***5.3 Technological Pipelines***

Pipelines with pressure up to 10 MPa (100 kgf/cm2) inclusive should be subdivided into groups (A, B, C) depending on the transported substance hazard class (explosivity, fire risk and insalubrity) according to section of RB «Recommendations for Construction And Safe Exploitation of Technological Pipelines», and also should be subdivided into five categories (I, II, III, IV, V) depending on fluid operating parameters (pressure and temperature).

Shutter tightness of pipeline stop valves should be selected in accordance with tightness norms. Leak tight rate of valves should not be lower than “A” (GOST R 54808-2011).

Pipeline laying should provide the smallest length of сommunications, exclude sagging and forming of stagnant zones.

As a design pressure in pipeline is taken:

- design pressure for the device which is connected to the pipeline;

- for compressor penstock - maximum pressure generated by compressor with closed gate valve from the pumping side;

- for pipelines with mounted safety valves - set pressure of the safety valve.

When selecting materials and wares for pipelines, follow the requirements of RB «Recommendations for Construction And Safe Exploitation of Technological Pipelines» and instructions in other regulatory and technical documents, which establish its assortment, nomenclature, types, basic parameters, conditions of use etc. At the same time it should be considered:

- design pressure and design temperature of transported fluid;

- properties of transported fluid (explosivity, fire risk, insalubrity etc.);

- properties of materials and wares (strength, cold resistance, weldability etc.);

- subzero temperature of environment for pipelines located outdoors or in unheated premises.

When selecting materials and wares for pipelines, as subzero design air temperature is taken:

- average temperature of the coldest five days in region with provision 0.92, if operating temperature of pressurized or being under vacuum pipeline paries is above zero;

- the absolute minimum temperature in region, if operating temperature of pressurized or being under vacuum pipeline paries can be subzero by the influence of environmental air.

Construction and design features of pipelines, pipeline components and valves shall comply with the requirements of RB «Recommendations for Construction And Safe Exploitation of Technological Pipelines». Material of pipeline components generally shall comply with material of connecting pipes. Quality and technical specifications of materials and produced wares, used for pipeline production, should be verified by appropriate passports or certificates.

Material performance of pipelines shall comply with company condition №P1-01.04 R-0009 “Quality Criteria of NK Rosneft JSC And It’s Owned Subsidiary Extraction Pipelines”, approved by the order №59 dated January 31, 2012, enacted January 31, 2012.

Gas, oil, gas condensate and brine water pipelines should be performed by 13XFA, other pipelines – by 09G2C.

Standard size of pipelines shall comply with unified pipe assortment and unified pipeline components nomenclature, presented in appropriate NK Rosneft JSC standarts.

When using and welding heterogeneous steels, follow the instructions of appropriate regulatory and technical documents.

Flanged and threaded joints allowed only in points of stop valves, pressure controllers and other equipment attachment, as well as instrumentations attachment.

Pipes, shaped connecting parts, flanges, gaskets and fasteners applied to pipelines have to meet the requirements of appropriate regulatory and technical documentation.

In the joints of pipelines with сombustible products and collector envisaged the valves mounting for its periodic disabling. At the beginning and at the end of every pipeline should be mounted stop devices for pipelines emergency decommissioning.

Material and design form, mechanical properties of valves have to be in accordance with Vankorneft JSC Technical Requirements for Manufacturing, Supply, Mounting of Manual And Electrified Stop Valves 1171-24.2006-01-40000-TH-TT-01. Stop valves have to be full-bore. Material form of stop and control valves depends on steel grade of pipeline which it is mounted on.

The project provides portable or stationary mechanization means for mounting and dismounting in mounting zones of valves and complex pipeline nodes weighing more than 50 kg and requiring periodic dismantlement.

On the pipelines which supply A and B group fluids in receptacles, operating under excess pressure, check valves are mounted.

Check valve have to be placed on the supply pipeline between receptacle and stop valves. If the same pipeline serves for supply and output of fluid, then сheck valve is not mounted. Check valve is mounted between supercharger and stop valves, on the centrifugal pumps. On the centrifugal pumps, which operate in the system without overpressure, сheck valves may not be mounted. Flanged joints are placed in visible points, available for maintenance, dismantling, repairs and mounting. It is not allowed to place pipeline flanged joints near fire hazard, volatile, toxic and caustic substances, above zones, destined for people and laboring areas.

Corrosion protection of pipelines and valves outer surface have to be performed according to Painting Specifications №VDD-SLI-T-PI-SPE-CPF-0003.

Corrosion protection of inner and outer surfaces of tank equipment have to be performed in manufacturing plant according to NK Rosneft JSC Technological Instructions № P.2-05.02 TI-0002.

Color solution have to comply with company guidelines №PZ-01.04 M0006 “Applying of NK Rosneft JSC Corporate Identity”.

Pipelines location have to provide convenience of its maintenance.

Pipeline valves should be conveniently and safely placed for maintenance and repairs. Valves manual actuator should be mounted on the height not more than 1.8 m from the floor of the room or platform, which operation is carried out from. With frequent use of valves actuator should be mounted on the height not more than 1.6 m.

Function and traffic direction of fluid should be indicated on pipelines.

Pipelines, which exposed to an endurance test and a density test in conjunction with the apparatus, should be calculated on durability with considering apparatus test pressure.

Pipelines location have to provide convenience of its maintenance.

Quality control of pipelines welds is held according to requirements of valid normative documents.

