

Technical assignment

for purchasing of equipment and provision with
pre-commissioning and personnel training services,
Modernization of the existing automated control system
and inspection of the mechanical part of the fuel system
of the diesel generator unit for the needs of "Shurtan Gas Chemical Complex", LLC.



1. GENERAL INFORMATION

1.1 Name

Modernization of the existing automated control system of the diesel generator unit, as well as technical inspection of the mechanical part of the fuel system of the diesel generator unit.

1.2 Basis and purpose of purchasing of equipment.

Basis: Protocol of the Technical Committee of "Shurtan Gas Chemical Complex", LLC No. 14 dated from 11/29/2019.

Creation of the modern automatic system control based on processor technology in the emergency diesel generator room, providing continuous data collection from field devices, monitoring, control with operating mechanisms, increasing failure stability, reducing the possibility of erroneous actions of the operator and personnel of process areas during working on the control of an automated process control system.

The operation of the starting system of the diesel generator fuel system has reached 300 operating hours. The fuel system was installed in 2000.

At the moment, in order to improve the mechanical part of the fuel system during the current repair on schedule, this starting system is subject to technical inspection by specialists.

This Technical Assignment (TA) is intended to supply the equipment, replace an outworn diesel fuel management system for the new one, and provide with the technical and commercial proposals for potential suppliers of diesel generator control systems.

1.3 Information about novelty (year of manufacture / production of equipment)

The supplied product must be a new product, not produced earlier than 2019 (which has not been previously used, restored, which has not lost its consumer properties). Automation devices for diesel generators must comply with GOST 10511-72, GOST 11102-75, GOST 11928-66, GOST 20820-75, GOST 21193-75, TOST 22464-77 standards, as well as standards and specifications for specific automation equipment.

1.4 Development / Manufacturing Stages

1.4.1 Before submitting an Application for participation in the Tender, the Supplier must carry out a survey of the facility. The contractor shall study the location and installation of the equipment on the customer's field. All supplied equipment must comply with the requirements established in the Technical Assignment (this TA).

1.4.2 To carry out a pre-design survey of the facility no later than 10 working days from the date of the official notification about winning the tender.

1.4.3 To hand over the design documentation to the Customer for approval no later than 30 working days from the date of the facility pre-design survey.

1.4.4 The date of beginning of work shall be agreed with the Customer.

1.4.5 The term for delivery, installation and commissioning works shall not be more than 30 days after the equipment arrives at the installation site.

1.4.6 Training for Maintenance, repair and operation of devices and equipment shall be carried out according to the training program developed by the Supplier and approved by the Customer.



1.5 Development / Manufacturing Documents

On the basis of this technical assignment, the Law of the Republic of Uzbekistan "On Standardization" classifies technical assignment (TA) as a type of organization standards and interprets them as a document developed and approved by the manufacturer / contractor to ensure the quality of products, works or services. Developing this document independently, the organization must take into account the results of tests and measurements, the provisions of interstate and national standards, experience in the realization of processes, the use of technologies and equipment during production / provision of services / performance of work.

2. SCOPE OF USE

The automated stationary diesel generators with a capacity up to 1000 kW (voltage 400 / 231V-50Hz), intended for use as sources of electricity and to carry out of the normal shutdown of technological units in case of emergency shutdown.

3. TERMS OF USE

3.1 General operation terms

3.1.1 Equipment, apparatus and connecting lines of units must be protected from interference noise and closed from mechanical damage.

3.1.2 Equipment and apparatus installed outdoors and indoors must be resistant to external influences in a temperate climate as per GOST 15150-69.

3.1.3 Diesel generators shall be equipped or prepared for equipment by automation.

3.2 Additional / special requirements for operation

3.2.1 The work performed must be performed of proper quality, in accordance with the requirements of this Terms of Reference, applicable law, fire, sanitary and epidemiological standards and within a specified period.

3.2.2 The Contractor is responsible for damage to property and equipment during delivery and installation.

- The Contractor provides copies of documents confirming the qualifications of specialists (certificates, certificates, certificates for electrical safety, fire safety, labor protection, safety, industrial safety, etc.).

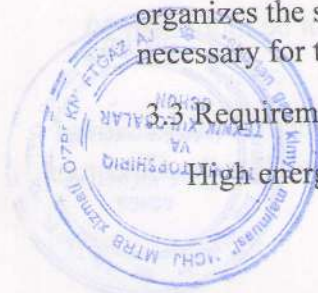
- To perform this type of work, there must be qualified specialists who previously performed this type of work, must have a certificate for a set of services for the modernization of power equipment.

- To perform a technical inspection of the mechanical part of a DEUTZ AG diesel engine model TBD 620 V 12, qualified specialists who have previously performed this type of work must be sent, must have a certificate of a set of services.

