>
<tr>
<td>Control station of ESP</td>
<td>approved in Russian Federation</td>
</tr>
</tbody>
</table>

![Diagram of system UORE ESV–146 (168)](image)

**ESP-aided dump flooding**

**Purpose:**
ESP-aided dump flooding system (UVSP) ensures transfer of formation water from the lower aquifer to the upper oil-producing interval, for the purpose of formation pressure maintenance (FPM).

**Installation design for VSP:**
- single-string UVSP–146 (168)-NV - transfer of formation water from the lower aquifer to the upper oil-producing interval;
- dual-string UVSP–146 (168)-NV - transfer of formation water from the lower aquifer to the upper oil-producing interval;
- single-string UVSP–146 (168)-NV - transfer of formation water from the upper oil-producing interval the lower aquifer.

**Advantages:**
- reservoir pressure maintenance in small areas in case of absence or remoteness of pressure maintenance systems;
- saving costs for well drilling;
- no need of surface pump installation and utility lines;
- taking water form the aquifer and injecting it to the oil-producing interval.

**Operating limits:**
- min. nominal diameter of string -146(168) mm;
- min. amount of targets in wellbore, first - water-bearing, other - oil-bearing;
- min. space between targets - 3 m;
- production string hermeticity and absence of outer hydrodynamical connection between targets;
- max. drift angle - 2° at 10 m;
- absence of cement coating over internal diameter of production string, absence of packers.
### Specification of system for formation water transfer from the upper oil-producing interval to the lower aquifer UVSP–146 (168)-VN

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>String diameter, mm</td>
<td>146</td>
</tr>
<tr>
<td>Diameter of installation substructure, mm, max</td>
<td>124</td>
</tr>
<tr>
<td>Max. housing diameter of CP, mm</td>
<td>92</td>
</tr>
<tr>
<td>Max. housing diameter of SEM, mm</td>
<td>103</td>
</tr>
<tr>
<td>Type of control station of ESP approved in Russian Federation</td>
<td>Tubing* GOST R 52203-2004</td>
</tr>
<tr>
<td>Operating environment</td>
<td>formation water</td>
</tr>
<tr>
<td>Temperature of operating environment, K (˚C), max</td>
<td>393(120)</td>
</tr>
</tbody>
</table>

### Specification of system for formation water transfer from the lower aquifer to the upper oil-producing interval UVSP–146 (168)-NV

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>String diameter, mm</td>
<td>146</td>
</tr>
<tr>
<td>Diameter of installation substructure, mm, max</td>
<td>124</td>
</tr>
<tr>
<td>Max. housing diameter of CP, mm</td>
<td>92</td>
</tr>
<tr>
<td>Max. housing diameter of SEM, mm</td>
<td>103</td>
</tr>
<tr>
<td>Type of control station of ESP approved in Russian Federation</td>
<td>Tubing* GOST R 52203-2004</td>
</tr>
<tr>
<td>Operating environment</td>
<td>formation water</td>
</tr>
<tr>
<td>Temperature of operating environment, K (˚C), max</td>
<td>393(120)</td>
</tr>
</tbody>
</table>
Dual operation pumping system with pumping of associated water into the intake bed

Purpose:
Dual operation pumping system (NSDD) is applied to increase efficiency of high flooded well operation by means of separating out of oil and water from formation fluid, lifting of watery oil to the wellhead, pumping of associated water into intake bed without lifting.

Application:
High flooded well with ESP, developed the available for pumping the associated water overlying intake bed.

Operating limits:
- min. nominal diameter of string -146 мм;
- min. amount of targets in wellbore - 2;
- min. space between targets - 3 м;
- production string hermeticity and absence of outer hydrodynamical connection between targets;
- max. drift angle - 2° at 10 m;
- absence of cement coating over internal diameter of production string, absence of packers.

Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>String diameter, mm</td>
<td>NSDD 01-146</td>
</tr>
<tr>
<td>Diameter of installation substructure, mm, max</td>
<td>146</td>
</tr>
<tr>
<td>Rated diameter of ESP, mm</td>
<td>NSDD 01-168</td>
</tr>
<tr>
<td>92;103</td>
<td>147</td>
</tr>
<tr>
<td>Type and brand of control station</td>
<td>approved in Russian Federation</td>
</tr>
<tr>
<td>Operating environment</td>
<td>oil, formation water</td>
</tr>
<tr>
<td>Temperature of operating environment, K (°C), max</td>
<td>393(120)</td>
</tr>
</tbody>
</table>

*Parameters of the current system are identical to the parameters of ECN-SGN
Dual completion system employing screw pump with pump case, operating the lower target, or sucker rod pump operating the upper target

Operating limits:
- min. nominal diameter of string - 168 mm;
- min. amount of targets in wellbore - 2;
- min. space between targets - 3 m;
- production string hermeticity and absence of outer hydrodynamical connection between targets;
- max. drift angle - 2° at 10 m;
- absence of cement coating over internal diameter of production string, absence of packers.