Identity coloration and marking of pipelines and its elements should be performed according to state standard and normative and technical documentation for industrial safety and for customer specifications.

Documentation and pipelines or its elements marking supplied by the manufacturer should be developed and delivered bundled with supplied products in a volume of requirements of section RB «Recommendations for Construction And Safe Exploitation of Technological Pipelines».

Marking and packaging requirements have to correspond to document №VDD-SLI-T-ME-SPE-CPF-0031.

**6 TECHNICAL DOCUMENTATION (PRODUCTION TECHNOLOGY)**

Provider technical documentation should have:

- full documents registry (passports, certificates, permissions for equipment using, mounting instructions, operating instructions etc.);

- information about development status and documentation release (with representation of the next documents versions deadlines);

- equipment layout drawings;

- equipment specification (all marks);

- sheet with scope of work for enlarged assembly of buildings and structures, pipe spools, equipment, metal structures, cable production and devices supplied elements.

Anyway supporting documents kit should not contain documentation at least established by GOST 2.601-2006.

Full documentation for supplied equipment have to be presented to Customer and General Designer (Giprovostokneft JSC) before its manufacturing.

Technical documentation shall include facility characteristics:

- technological schemes of modules and objects as a whole with streams parameters on the borders of objects;

- name, characteristics and anchoring of all dimensions of main and auxiliary pipelines at the modules border;

- data with dimensions and weight of modules and removable elements;

- technical characteristics of separate equipment;

- initial data for modules substructure design with indication of static and dynamic loads, location and size of anchor bolts;

- data with consumed energy resources, information about estimated electrical loads and input voltage of electroconsumers and power inlet places, explosion safety performance of every electroconsumer;

- layout, montage drawings, include combined images of support posts for cables, cabinets and other devices, which affect on the equipment maintenance conditions;

- hideout of pumping equipment and piping;

- permissible connecting nipples loads from the side of external pipelines; requirements for the control systems equipment placement to provide its operability;

- heat consumption on heating and heat supply of hideouts, connecting to heat networks facility;

- functional automation scheme;

- Scheme should be accomplished as GOST 21.404-85 required;

- Instrumentation and automation equipment specification;

Document have to contain designation of instrumentation and automation, name, technical

specifications, quantity, manufacturer.

- cables and conduits log;

Document have to contain designation of instrumentation and automation cables, name, technical specifications (veining, an outer diameter, etc.), laying conditions, connecting places of both ends, voltage, quantity, number of connecting scheme.

- Schemes of external electrical wiring / planimetric schemes;

- junction boxes connecting schemes;

- location plans of instrumentation and automation equipment, cable and pipe wiring in technological blocks;

On plans it should be specified anchor sites of devices installation, connection boxes, local control system equipment, elevations, location and coordinates of wiring, location and coordinates of cable inlets.

- the list of input/output signals;

Document have to contain characteristics of the information signals, transmitted from facility to control system, and control signals from control system to facility.

- "Cause-effect" table;

Table should have the list of possible emergencies on facility and appropriate actions of control system elements.

- mounting installation drawings of instrumentation and automation equipment.

Requirements to fulfill technological schemes:

- equipment location on technological schemes should comply with its real location on arrangement drawings. Pipelines connecting sequence to collectors should comply with real sequence on arrangement drawings;

- when technological scheme placing on multiple drawings, schemes drawings have to dock each other along the pipelines, it should not be omission pipelines on drawings, through which pipelines lie by transit;

- on the brims of scheme drawings, at the point of jump to an adjacent drawing it should be listed links – “continuation of dr. N” or “beginning of dr. N”.

Provider solely responsible for implementation of Customer technological conditions and for procuring facility safe exploitation. It should be appropriate notation by responsible developer according to GOST 21.1101-2009 about it.

Composition, content and deadlines of documentation submission have to comply with the requirements, forth in Annex T and comply with Customer requirements for documentation 2102-33-110000-TKD.

All Developer and Provider documentation about compressor station equipment have to be agreed with Customer in development phase and in final acceptance phase.

***Annex D***

**The List of Attached Documents**

|  |  |
| --- | --- |
| 0222-004-APG sheet 7 | Principal technological scheme of vacuum compressor station. |
| 0222-004-APG sheet 8 | Vacuum compressor station. Plan on elevation 0.000. Plan on elevation +1.500. Plan on elevation +4.500. Incisions. |
| 0222-004-PS sheet 5 | Vacuum compressor station. Plan of electrical wiring. |
| 0222-004-PS sheet 8 | Vacuum compressor station. The list of input/output signals. |
| 0222-004-PS sheet 11 | Vacuum compressor station. Functional automation scheme. |
| 0222-004-ASU sheet 16 | Vacuum compressor. Functional automation scheme. |
| 0222-004-ASU sheet 17 | Vacuum compressor. Pumps 001-04-NA-1/1.2. Functional automation scheme. |
| 0222-004-ASU sheet 18 | Vacuum compressor. Receptacles 001-04-E-1/1, 001-04-E-1/2. Pump 001-04-N-2. Functional automation scheme. |
| 0222-004-ASU sheet 42 | Vacuum compressor station module. The list of input/output signals. |
| 0222-004-ASU sheet 25 | Vacuum compressor station. Plan of electrical wiring. |
| 0222-004-AS8 sheet 3 | Pile field plan. Nodes. View A. Incision. |
| 0222-004-AS8 sheet 4 | Girders, fencing and ladders location scheme. Nodes. Views. Incisions. |
| 0222-004-AS8 sheet 5 | Drainage tank platform. Pile field plan. Scheme 1. Node. Incision. |
| 0222-004-AS8 sheet 6 | Drainage tank platform. Scheme of prop for receptacle location. Prop OP1. Node. Incisions. Cut. Pos. 4. Detail of bearing plates bracing. |
| 0222-004-AS8 sheet 8 | Oil household platform. Pile field plan. Schemes. Node. Incision. |
| 0222-004-AS8 sheet 9 | Oil household platform. Scheme of prop location. Prop OP1. Pos. 13. Incisions. Cuts. Nodes. |
| 0222-004-AS8 sheet 10 | Oil household platform. Door D1. Views. Incisions. Cuts. Nodes. |
| 0222-000-AS sheet 9 | Technical requirements for enclosing structures. |