3.2.3 In the course of the work, the Customer draws up the necessary work permits for the work, organizes the safe storage of the supplied equipment, tools and other property of the Supplier necessary for the work.

3.3 Requirements for equipment operating costs

High energy efficiency and reliability of the units should ensure low operating costs.



4. TECHNICAL REQUIREMENTS

4.1 Basic technical requirements

The supplier shall upgrade the old RDISP 22 operator panel and CDIO 16 / 16-0.5-1131 programmable controller; CP 1131-P CoDesys V 2.6.0 software controller from Berghof (MOOG) company. Update the software of controllers and visualization of control systems on the basis of modern software.

4.2 The modernization of the old operator control stations and Automatic Control System Of Technological Process (ACSTP) cabinets of a diesel generator includes:

- Replacement of the existing programmable controller CDIO 16 / 16-0.5-1131 with a duplicated controller.
- All modules of input / output signals; Replacement of the existing outdated technical means with the base of modern modules.
- Replacement of the existing panel, updating of the interface connection between the controller.

Specification of the existing equipment:

2 CPU Control module from I / O Discrete module CDIO 16 / 16-0.5-1131, B.NR: 2011030, + 6X13027 Control module, 16 discrete Inputs, 16 configurable discrete Inputs / outputs, line: 2xCAN, 1xRS232, status LEDs, auxiliary voltage: 24V, incl. plug, Dimensions WxHxD [mm] 124 x 170 x 85.5 (modular dimension W = 113 / 118.5), Power consumption at Ue = +24 VDC idling max. 300 mA; all I / Os active approx. 10 A piece 1

No	Name	Specifications	Unit	Qty.
1	Control panel RDISP-22 240/64RTCJST6120 DO, Best.-Nr.: 13698	With potential-free make contact and protective diode, Graphic terminal, 240x64 dots, 8 function buttons, dialer, red LEDs 17-32V DC, CAN-Bus, RS232 / TTY,	pcs.	1
2	CPU Input/output controller modules Digital module CDIO 16/16-0.5-1131, B.NR: 2011030,+6X13027	Controller module, 16 discrete Inputs, 16 configurable discrete Inputs / outputs, line: 2xCAN, 1xRS232, status indicating LEDs, auxiliary voltage: 24V, including plug, Dimensions WxHxD [mm] 124 x 170 x 85.5 (modular dimension W = 113 / 118.5), Power consumption at Ue = +24 VDC idling max. 300 mA; all I / Os active approx. 10 A	pcs.	1
3	Discrete expansion module QDIO 16/16- 0.5, B.NR.: 13351,+6x13027	Discrete expansion module, 16 discrete Inputs, 16 configurable discrete Inputs / outputs, auxiliary voltage: 24V, including plug. Dimensions WxHxD [mm] 124 x 170 x 85,5 (modular dimension W = 113/118,5), Power consumption at Ue= +24 VDC idling max. 300 mA; all I/Os active approx. 10 A	pcs.	1

4	Analog expansion module QAIO 16/4-1 B.NR.: 13740, +5X13027	Analog expansion module, 16 analog inputs, 4 analog outputs 4-20mA, auxiliary voltage 24V, including plug	pcs.	1
5	Proact digital speed control (Woodward)	Speed controller, Part No. 9905-463 Serial No. 12122279 pcs 1	pcs.	1

4.2 Main technical, economic and operational indexes.

The equipment is operated with a wide temperature range, therefore, it must provide high reliability and efficiency.

4.3 Reliability requirements

- Diesel generators with a capacity of up to 1000 kW, intended for use as sources of electricity, and establishes technical requirements for their automation.
- Automation systems, their components and devices must operate reliably at the following ambient temperatures: from - 20 ° C to + 60 ° C indoors;

Electronic elements and devices intended for installation in switchboards, consoles or enclosures must operate reliably at ambient temperatures up to + 65 ° C.

Temperatures up to + 75 ° C shall not cause damage to automation systems, their elements and devices.

- Automation systems must operate reliably at relative air humidity (75 ± 3) % and temperature (50 ± 2)°C or at relative air humidity (80 ± 3)% and temperature (45 ± 2)°C, as well as at relative air humidity (95 ± 3)% and temperature (30 ± 2) ° C.

- Automation systems must operate reliably at vibrations with frequencies from 2 to 100 Hz: at frequencies from 2 to 13.2 Hz - with a displacement amplitude of ± 1 mm and at frequencies from 13.2 to 100 Hz - with an acceleration of ± 0.7 g.

- Automation systems installed on vibration sources (diesel engines, compressors, etc.) or in the tiller compartment must operate reliably at vibrations with frequencies from 2 to 100 Hz: at frequencies from 2 to 25 Hz - with a displacement amplitude of $\pm 1,6$ mm at frequencies from 25 to 100 Hz - with an acceleration of ± 4.0 g.

