2. Technical parameters:
2.1 Parameters:
2.1.1 Pump head - 177.5 m
2.1.2 Maximum capacity - 9.5 m3/h
2.1.3 Shaft sealing is single mechanical seal
2.1.5 Rotating speed - 1450 rpm
2.1.6 Pump efficiency - not less than 45%
2.1.7 adjustment of flowrate from 50 to 100 %
2.2 Medium:
2.2.1 the medium - an ammonia water (NH3 - 4.5%, CO2 - 2%, a carbamide - 1.7%, water - 91.8%)
2.2.2 Operating temperature of the medium: +65/+75C
2.2.3 Density: 1.04/1.07 g/cm3
2.3 Other:
2.3.1 climatic category: UHL4 (+1/+35C)
2.3.2 explosive zone
2.3.3 operational mode: continuously, annual operational period - 8640 hours.
3. Purchase set:
3.1. the centrifugal pump with the electric motor mounted on a frame - 1 piece
3.2. spare parts:
3.2.1 a shaft - 1 piece
3.2.2 a mechanical seal - 1 set
3.2.3 the impeller - 1 piece
3.2.4 the protective sleeve - 1 piece
3.2.5 the half-couplings - 1 set
3.2.6 mating flanges for welding, gaskets and hardware - 1 set for a pump piping
3.2.7 the front bearing of the electric motor - 1 piece
3.2.8 a tail bearing of the electric motor - 1 piece
3.2.9 when included seal glands, provide 2 sets of sealings for a front bearing assembly and 2 sets for tail bearing assembly.
3.2.10 lubricant for the electric motor (recommended by manufacturing plant) - 5 kg.
4. Engineering requirements:
4.1. Requirements to a design of the pump (by a mechanical part).
4.1.1. Pump type: centrifugal
4.1.2. Execution of the pump: horizontal.
4.1.3. All elements of the pump: a flow channel (casing), the impeller, a shaft, protective sleeves, impellers, etc. contacting to a working medium should be made of the appropriate alloy steels (corrosion-errosion resistant) during operating mediums specified in paragraph 2.2.1 of this requirement specification. Corrosion must be no more than 0.01 mm/year. The plated pump parts are not allowed.
4.1.4. The pump and its main assembly units, blocks and parts should be designed , produced and tested according to the relevant international or European standards and provide safety requirements according to industry standard OST 26-06-2028-96 "Pumps for common industrial applications. Safety requirements".
4.1.5. Design of the parts connections of the pump which are under pressure should exclude a possibility of sealing break or disclosure of a joint. On nozzles of pumps, tongue-and-groove flanges must be applied.

4.1.6. Design of pumps should provide a possibility of their complete drainage before disassembly during a halt for carrying out repair work and replacement of mechanical seal without dismounting of a flow channel.
4.1.7. The exterior, unmachined surfaces of pumps should be painted so that to exclude a possibility of corrosion in use. All bores and all elements of fittings should be closed for the purpose of prevention of their pollution.
4.1.8. Inlet the nozzle should be designed for the same pressure as the nozzle on a pressure line.
4.1.9. The bearing unit should perceive an axial load without the additional throttling device, a bearing lubrication - the consistent one, with a possibility of adding as required during operation.
4.1.10. The pumping unit should be equipped with a single mechanical seal and be installed on a protective shaft sleeve.
4.1.11. The half-coupling should have a spacer. Operating temperature range of elastic elements of the half-coupling is from -30 ℃ to +80 ℃.
4.1.12. On a pumping unit in easily accessible and visible places, nameplates of manufacturing plant according to the requirements of EC identification marking with indication of the following data in Russian should be fixed:
4.1.12.1. Name and trademark of manufacturing plant.
4.1.12.2. Name of a standard size and design of the pump.
4.1.12.3. Year of manufacture.
4.1.12.4. Serial number.
4.1.12.5. Basic operating performance of the pump: flowrate m3/hour; head, m; shaft power, kW; rotational speed, RPM.
4.1.12.6. Allowable working pressure in the casing.
4.1.12.7. Weight of the pump.
4.1.12.8. Type of climatic modification.
4.1.12.9. Operating temperature range of the medium.
4.1.13. The pump assemblies delivered in separate packages should have identification mark with indication of a serial No and a position of the pump.
4.2. Requirements of reliability, non-failure operation and durability.
4.2.1. The pumping unit should provide the following indicators of non-failure operation, durability and reliability: an operating time between capital repairs: not less than 17280 hours, an operating time between running repairs: not less than 2160 hours, design service life: not less than 16 years.
4.3. Requirements for instrumentation and automated control systems.
4.3.1. Control of an availability of the moved liquid in a pump casing: explosion-proof (Exd) vibration signaling device of level with the non-contact switch.
4.3.2. If required, a scope of supply must include the additional equipment intended for safe operation of the pump (type and completeness of it has to be approved with the customer).
4.4. Requirements for an electric part.
4.4.1. Type - a squirrel-cage motor.
4.4.2. Type of a drive mechanism - a centrifugal pump. Joint of the electric motor with a drive mechanism by means of the coupling.
4.4.3. An explosive atmosphere in the location of the electric motor (according to PUE) B1 IIAT1 (ammonia).
4.4.4. Consumed power according to calculation of the supplier, but no more than 18.5 kW.
4.4.5. Mains voltage: three-phase 50 Hz of 380 V. Operation of the electric motor with frequency over 50 Hz is not allowed.