***Annex E***

**Questionnaire for inlet separator 001-04-GS-3/1.2**

|  |  |
| --- | --- |
| **Questions** | **Answers** |
| **1. COMMON DATA** | |
| 1.1. Product name | Gas separator 001-04-GS-3/1.2 |
| 1.2. Purpose and scope | Gas purification from liquid drops and mechanical impurities |
| 1.3. Customer's Name | Suzun, JSC |
| **2. PERFORMANCE INDICATORS AND PRODUCT CHARACTERISTICS** | |
| 2.1. Gas Productivity, nm3/h, reduced to conditions:  t=0oC, P=0.1013 MPa | Maximum – 7500  Minimum - 380 |
| 2.2. Excessive process pressure, MPa  Design pressure, MPa | Minus 0.005+-0.02  0.6 |
| 2.3 Device volume, m3 | 8 |
| 2.4. Operating temperature, oC, possible deviations, oC | 10+-51 |
| 2.5. Permissible hydraulic resistance, MPa | Less than 0.005 |
| 2.6. Mass concentration of liquid drops in crude gas on product inlet, g/nm3 | Up to 140\* |
| 2.7. Permissible mass concentration of liquid in purified gas on outlet, g/m3 | Up to 0.02 |
| 2.8. Counterpressure in branches of fault from the safety valves, MPa (exc.) | 0.005 |
| 2.9. Presence of preheating device and place of its location | External electric heating with heat insulation |
| 2.10. The list of parameters to be monitored and regulated (not provided by the scheme) | - |
| **3. FLUID CHARACTERISTICS** | |
| 3.1. Fluid name and its state of aggregation | Hydrocarbon gas, liquid drops (oil,water) |
| 3.2. Mole fraction of every component (gas), % |  |
| CO2 | 0.29 |
| N2 | 0.29 |
| CH4 | 40.81 |
| C2H6 | 7.46 |
| C3H8 | 17.69 |
| i-C4H10 | 6.78 |
| n-C4H10 | 10.69 |
| i-C5H12 | 3.13 |
| n-C5H12 | 3.09 |
| C6H14 | 1.99 |
| C7H16 | 0.93 |
| **Questions** | **Answers** |
| C8H18 | 0.34 |
| C9 or above | 0.07 |
| H2O | 6.44 |
| Total: | 100 |
| 3.3. Temperature of oil solidification, oC | Minus 14 |
| 3.4. The gas density, reduced to conditions of t=0°C, P=0.1013 MPa | 1.596 |
| 3.5. Density of gas under operating conditions (pressure of 0.005 MPa (exc.), temperature 42°C), kg/m3 | 1,463 |
| 3.6. Separated liquid density, kg/m3 under operating conditions | 685+-1022 |
| 3.7. Kinematic viscosity of the fluid under operating conditions, mm2/s | 0.61+-10,56 |
| 3.8. Character of the fluid:  - category of explosive mixtures under GOST R 51330.11-99,  - category of explosive mixtures under GOST R 51330.5-99,  - hazard class under GOST 12.1.005-88. | PA  T3  3 (oil) |
| 3.9. The presence of active corrosive components in gas, % mol. | Hydrogen sulphide – none  Carbon dioxide - 0.29 |
| **4. CONDITIONS OF EXPLOITATION AND CONTROL** | |
| 4.1. Quantity of ordered products in object as a whole, incl. over the years, pcs. | 2 |
| 4.2. Type of delivery | Not in blocks |
| 4.3. Required product life, years | Not less than 25 years |
| 4.4. Location of technological process command centre | Control room |
| 4.5. Location of the product | Open area |
| 4.6. Climatic construction and placement category according to GOST 15150-69 | HL1 |
| 4.7. The presence of metal structures and other additional external loads, its quantity, location and action scheme (indicated on the sketch) | Places of installation pads for mounting of shelter buildings piping, service platforms and stairs provided by the Provider of block-complete facility. |
| 4.8. Environmental conditions  - average temperature of coldest five days,  security 0.92,°C;  - Absolute minimum  temperature,°C  - Absolute maximum  Temperature,°C  - seismicity | Minus 49  Minus 57  Plus 33.3  5 points rating under MSK-64 scale |
| **Questions** | **Answers** |
| **5. OTHER REQUIREMENTS** | |
| 5.1. Other requirements at the discretion of the questionnaire compiler | 1. Material performance of the device: low-alloy cold-resistant steel 09G2S with guaranteed impact toughness at KCU samples at minus 60°C  2. Paries thickness and corrosion allowance shall comply with technical documentation and confirmed by calculations. Corrosion rate - 0.1 mm/year.  3. Inspection hatches should be provided with the opening mechanism (swivel or hinged).  4. Corrosion protection of device’s inner and outer surfaces should be performed at the manufacturer factory in accordance with the NK Rosneft JSC Technological instructions No P.2-05.02 TI-0002.  5. Appliance should be manufactured and tested in accordance with the specifications of manufacturer and the requirements of PB 03-576-03 "Rules of Arrangement And Safe Operation For Receptacles Working Under Pressure".  6. Fastening elements of flange joints must be protected against corrosion by hot dip galvanizing.  7. Equipment documentation should have information about permissible loads of the connected pipelines.  8. The appliance should be equipped with a plug for grounding (2 units).  9. Device drawing should include information about the dimensions of supporting elements, breakdown of holes for foundation bolts and the value of the maximum load of technological equipment on foundations.  10. Foundation bolts should be bundled with the device.  11. The set of supporting documents should contain information about product characteristics, general view drawing, the task for designing the building part (foundation), the certificate of conformity and the RTN permit as well as operational documentation in a volume not less than GOST 2.601-2006 defines.  12. Full supplied equipment documentation should be submitted to the Customer and General Designer prior to start manufacturing.  13. Color solution have to comply with company guidelines №PZ-01.04 M0006 “Applying of NK Rosneft JSC Corporate Identity”.  14. Fittings A, B, C, D, R, I, S shall be equipped with companion flanges according to GOST 12821-80 with rotary wafer plug-rings, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating. Type of sealing flange surfaces according to GOST 12815-80.  15. Fittings Z, M, M1, N, N1 have to be equipped with companion flanges according to GOST 12821-80, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating. Type of sealing flange surfaces according to GOST 12815-80.  16. Fittings E, F, K, T, T1 have to be equipped with flanged blanking plugs, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating.  17. Sketch of the device is shown in Figure E1.  18. Branch pipes should comply with the additional requirements of DT 001-05-2006. Branch pipes, which did not pass impact test KCU at temperature of minus 60°C, are not allowed to procurement and exploitation.  19. Receptacle passport shall be published in hard copy, in accordance with the rules PB 03-576-03 about design and safe operation with receptacles. Passport format - 210x297 mm. Passport cover - hard. The sheets of the passport must be performed on thick paper. |
| **Questions** | **Answers** |
|  | 20. The equipment shall be tested by the manufacturer in the presence of Customer (or his representative). |
| \*- Considering the possibility of condensation during gas cooling in pipes. | |