Dual completion system employing twin screw pump with pump case (lower screw pair operates the lower target, upper screw pair operates the upper target)

productivity - 12, 16 and 25 m³/day

Operating limits:
- min. nominal diameter of string - 168 mm;
- min. amount of targets in wellbore - 2;
- min. space between targets - 3 m;
- production string hermeticity and absence of outer hydrodynamical connection between targets;
- max. drift angle - 2° at 10 m;
- absence of cement coating over internal diameter of production string, absence of packers.
SERVICE of oilfield equipment

• Field equipment service of electric submersible pump installations
• Field equipment service of reservoir pressure maintenance system
• Capillary reagent feeding system to well

If you have any further questions or offers, contact us via the following telephone numbers:
marketing department tel/fax: +7 (8553) 31-84-71, 31-85-67, 37-00-85;
reception +7 (8553) 45-89-13
Field equipment service of electric submersible pump installations.

Field equipment service of electric submersible pump installations includes:
- delivery at wellhead, assembly, disassembly of УЭПН electrical submersible pump installations and ground-based electrical equipment (control station and transformer);
- launch after well-workover operation, selection of operation mode;
- maintenance work of ТМПН, control station (with frequency converter or with soft start) at wellhead;
- assembly of antenna-feeder arrangement system for information transmission using a control station controller or operator's console;
- quick execution of current repair requests;
- pickup and delivery of surface and submersible equipment to a maintenance department after disassembly.

Basic types of maintainable equipment (UEPN):
- UECN - electrical centrifugal pump installation;
- USVN with PP - installation of screw-sucker-rod pump with top-head drive;
- UEDN - electrical diaphragm pump installation;
- UEVN - electrical screw pump installation;
- UNCV with VP - electrical centrifugal pump installation with top drive;
- CNV – water centrifugal pump;
- NESI – electrical inductive downhole heater;
- heater ТЕРМ- is applied for heating of formation fluid in bottomhole in order to increase fluidity and reduce asphaltic resinous paraffine sediments on equipment.
- SB – switchboard UEPN;
- TMPN – oil transformer of submersible pump.

Field equipment service of reservoir pressure maintenance system

Field equipment service includes:
- delivery, assembly, disassembly of pumping units of types CNS and GNU;
- routine maintenance of pumping units, including auxiliary equipment;
- technical control of pumping unit.

Basic types of maintainable equipment:
- sectional centrifugal pumps;
- horizontal pump installations produced by domestic enterprise and other producers;
- pumping units;
- high-voltage and low-voltage control stations, switchboards, low-voltage and high-voltage SEM;
- stop valve, oiling systems, electrical equipment and hoisting devices KNS etc.
Capillary reagent feeding system to wells

**Purpose and application:**
Capillary reagent feeding system is designed for dosed injection of chemical reagent into oil, water and gas well in order to prevent deposits of paraffins and inorganic salt, to reduce corrosiveness of production, to reduce stable emulsion breaking. In downhole pipeline, fixed on the outer surface of the tubing, chemical reagent goes to the interval (scheme).

**Structure:**
Capillary reagent feeding system consists of surface and downhole parts:
1. dispensing installation,
2. ground pipeline,
3. input device through the outer side,
4. input device through the cable entry,
5. capillary tube,
6. protectolizer.

Continuous operating time (upon operation of one dosing pump at the maximum efficiency), day - from 1 to 250 l/d. Dosing installation is used with anisochronous, electromagnetic and incremental drive.

Ground pipeline is designed for connection between the dosing installation and input device through the cable entry. Depending on climatic conditions capillary reagent feeding system can be completed with ground pipeline with a heater. Downhole part consists of capillary armoured (not armoured) pipeline, sprayer, load, centralizer, valve and other equipment. Capillary pipeline made from polypropylene, normalized polyethylene and stainless steel. Capillary pipeline types: special polymeric pipeline and special polymeric armoured pipeline.