4.4.6. A class of insulation of a stator winding - F.
4.4.7. Degree of protection of enclosure - not below IP55.
4.4.8. An operating mode - S1 (continuous).
4.4.9. To execute painting of an equipment in gray RAL7047 color taking into account a corrrosion activity of medium C4 (high).
4.4.10. Energy efficiency class: IE3.
4.4.11. Neutral mode: solidly grounded.
4.4.12. The electric motor should be bidirectional.
4.4.13 Material of an motor support - cast iron.
4.4.14. The cooling fan and a fan guard should be executed of steel.
4.4.15. An availability of the removable front and rear end shields from cast iron or steel.
4.4.16. The front end shield should have finning for the best heat removal.
4.4.17. Temperature monitoring of a stator winding of the electric motor: temperature sensors in a stator winding (the thermistors of RTS which are built in a winding).
4.4.18. Execution of an electric motor mounting mode - horizontal on feet, an exit end of a shaft - one.
4.4.19. In the electric motor bearings of global manufacturers should be used: SKF, FAG or similar is not lower than the 300th series.
4.4.20. Execution of motor windings and design of end shields must allow usage of the electric motor with the frequency transformer (a reinforced insulation of front parts of a stator, heavy-duty "a squirrel cell" of a rotor)
4.4.21. The terminal box of the electric motor should be impact-resistant and have a possibility of rotation with a step on 90 °(4x90 °). Arrangement of a box - on top.
4.4.22. Joint of a stator winding should be executed in input device of the electric motor. A possibility of joint of windings is star/triangle in input device of the electric motor.
4.4.23. The power terminal box of the electric motor should be equipped with two cable entries from stainless steel with diameters not less than 40 mm for armored power cables and cable entries from stainless steel with a diameter not less than 10 mm for armored cables for connection of temperature sensors of a stator winding. Plugs for cable entries meeting requirements for explosion protection and rubber sealings for different diameters of the brought-in power cables should be stipulated.
4.4.24. On the electric motor there has to be a tag with indication of electric parameters, explosion protection identification marks (the tag also should be reflected in the passport or the operating documentation).
4.4.25. In an electric motor installation place on a frame, manufacturing plant of a pumping unit must ptovide adjusting blocks for centering of the electric motor.
4.4.26. Housings of the electric motor, the pump and a frame should be provided with ground bolts.
4.4.27. The equipment and component parts should be manufactured no later than January, 2019.

5. Requirements for documentation

5.2. Accompanying technical documentation should contain the following information, not less:
5.2.1. For mechanical equipment: The passport of the pump should contain information:
5.2.1.1. Details of manufacturing plant of the pump.
5.2.1.2. Details of manufacturers (subsuppliers) of the main components.
5.2.1.3. Manufacturing dates of the pump and main components.
5.2.1.4. The name of standards on the basis of which calculation, design, production and testing

of the pump and its main assembly unit, blocks and parts is accomplished.

5.2.1.5. Calculation of bearings.

5.2.1.6. The complete list of process parameters of the pump with indication of a design numerical values.

5.2.1.7. Charts with load characteristics (working curves).

5.2.1.8. The assembly drawing of the pump with necessary quantity of the sectional views, types and sections explaining its construction with indication of clearances, preloads, the mating sizes, the basic overall dimensions, a weight.

5.2.1.9. The passports, drawings or technical sketches of the main blocks and parts of the pump (a rotor, a torque coupling assembly, blocks in casing and mechanical seals, bearing units, etc.) with necessary quantity of sectional views, types and sections explaining their construction with indication of clearances, preloads, the mating sizes, the basic overall dimensions, a weight.

5.2.1.10. The certificates certifying quality of the materials applied to production of components with indication of steel grades (with decryption of the chemical composition) and mechanical properties (of 100% of components).

5.2.1.11. The acts of engineering supervision confirming quality of the manufactured equipment and fulfillment of requirements of design documentation (on 100% of parts and components).

5.2.1.12. Installation, operation, technical maintenance and repair manuals for the pump and all components of a pumping unit.

5.2.1.13. Warranty and design service life of the main assembly units, pump parts and components: rotor assembled, mechanical seal, bearings, torque coupling assembly.