**Figure E1. Sketch of The Device.**

Fittings Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Designation | Function | Du, mm | Pu, MPa | Quantity |
| A | Gas inlet | 500 | - | 1 |
| B | Gas outlet | 500 | - | 1 |
| C | Condensate outlet | 50 | - | 1 |
| I | For purging | 50 | - | 1 |
| D | For drainage | 50 |  | 1 |
| P | Inspection hatch | 450 |  | 1 |
| R | Emergency unloading | 80 |  | 1 |
| S | For the safety valve | 50 |  | 1 |
| M, M1 | For differential pressure sensor | 50 |  | 2 |
| Z | For steaming |  |  | 1 |
| E | For thermometer | 50 |  | 1 |
| K | For manometer | 50 |  | 1 |
| F | For temperature sensor | 50 |  | 1 |
| N, N1 | For level sensor | 50 |  | 2 |
| T, T1 | For level annunciator | 50 |  | 2 |
| Note: Fittings and flanges for instrumentation and automation equipment have to be clarified with Customer in accordance with the selected device models. | | | | |

**Figure E2. Fittings Table.**

***Annex F***

**Questionnaire for drainage capacitance 001-04-DE-5 with semisubmersible pump 001-04-NP-5**

|  |  |  |
| --- | --- | --- |
| **Questions** | **Answers** | |
| **1. COMMON DATA** | | |
| 1.1. Product name | Drainage capacitance 001-04-DE-5 with semisubmersible pump 001-04-NP-5 | |
| 1.2. Purpose | Drainages admission from vacuum compressor station | |
| 1.3. Customer's Name | Suzun, JSC | |
| **2. PERFORMANCE INDICATORS AND CAPACITANCE CHARACTERISTICS** | | |
| 2.1 Internal volume (capacity), m3 | 8 | |
| 2.2. Excessive process pressure, possible deviations, (+-)%, MPa | 0.005 | |
| 2.3. Design pressure, MPa | 0.07 | |
| 2.4. Operating temperature, oC, possible deviations, (+-) oC | 10+-51 | |
| 2.5. Presence of the preheating device and place of its installation | Outdoor electrical heating with thermal insulation | |
| 2.6. Presence of additional internal devices | None | |
| 2.7. Bearing type | Supports under OST 26-2091-93 | |
| 2.8. Counterpressure in branches of fault from the safety valves, MPa | None | |
| 2.9. Depth of capacitance installation from planning surface to upper outer generatrix of shell (for drainage capacitance installed below zero mark), mm | - | |
| **3. PERFORMANCE INDICATORS AND PUMP CHARACTERISTICS** | | |
| 3.1. Pump unit type | Semisubmersible pump unit VND type. 50/150 (analog) | |
| 3.2. Supply, m3/h | 50 | |
| 3.3. Minimum supply, m3/h | 35 | |
| 3.4. Maximum supply, m3/h | 70 | |
| 3.5. Head, m | 150 | |
| 3.6. Output pressure (not more than), MPa | 1.6 | |
| 3.7. Immersion depth, m | 2.5 | |
| 3.8. Climatic performance of the pump unit | HL1 | |
| 3.9. Shaft sealing | Double frontal \* | |
| 3.10. Requirements to drive unit:  - Power voltage, V  - frequency, Hz | 380  50 | |
| 3.11. Power of drive unit, kW | 37 | |
| 3.12. Revolutions, rev/min | 2950 | |
| 3.13 Performance in part of explosion protection | Explosion proof IIExdIIAT3, shell type IP65 | |
| 3.14 Electric motor type | - | |
| **Spare parts list of the pump unit** | | |
| 1 indicator VND.305441.001-61, pcs | | 1 |
| 2 Cuff GHI.754174.040-84.05, pcs | | 1 |
| 3 Ring VND.711141.137-84, pcs | | 1 |
| 4 Ring VND.711141.138-84, pcs | | 1 |
| 5 Ring VND.711141,096-84, pcs | | 1 |
| 6 Ring GH.711141.093-84, pcs | | 1 |
| 7 Ring GH.711141.046-84, pcs | | 2 |
| 8 Laying OH.754152.018-84-16, pcs | | 2 |
| 9 Cuff GHI.754171.003-84, pcs | | 2 |
| 10 Ring 165-175-46\_GOST9833-73 B-14NTA, pcs | | 1 |
| 11 Ring 170-175-36 GOST9833-73 B-14NTA, pcs | | 2 |
| 12 Toothing Rotex-42 94ShA-T, pcs | | 1 |
| 13 Set of spare parts to frontal control | | 1 |
| 14 Bearings SKF | | 1 |
| \* Manufacturer and mark similar to "TREM-Engineering" clarified by Provider and coordinated with Customer at tender stage.  Semisubmersible pump mark, its constructive and material design (with grade indication of steel casing and flowing part) coordinated with Customer at tender stage. | | |
| **4. FLUID CHARACTERISTICS** | | |
| 4.1. Fluid name and its aggregate state | Oil, hydrocarbon condensate comprising water up to 60% of weight | |
| 4.2. Fluid structure | Variable | |
| 4.3. Content of corrosive components, % mol. | CO2 – up to 0.29 (gas phase) | |
| 4.4. Density in operating conditions, kg/m3 | 630+-1022 | |
| 4.5. Kinematic viscosity in operating  conditions, cSt | 0.4+-10.56 | |
| 4.6. Character of the fluid:  - category of explosive mixtures under GOST R 51330.11-99,  - category of explosive mixtures under GOST R 51330.5-99,  - hazard class under GOST 12.1.007-76. | IIA  T3  3 | |
| **5. EXPLOITATION AND CONTROL CONDITIONS** | | |
| 5.1. Quantity of ordered products in object as a whole, including over the years, pcs. | 1 | |
| 5.2. Delivery type: in block, not in block | Capacitance is supplied complete with pump | |
| 5.3. Required product life, years | 25 | |
| 5.4. Location of technological process command centre | Control room | |