**Advantages:**
- Heat-resistance level of chemical reagent is measured depending on material type of capillary tube, max, °C:
  - high-density polyethylene: 70
  - polypropylene compositions: 100
  - thermoeleastolver: 110
  - high-density vulcanized polyethylene, copolymer and block copolymer of propylene: 120
  - fluoroplastic, fluorocopolymer: 160
- capillary tube OD, mm: 10, 13, 15
- capillary tube ID, mm: 4, 5
- ovality of capillary tube, OD, max, %: 15
- operating pressure, max, MPa: 5
- length, m: до 3600

**Technology of Capillary reagent feeding with capillary devices allows:**
- to dose chemical agent efficiently;
- to ensure the chemical reagent feeding into required point of wellbore;
- to increase error-free running time of well;
- significantly reduce expensive reagent consumption by means of exact dispensing into the insertion point with more effective dose and concentration of chemical composition.

**Capillary supply system of the following chemical reagents:**
- corrosion inhibitors (Record-608, SNPh-1004, SNPh-1007, Doc-12, Reapon-IF, Sonkor-9701, Vikor-1A etc.);
- demulsifying agent (Daufax DB-02, Daufax 63N40, Intex 720, Sondem 4401, SNPh-4410, 4403, Record-758 etc.);
- scale inhibitors (Sonsol-2001A, SNPh-5312, Sonsol-3001, Sonsol-3003M, SNPh-5313 etc.);
- inhibitor of paraffin deposit (SNPh-7941, SNPh-7963, PAP-28A, Sonpar-5403 etc.);
- oil menstruum (Miaprom, Sonpar-5402, SNPh-7870, MS-25, JOU etc.);
- weak acid (5-15% HCl).

**Chemical feeding scheme:**
- to dose chemical agent efficiently;
- to ensure the chemical reagent feeding into required point of wellbore;
- to increase error-free running time of well;
- significantly reduce expensive reagent consumption by means of exact dispensing into the insertion point with more effective dose and concentration of chemical composition.
CABLE production

- Cables for submersible pumps KPBP-90, KPBK-90, KPpBP-120, KPpBK-120, KPpTBP-130, KPpTBK-130
- Flat heat-resistant cables for submersible electric pumps KIFBP - 200, KIFBP - 250
- Winding wires with enamel insulation
- Winding wires with film insulation
- Special armored polymeric pipeline
- Universal cables
- Power cables with PVC insulation and sheath VVG, VVG-P, VVGng
- Power cables, low flammability and low gas and smoke emission VVG- P ng-LS
- Control cable with polyvinylchloride insulation and cover KVVG
- Installation wire PV1

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reception +7 (8553) 45-89-13
### Cables for submersible pumps

**KPBP-90, KPBK-90 (TS 16-505.129-2002)**  
**KpTBP-130, KpTBK-130 (TS 3542-097-04724019-2005)**

**Application:**  
Cables with insulation made from polyethylene, polypropylene, block polymer propylene with ethylene are applied for supply of electricity to SEM with nominal voltage - 3,3 kV, rate up to 50a Hz. Climatic version UHL, category 1 and 5 according to the GOST 15150-69, for operation in well fluid.

**Design:**  
Cable is produced flat and round, with armor made from steel galvanized strip or stainless steel strip.

**Design:**  
1 — copper electric conductor;  
2 — first insulating layer;  
3 — second insulating layer;  
4 — bedding made from belt of nonwoven fabric;  
5 — armor made from steel galvanized strip.

### Design factor

<table>
<thead>
<tr>
<th>Cable brand</th>
<th>Nominal cross-section area of conductor, mm</th>
<th>Estimated weight of 1 km, kg</th>
<th>Cable OD (diameter), mm</th>
<th>Max. conductor heating temperature, °C</th>
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</thead>
<tbody>
<tr>
<td>KPBP-90</td>
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<td>814</td>
<td>10,7х27,0</td>
<td>90</td>
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<td></td>
<td>3х10</td>
<td>898</td>
<td>13,6х33,8</td>
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<td>3х16</td>
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<td></td>
<td>3х25</td>
<td>1392</td>
<td>33,7</td>
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**Designation:**  
KPBP-90, KPBK-90 — cable with polyethylene insulation, armoured, flat (round), permissible conductor heating temperature, max - 90 °C.  
KPpBP-120, KPpBK-120 - cable with polypropylene insulation, armoured, flat (round), permissible conductor heating temperature, max - 120 °C.  
KpTBP-130, KpTBK-130 - cable with insulation made from block polymer propylene with ethylene, heat-resistant, armoured, flat (round), permissible conductor heating temperature, max - 130 °C.
Flat heat-resistant cables for ESP KIFPB – 200, KIFPB – 250
(TS 3534-003-52576198-2007)

Purpose and application:
Cables are applied for energy transmission at SEM on nominal voltage up to 4,2 кW, frequency 50-70Hz, permissible operational temperatures is from -60°C to +200°C or +250°C. Climatic version UHL, category 1 and 5 in accordance with GOST 15150-69, for operation in well fluid. Can be used as lengthener.