5.2.1.14. Data for therecommended lubricants (type, the brand, analogs from different manufacturers).

5.2.1.15. Results of stand tests with indication of the reached operation parameters and evaluation of their compliance to design, data about bearing temperature, absolute vibration of a rotor with indication of the actual and normative values (in case of carrying out the specified tests).

5.2.1.16. Data (form) on the design and actual clearances, preloads and the mating sizes as a result of assembly of the pump at manufacturing plant.

5.2.1.17. A measurement chart of radial and face runouts of a rotor with indication of design and actual values.

5.2.1.18. Other information in the volume determined by manufacturing plant.

5.2.1.19. Structure of a repair cycle, volume of repair works, requirements to personnel.

5.3. The test reports and certificates confirming quality of the applied materials can be executed in English with obligatory word for word translation into Russian.

5.4. Info about operating life.

5.5. For electrical equipment technical documentation should contain:

5.5.1. Copies of conformity certificate to requirements of the Technical regulation of the Customs union TR CU 012/2011.

5.5.2. The operating documentation on the electric motor, with indication of electric characteristics of the electric motor, identification mark of explosion protection, types of bearings, lubricant, settings of acting for RTS, settings of acting for PT100 (setting of precritical condition - for alarm, setting of critical condition - a signal on shutdown), frequency of the Maintenance etc.

5.5.3. Repair documentation for explosion-proof equipment (sectional drawings of the electric motor, drawings of each assembly detail with explosion protection elements, including a stator winding).

5.5.4. Instruction for electric tests and checks of all electrical equipment.

5.5.5. Info about operating life.

6. **Requirements to the manufacturer**

6.1 The manufacturer should have:

6.1.1. The documents confirming the right for conducting development and production of the pumping units (national licenses, patents, permissions, etc) applied on hazardous production facilities. (Provide copies of documents).

6.1.2. The declaration (certificate) on compliance to the offered products to requirements of TR CU 010/2011.

6.1.3. ISO 9001:2008 in the field of design and manufacture of pumping units. (Provide the copy)

6.1.4. Internal qualification personnel, production base and experiment on development and manufacture(production) of similar pumping units. (Provides the relevant information and the reference-list).

6.3. Warranty obligations.

6.3.1. The manufacturer should guarantee achievement of design technological and operational parameters according to these document and own responsibility in case of failture to achieve them.

6.3.2. The manufacturer should provide the information concerning warranty services for the supplied equipment, namely:

6.3.2.1. Guaranty periods - not less than 3 years from the date of commissioning (not less than 48 months from the delivery date), in case of meeting storage and operation instructions.

6.3.2.2. Conditions, scopes and terms of providing warranty services.

6.4. The supplier undertakes to execute spare parts orders at the request of the Buyer during design service life, after the expiration of warranty period, based on the specifications and the prices which are subject to approval between the sides.

7. Requirements to a proposal

7.2. The technical proposal from the potential contractor on design and manufacture of a pumping unit should contain the complete information in volume not less requirements of this document. Answers should be unambiguous, namely:

7.2.1. The written confirmation of technical and organizational capability of performance of works according to requirements of this requirement specification, namely: provide the answers and the relevant documents (and/or copies of documents) confirming a possibility of fulfillment of each clause of this requirement specification.

7.2.2. The list of the main technological operational parameters with indication of a rated and limiting numerical values. Charts of load characteristics.

7.2.3. The assembly drawing of the pump with necessary quantity of the sectional views, types and sections explaining its design, the basic overall dimensions, weight.

7.2.4. The drawings or technical sketches of the main units and parts of the pump (a rotor, a torque coupling assembly, units located in casing and end seals, bearing assemblies, etc.) with necessary quantity of sectional views, types and sections explaining their design of the basic overall dimensions, weights. Specify steel grades (with decryption of the chemical composition and mechanical properties) which are used for manufacturing of the main parts of the pump.

7.2.5. The name of the standards applied to calculation, design, manufacture and testing of the pump and its main component parts.

7.2.6. Name of the countries and manufacturers (subsuppliers) of the fundamental assembly unit, parts and components of a pumping unit, namely: end seals of the pump, pump bearings, torque

coupling assembly.

7.2.7. Information about the provided warranty services on the supplied equipment, namely: design service life of the pump; conditions, scopes and terms of providing warranty services; name of the enterprise for rendering warranty services; other additional information in the volume determined by the manufacturer (supplier).

7.2.8. The list of recommended spare parts for the pump.

7.2.9. Verified copies of documents in volume of requirements of item 6 "Requirements to manufacturer".

7.2.10. The competitive proposal should contain answers to each clause and in the order covered in this document.

7.2.11. At failure to meet requirements of this requirement specification or not providing (incomplete) information for any clause, the offer can be rejected.