| 5.5. Location of the product (room, open area) | Open area, overground installation with insulating cover for heating instrumentation and automation equipment and electric motor | |
| 5.6. Installation characteristics:  - category of rooms, buildings and outdoor facilities for explosion and fire hazard by SP 12.13130.2009  - class of explosive zones under PUE (sixth edition, 1985. with 2002 changes) | AN  V-1g | |
| 5.7. Climatic construction and placement category according to GOST 15150-69 | HL1 | |
| 5.8. Soil name, normative pressure on foundation soles, MPa | - | |
| 5.9 Height of pedestal part above the ground-plan, mm, and its weight, kg, foundation dimensions | - | |
| 5.10. The presence of metal structures and other additional external loads, its quantity, location and action scheme (indicated on the sketch) | Places of installation pads for mounting piping, service platforms and stairs provided by the Provider of block-complete drainage capacities facility. | |
| 5.11. Environmental conditions  - average temperature of coldest five days, security 0.92,°C;  - Absolute minimum temperature,°C  - Absolute maximum temperature,°C  - seismicity | Minus 49  Minus 57  Plus 33.3  5 points rating under MSK-64 scale | |
| **Questions** | **Answers** | |
| **6. OTHER REQUIREMENTS** | | |
| 6.1. Other requirements at the discretion of the questionnaire compiler | 1. Material performance of the device: low-alloy cold-resistant steel 09G2S with guaranteed impact toughness at KCU samples at minus 60°C  2. Paries thickness and corrosion allowance shall comply with technical documentation and confirmed by calculations. Corrosion rate - 0.1 mm/year.  3. Inspection hatches should be provided with the opening mechanism (swivel or hinged).  4. Corrosion protection of device’s inner and outer surfaces should be performed at the manufacturer factory in accordance with the NK Rosneft JSC Technological instructions No P.2-05.02 TI-0002. Color solution have to comply with company guidelines №PZ-01.04 M0006 “Applying of NK Rosneft JSC Corporate Identity”.  5. Appliance should be manufactured and tested in accordance with the specifications of manufacturer and the requirements of PB 03-584-03 "Rules of Design, Construction And Acceptance of Welded Steel Capacitance And Devices".  6. Fastening elements of flange joints must be protected against corrosion by hot dip galvanizing.  7. Equipment documentation should have information about permissible loads of the connected pipelines.  8. The appliance should be equipped with a plug for grounding (2 units).  9. Device drawing should include information about the dimensions of supporting elements, breakdown of holes for foundation bolts and the value of the maximum load of technological equipment on foundations.  10. Foundation bolts should be bundled with the device.  11. The set of supporting documents should contain information about product characteristics, general view drawing, the task for designing the building part (foundation), the certificate of conformity and the RTN permit as well as operational documentation in a volume not less than GOST 2.601-2006 defines.  12. Full supplied equipment documentation should be submitted to the Customer and General Designer prior to start manufacturing.  13. Fittings C, D, G shall be equipped with companion flanges according to GOST 12821-80 with rotary wafer plug-rings, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating. Type of sealing flange surfaces according to GOST 12815-80.  14. Fitting N have to be equipped with companion flanges according to GOST 12821-80, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating. Type of sealing flange surfaces according to GOST 12815-80.  15. Fittings Z, F, K have to be equipped with flanged blanking plugs, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating.  16. Sketch of the device is shown in Figure F1.  17. Branch pipes should comply with the additional requirements of DT 001-05-2006. Branch pipes, which did not pass impact test KCU at temperature of minus 60°C, are not allowed to procurement and exploitation.  18. Receptacle passport shall be published in hard copy, in accordance with the rules PB 03-576-03 about design and safe operation with receptacles. Passport format - 210x297 mm. Passport cover - hard. The sheets of the passport must be performed on thick paper.  19. Capacitance has to be manufactured and tested in accordance with the specifications of the manufacturer and PB 03-584-03 "Rules for design, manufacture and acceptance of steel welded capacitances and devices."  20. The equipment shall be tested by the manufacturer in the presence of Customer (or his representative).  21. Material design of details and assembly units of the pump must comply S-6 API 610.  22. Level gauge branch pipe should be equipped with pacifier in the removable version. Diameter of the stilling column must be at least 100 mm. | |