Design:
Cable is produced flat, with armor made from steel galvanized strip or stainless steel strip.

Structure:
1 - copper electric conductor;
2 - insulation made from polyimide-fluoroplastic film;
3 - insulation made from extruded fluoropolymer;
4 - bedding made from belt of nonwoven fabric;
5 - armor made from steel galvanized strip.

Designation:
KIFPB – 200 – cable insulated by polyimide-fluoroplastic film and fluoropolymer, armored, flat, max. heating temperature of conductor up to 200 °C.
KIFPB – 250 – cable insulated by polyimide-fluoroplastic film and fluoropolymer, armored, flat, max. heating temperature of conductor up to 250 °C.

Winding wire with enamel insulation

Application:
Wires are applied for production and extensive repair of SEM winding, transformer winding, relay and inductance coil, and also measuring instruments and etc. Operation temperature - from -60° up to 200°C.

Wires can be of different series:
- PETV-1 (ТS 16-705.110-79);
- PETV-2 (ТS 16-705.110-79);
- PET-155 (ТS 16.K71-160-92);
- PET-55 (ТS 16-705.173-80);
- PET-200 (TS16-505.937-76).

PETV-1 – copper enameled wire, heat-resistant, covered with high-tensile thinned enamel, TI 130.
PETV-2 – copper enameled wire, heat-resistant, covered with high-tensile enamel, normal thickness, TI 130.
PET-155 – copper wire enamelled by polyester, TI 155.
PETM-155 – copper wire, covered with insulating polyestercyanuratimide enamel, heat-resistant for mechanized winding, TI 155.
PET-200 – copper wire enameled by polyamide, heat-resistant, TI 200.

Structure:
1 - copper wire in diameter from 0,40 up to 2,0 mm;
2 - enamel insulation.
**Winding wires with film insulation**

**Purpose and application:**
Winding wires are applied for SEM winding. It is used in the process of manufacturing and extensive repair of SEM stator.

Excellent electrical properties of wire ensure high degree of equipment reliability under overstrain.

**Wire can be of different series:**
- PPI – (ТS 16-705.159-80);
- PPI – U (ТS 16-705.159-80).

**Designation:**
- PPI – copper wire with insulation made from polyimide-fluoroplastic films (one type);
- PPI-Y – copper wire with insulation made from polyimide-fluoroplastic films (different types).

**Structure:**
1 - copper wire in diameter from 1.80 up to 3.15 mm;
2 - insulation consist of polyimide-fluoroplastic films.

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**Special polymeric armoured pipeline**
(TS 3666-001-82321082-2011)

**Purpose and application:**
Pipeline is designed for chemical reagent feeding into the required interval. Pipeline is designed for operation under higher temperature up to 120°C. UHL climatic configuration, category 1 and 5 in accordance with GOST 15150-69, for operation in formation fluid.

**Design:**
Pipeline is designed flat and round, armored, made from steel galvanized strip or stainless steel strip.

**Designation:**
SPBT - special polymeric armored pipeline.

**Design factor:**
- amount of polymeric pipelines – from 1 to 3;
- outer diameter polymeric pipeline - 10,1±0,3 mm;
- inner diameter polymeric pipeline - 4,5±0,5 mm.

**Structure:**
1 - polymeric tube;
2 - bedding made from belt of nonwoven fabric;
3 - armor made from steel galvanized strip.
### Universal cable

**(TS 3666-002-82321082-2011)**

**Purpose and application:**
Universal cable is designed for energy transmission at SEM on nominal voltage 3.3 kW, frequency 50 Hz, and for chemical feeding. Max. heating temperature of conductor - 120°C. UHL climatic configuration, category 1 and 5 in accordance with GOST15150-69, for operation in well fluid.

**Design:**
Universal cable is produced flat, with armor made from steel galvanized strip or stainless steel strip.

**Designation:**
UKU – universal cable.

**Structure:**
1 - electric conductor;
2 - undercoat and secondary coat;
3 - polymeric pipeline;
4 - bedding made from belt of nonwoven fabric;
5 - armor made from steel galvanized strip.