Note: jet nozzles should be oriented parallel to the tangent to сapacitance cowling in the place of collector location, nozzles of two collectors have to be placed chequerwise (every nozzle have to create a stream directed into the space between two opposite nozzles).

Fittings Table

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Designation | Function | Du, mm | Pu, MPa | Flanges | Quantity |
| A | Manhole hatch | 800 | 0.3 | - | 1 |
| B | To install the pump | 700\*\* | 1.0 | - | 1 |
| C | Product input | 50 | - | - | 1 |
| G | Product output | 80\*\* | - | - | 1 |
| D | Gas outlet | 100 | - | - | 1 |
| E | Temperature sensor | 50 | 1.6 | Use 1\* | 1 |
| Z | For level sensor | 150 | 1.6 | Use 1\* | 1 |
| N | For sediment erosion | 50 | - | - | 1 |
| K | For level annunciator | 50 | - | - | 1 |
| \* Fittings and flanges for instrumentation and automation equipment have to be clarified with Customer in accordance with the selected device models.  \*\* Diameter is clarified by Supplier of the pump unit. | | | | | |

**Figure F1. Sketch of The Device. Fittings Table.**

***Annex G***

**Questionnaire for capacitances of clean and waste oil 001-04-E-1/1.2**

|  |  |
| --- | --- |
| **Questions** | **Answers** |
| **1. COMMON DATA** | |
| 1.1. Product name | Capacitance for clean and waste oil |
| 1.2. Purpose and scope | For storage of clean and waste oil |
| 1.3. Customer's Name | Suzun, JSC |
| **2. PERFORMANCE INDICATORS AND PRODUCT CHARACTERISTICS** | |
| 2.1 Internal volume (capacity), m3 | 5 |
| 2.2. Operating pressure, MPa (exc.) | Atm. |
| 2.3. Design pressure, MPa (exc.) | 0.07 |
| 2.4. Operating fluid temperature, oC, minimum  maximum  steaming temperature | Plus 10  Plus 33,3  Plus 110 |
| 2.5. Presence of the preheating device and place of its installation | Internal electric heater (220 V, 10 kW) supplied with explosion-proof thermostat, complete with a SHUN type oven in HL1 climatic performance, providing:  - maintaining predetermined temperature mode inside the capacitance not lower than 10 ° C,  - protection heating elements shells from overheating,  - protection power cables from overload,  - protection against short-circuit currents, remote heating block by "Dry contact" type external signal. |
| 2.6. Presence of additional internal devices | - |
| 2.7. Bearing type | Steel Saddle Reliance under OST 26-2091-93 |
| 2.8. Counterpressure in branches of fault from the safety valves, MPa | None |
| **3. FLUID CHARACTERISTICS** | |
| 3.1. Name of liquid phase | Synthetic compressor oil |
| 3.2. Physical condition | Flammable liquid |
| 3.3. Chemical composition, % | - |
| 3.4. Density of liquid phase at +20°C, kg/m3 | Specifies by Supplier |
| 3.5. Kinematic viscosity, cSt:  at +40°C | Specifies by Supplier |
| 3.6. Character of the fluid:  - category of explosive mixtures under GOST R 51330.11-99,  - hazard class under GOST 12.1.007-76. | -  4 |
| **4. EXPLOITATION AND CONTROL CONDITIONS** | |
| 4.1. Quantity of ordered products in object as a whole, including over the years, pcs. | 2 |
| 4.2. Required product life, years | Not less than 25 |
| 4.3. Location of technological process command centre | Control room |
| 4.4. Location of the product | Outdoor installation on the open area |
| 4.5. Installation method | Above-ground installation |
| 4.6. Installation characteristics:  - category of rooms, buildings and outdoor facilities for explosion and fire hazard by SP 12.13130.2009  - class of explosive zones under PUE (sixth edition, 1985. with 2002 changes) | AN  V-1g |
| 4.7. Climatic construction and placement category according to GOST 15150-69 | HL1 |
| 4.8. Height of pedestal part above the ground-plan, mm, and its weight, kg, foundation dimensions | - |
| 4.9. Soil name, normative pressure on foundation soles, kPa | - |