**Design factor:**
3x16 + capillary tube (outer Ø10,1; inner Ø4,5).

### Power cables with PVC insulation and sheath VVG, VVG-P, VVGng

**(GOST 16442-80)**

**Purpose and application:**
Power cables are designed for energy transmission and distribution at stationary installations for fixed wiring on AC nominal voltage 0.66 kW and 1.0 kW, frequency 50 Hz, DC nominal voltage is 2.4 times more than AC nominal voltage. Cables are produced for operation in temperate, frigid and tropical climate. Cables are applied for vertical, inclined and horizontal path.

**Cables are used for cabling:**
- in the open air, in the absence of mechanical damaging during the operation;
- for cabling in dry or damp premises (tunnel), channels, mines, collectors, production area;
- for cabling on scaffold bridge, in blocks;
- for cabling in fire-hazardous premises;
- for cabling in explosion hazard zones, type B-I, B-Ir, B-II, B-Ia;
- cables with copper conductors are applied for cabling of lighting network in explosion hazard zones type B-Ia.

**Designation:**
VVG - Power cable with copper conductor, with insulation and cover made from PVC plasticate.
VVG-P - Power cable with copper conductor, with insulation and cover made from PVC plasticate, flat.
VVGng - Power cable with copper conductor, with insulation made from PVC plasticate and cover from PVC plasticate, low inflammability level.

**Structure:**
1 – electric conductor;
2 – insulation made from polyvinylchloride plasticate (PVC);
3 – cover made from PVC plasticate, cable brand VVG made from PVC plasticate, low inflammability.

**Design factor:**
Nominal cross-section area of conductor, mm²: (1+4) x (0.75+16) mm²
Power cables, low flammability and low gas and smoke emission
VVG- P ng-LS
(TS 3520-008-04724019-2006)

Purpose and application:
Power cables are designed for energy transmission and distribution at stationary installations for fixed wiring on AC nominal voltage 660V or 1000V, frequency 50 Hz, DC nominal voltage is 2,4 times more than AC nominal voltage.

Cables are produced for operation in temperate, frigid and tropical climate. Cables are applied for operation overland, on the river and lake, 4300 m. above sea level. Cables are designed for vertical, inclined and horizontal path.

Cables are used for cabling:
- in the open air in the absence of mechanical damage during the operation;
- for cabling in dry or damp premises (tunnel), channels, mines, collectors, production area;
- for cabling on scaffold bridge, in blocks;
- for cabling in fire-hazardous premises;
- for cabling in explosion hazard zones, type B-I6, B-Ir, B-II, B-IIa;
- of lighting network in explosion hazard zones type В-Iа.

Designation:
VVG-P ng-LS – power cable with copper conductors with insulation and cover made from polyvinylchloride plasticate, low flammability, low gas and smoke emission.

Structure:
1 - conductor;
2 - insulation made from polyvinylchloride composition, low inflammability level;
3 - cover made from PVC composition, low inflammability level.

Design factor:
Nominal cross-section area of conductor, mm²:
(1÷4) х (0,75÷16) mm²

Control cable with polyvinylchloride insulation and cover KVVG
(GOST 1508-78)

Application:
Cables are intended for stationary connection to electric devices, units, cassemblies of clamps of electric distributing devices, rated voltage up to 660 V, frequency up to 100 Hz, dc voltage up to 1000 V.

Cables are applied for cabling in the open air, in the premises, channels, tunnels, in corrosive environment, if the mechanical stress involved is moderate. They are suitable for direct burial if they are protected at outcroppings. Cables have low flammability (in accordance with GOST 12176-89). UHL climatic configuration in accordance with GOST 15150-69.

Designation:
KVVG – control cable with copper conductors, with insulation made from polyvinylchloride plasticate in polyvinylchloride cover, without outer covering.

Structure:
1 - electric conductor;
2 - insulation made from PVC plasticate;
3 - cover made from PVC plasticate.

Design factor:
Nominal cross-section area of conductor, mm²:
(1÷19) х (0,75÷16) mm²
Installation wire PV1 (GOST 6323-79)

Application:
Wires are designed for electrical energy distribution in power and lighting mains indoor and outdoor conditions, ac voltage - 380 and 660V. Is applied for mounting of secondary circuit, installation on pipes, and mounting of power and lighting mains.

Designation:
PV1 – copper wiring cable with polyvinylchloride insulation.

Structure:
1 - electric conductor;
2 - insulation made from PVC plasticate.

Design factor:
0,75; 1,0; 1,5; 2,5; 6,0; 10; 16 (conductor section mm²).
For notes