| 4.10. The presence of metal structures and other additional external loads, its quantity, location and action scheme | - |
| 4.11. Environmental conditions  - average temperature of coldest five days, security 0.92,°C;  - Absolute minimum temperature,°C  - Absolute maximum temperature,°C  - seismicity | Minus 49  Minus 57  Plus 33.3  5 points rating under MSK-64 scale |
| **Questions** | **Answers** |
| 4.12. Other requirements at the discretion of the questionnaire compiler | 1. Material performance of the device: low-alloy cold-resistant steel 09G2S with guaranteed impact toughness at KCU samples at minus 60°C  2. Paries thickness and corrosion allowance shall comply with technical documentation and confirmed by calculations. Corrosion rate - 0.1 mm/year.  3. Inspection hatches should be provided with the opening mechanism (swivel or hinged).  4. Corrosion protection of device’s inner and outer surfaces should be performed at the manufacturer factory in accordance with the NK Rosneft JSC Technological instructions No P.2-05.02 TI-0002. Color solution have to comply with company guidelines №PZ-01.04 M0006 “Applying of NK Rosneft JSC Corporate Identity”.  5. Branch pipes should comply with the additional requirements of DT 001-05-2006. Branch pipes, which did not pass impact test KCU at temperature of minus 60°C, are not allowed to procurement and exploitation.  6. Level gauge branch pipe should be equipped with pacifier in the removable version. Diameter of the stilling column must be at least 100 mm.  7. Receptacle passport shall be published in hard copy, in accordance with the rules PB 03-576-03 about design and safe operation with receptacles. Passport format - 210x297 mm. Passport cover - hard. The sheets of the passport must be performed on thick paper.  8. Receptacle should be manufactured and tested in accordance with the specifications of manufacturer and the requirements of PB 03-584-03 "Rules of Design, Construction And Acceptance of Welded Steel Capacitance And Devices".  9. The equipment shall be tested by the manufacturer in the presence of Customer (or his representative).  10. Provide nodes for connection to the external grounding.  11. Fittings B, C shall be equipped with companion flanges according to GOST 12821-80 with rotary wafer plug-rings, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating. Type of sealing flange surfaces according to GOST 12815-80.  12. Fitting G have to be equipped with companion flanges according to GOST 12821-80, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating. Type of sealing flange surfaces according to GOST 12815-80.  13. Fittings D, E, F, Z, K have to be equipped with flanged blanking plugs, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating.  14. Include in contents of delivery an electric heater with SHUN type heating cabinet. Submersible electric ceramic heater with a control cabinet have to be delivered in one package with a capacitance of corresponding climatic performance HL1 for connection to a source of electricity by client. Switching box and SHUN have to be located in the place convenient for cable entry and exploitation. Diameters of cable entries should be coordinated with Giprovostokneft, JSC. Provide on the neck of the capacitance some grounding nodes for connection to an external grounding device. |

Fittings Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Designation | Function | Du, mm | Pu, MPa | Quantity |
| A | Manhole hatch | 800 | 0.1 | 1 |
| B | Breathing fitting | 50 | 0.6 | 1 |
| C | Receiving and distributing fitting | 80 | 1.6 | 1 |
| D | For electric heater | 125 | - | 1 |
| E | For level sensor | 150 | 1.6 | 1 |
| F | For temperature sensor | 50 | 1.6 | 1 |
| G | Drainage fitting (steaming) | 50 | - | 1 |
| Z | For thermometer | 50 | 1.6 | 1 |
| K | For thermostat | Defined by Supplier | | 1 |

**Figure G1. Sketch of The Device. Fittings Table.**

***Annex H***

**Questionnaire for oil supply pump 001-04-NA-2**

|  |  |
| --- | --- |
| **Questions** | **Answers** |
| **1. COMMON DATA** | |
| 1.1. Product name | Oil supply pump 001-04-NA-2 |
| 1.2. Purpose and scope | Feed oil into the oil tank |
| 1.3. Customer's Name | Suzun, JSC |
| 1.4. Mark | NMSH type gear pump |
| 1.5. Casing steel grade | Stainless steel |
| **2. PERFORMANCE INDICATORS AND PRODUCT CHARACTERISTICS** | |
| 2.1. Nominal supply, m3/h | 4 |
| 2.2. Intake pressure, MPa (exc.) | Atm. |
| 2.3. Injection pressure, MPa (exc.) | 0.4 |
| 2.4. Permissible vacuum suction height, m, not more | 5 |
| 2.5. Diameter of merging pipeline on inlet and outlet, mm | Du50 |
| 2.6. Availability of heating | Heated casing |
| 2.7. List of technological parameters for monitoring and regulating | In accordance with manufacturer's specifications |
| **3. FLUID CHARACTERISTICS** | |
| 3.1. Name of liquid phase | Synthetic compressor oil |
| 3.2. Physical condition | Flammable liquid |
| 3.3. Product Temperature,°C  - minimum operating temperature  - maximum operating temperature | Plus 10  Plus 33,3 |
| 3.4. Density at +20°C, kg/m3, not more | Specifies by Supplier |
| 3.5. Kinematic viscosity, cSt:  at +40°C | Specifies by Supplier |
| 3.6. Character of the fluid:  - hazard class under GOST 12.1.007-76. | 4 |
| 3.7. Pour Point,°C, not more | Specifies by Supplier |
| 3.8. Environmental conditions  - average temperature of coldest five days, security 0.92,°C;  - Absolute minimum temperature,°C  - Absolute maximum temperature,°C  - seismicity | Minus 49  Minus 57  Plus 33.3  5 points rating under MSK-64 scale |
| **4. REQUIREMENTS FOR PUMP AND DRIVE UNIT** | |
| 4.1. Quantity of ordered products in object as a whole, including over the years, pcs. | 1 operating / 1 reserve |
| 4.2. Required product life, years | Not less than 25 |
| 4.3. Location of the product | Open area, under the canopy |
| 4.4. Climatic construction and placement category according to GOST 15150-69 | HL1 |
| 4.5. Installation characteristics:  - category of rooms, buildings and outdoor facilities for explosion and fire hazard by SP 12.13130.2009  - class of explosive zones under PUE (sixth edition, 1985. with 2002 changes) | AN  V-1g |
| 4.6. Shaft sealing | Face seal |
| 4.7. Requirements to drive unit:  - Power voltage, V  - frequency, Hz | 380  50 |
| 4.8. Power of drive unit, kW | 2.2 |
| 4.9. Revolutions, rev/min | 1500 |
| 4.10. Performance in part of explosion protection | Explosion proof |
| 4.11. Pump type | Gear pump |
| 4.12. Other requirements for the questionnaire compilation. | 1. Delivery comprises - with companion flanges according to GOST 12821-80, rotary wafer plug-rings, bundled with spiral wound gaskets in accordance with GOST R 52376-2005 and fasteners with zinc coating.  2. Equipment supplier should provide the certificate of conformity of industrial safety requirements, the RTN permit for use in composition with hazardous production facilities. |

***Annex I***

**Questionnaire for oil filter 001-04-F-4**

|  |  |  |
| --- | --- | --- |
| **Questions** | | **Answers** |
| **1. COMMON DATA** | | |
| 1.1. Product name | | Oil filter 001-04-F-4 |
| 1.2. Purpose and scope | | Cleaning the engine oil from the mech. impurities |
| 1.3. Customer's Name | | Suzun, JSC |
| **2. PERFORMANCE INDICATORS AND PRODUCT CHARACTERISTICS** | | |
| 2.1. Productivity at the inlet of product, m3/h | | 4 |
| 2.2. Design pressure, MPa (exc.) | | 1.6 |
| 2.3. Product Temperature,°C  - minimum operating temperature  - maximum operating temperature | | Plus 10  Plus 33,3 |
| 2.4. Permissible hydraulic resistance, MPa | | 0.01 |
| 2.5. Nominal filtration fineness, mm | | 0.2 |
| 2.6. Outer diameter and paries thickness of pipeline, on which product is installed, mm | | 57x5 |
| 2.7. Availability of preheating device and the place of its installation | | Electroheating cable |
| 2.8. Filter type | | Wye |
| **3. FLUID CHARACTERISTICS** | | |
| 3.1. Name of liquid phase | | Synthetic compressor oil |
| 3.2. Physical condition | | Flammable liquid |
| 3.3. Density of fluid at +20°C, kg/m3, not more | | Specifies by Supplier |
| 3.4. Kinematic viscosity, cSt:  at +40°C | | Specifies by Supplier |
| 3.5. Name of solid phase | | Mechanical impurities |
| 3.6. Nature of solid phase particles (amorphous, prone to sticking, etc.) | | - |
| 3.7. Character of the fluid:  - hazard class under GOST 12.1.007-76. | | 4 |
| **4. CONDITIONS OF EXPLOITATION AND CONTROL** | | |
| 4.1. Quantity of ordered products in object as a whole, incl. over the years, pcs. | 1 | |
| 4.2. Type of delivery: in block, not in block | Not in blocks | |
| 4.3. Required product life, years | Not less than 25 years | |
| 4.4. Location of technological process command centre | - | |
| 4.5. Location of the product | Open area, under the canopy | |
| 4.6. Installation characteristics:  - category of rooms, buildings and outdoor facilities for explosion and fire hazard by SP 12.13130.2009  - class of explosive zones under PUE (sixth edition, 1985. with 2002 changes) | AN  - | |
| 4.7. Climatic construction and placement category according to GOST 15150-69 | HL1 | |
| 4.8. Environmental conditions  - average temperature of coldest five days,  security 0.92,°C;  - Absolute minimum  temperature,°C  - Absolute maximum  Temperature,°C  - seismicity | Minus 49  Minus 57  Plus 33.3  5 points rating under MSK-64 scale | |
| 4.9. Other requirements at the discretion of the questionnaire compiler | 1. Estimated filter temperature:  - Minimum - minus 49°C  - Maximum - plus 33.3°C  2. Du 50 wye filter with removable filtering element. | |
| 4.10. Requirements for Supplier | 1. Supplier should specify filter pressure differential in clean and polluted status.  2. Equipment supplier should provide the certificate of conformity of industrial safety requirements, the RTN permit for use in composition with hazardous production facilities. | |