- Diesel generator must provide stable performance with allowable reduction of effect up to 90% at outdoor temperature from - 30 ° C to 60 ° C

- The equipment to be supplied must be manufactured not earlier than 2019, comply with the requirements of the international standard and be certified.

- To indicate the service life of the equipment. All supplied equipment must be new, packaged, not repaired;

- All equipment must be supplied as a set.

- The probability of failure-free operation of the control system for functionally independent operations should be at least 0.95 for 2000 hours or 0.9 for 5000 hours.

- The assigned resource of the control system before factory repair must be at least 25,000 hours.



- The operating time without readjustment and adjustment must be at least 5000 hours.
- The service life of the control system must be equal to service life of the diesel generator.
- Diesel generators equipped with automation equipment must have a warranty period not less than the diesel engine warranty period.

4.4 Design requirements, installation and technical requirements

- 4.4.1. Automated monitoring and control system for operating modes with the ability to operate in manual and semi-automatic modes;
- 4.4.2. Simplicity of operation, maintainability of technological units of equipment, provision with the safety of life and health of service personnel;

4.5 Requirements for the contractor

4.4.1. To have a permit issued by the SRO (self-regulating organizations) to carry out activities for the design of buildings and structures.

4.4.2. To have certified experienced specialists for installing and commissioning of the chillers and for training of personnel.

4.4.3. All measuring instruments used in the performance of work must have an unexpired inspection certificate issued by the State Metrological Service. Electrical work must be carried out by an organization that has a certificate of registration of an electrical laboratory.

4.4.4. To carry out the training (at least 24 hours) of 3 (three) Customer's specialists oriented on the control and maintenance of diesel generators.

4.4.5. Documentation according to the following list, but not limited to it, must be provided in Russian and English, 2 copies, in paper and electronic versions for each component piece of equipment:

- Installation instructions.
- Operation manual and maintenance method.
- Description of malfunctions, indicating the reasons and methods of elimination.
- General technical documentation, information about equipment supplier, indicating the parameters and the need for energy resources;
- Technical characteristics and description of equipment units, other technical information.

4.4.6 Quality certificates, certificates of conformity, installation diagram and equipment passport.

4.6 Environmental reliability requirements.

When exposed to environmental factors, avoid harmful effects such as high temperature and aggressive environment. To provide protection against mechanical damage during storage, transportation and packaging.

4.7 Power supply / energy supply Requirements.

The diesel generator must be powered from a 380 V three-phase alternating current network (4 15% ... + 10%).



4.8 Requirements for instrumentation and automation.

All measuring instruments used in operation must have an unexpired inspection certificate issued by the State Metrological Service.

System structure requirements.

Automatic Control System Of Technological Process (ACSTP) of a diesel generator, which provides automated collection and processing of information necessary to optimize the control of a technological facility, shall include the following requirements:

The diesel generator must be fully automated and have its own set of software and hardware controls, made on modern microprocessor-based automation and provide with:

- constant readiness for automatic start-up;
- predominance of the start-up command over other commands (normal stop, technological cranking of the crankshaft, manual shut-down, etc.), except for the emergency shut-down command. A diesel generator (DG) in the "standby" mode shall not have automatic prohibitions for start-up;
- automatic maintenance of the generator output voltage within the specified limits at all DG operation modes;
- power supply of start-up, control, protection, signaling and regulation circuits shall be carried out from an autonomous power source as part of the DG;
- maintaining a constant (within the limits of the regulatory characteristic) frequency of rotation of the DG shaft;
- alarm signaling in case of deviation of operating parameters from alarm values;
- warning signaling in case of deviation of operating parameters from warning values;
- diesel engine protection;
- generator protection;

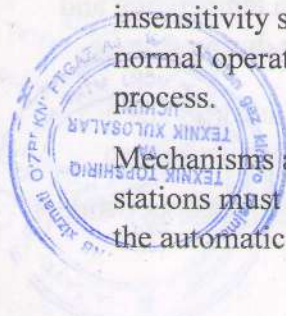
Automatic diagnostics of technical facilities of a diesel generator;

- emergency shutdown of a diesel generator operating in normal (autonomous) mode at:

- 1) lowering of the oil pressure up to the limited value;
- 2) increasing of the speed of the diesel engine crankshaft up to the limited value;
- 3) multiphase faults in the stator winding;
- 4) external interphase short circuits.

Automatic control must be stable over the entire control range. The value of the control insensitivity shall be such that fluctuations of the controlled parameters, which may occur under normal operating conditions of the controlled equipment, do not lead to instability of the control process.

Mechanisms and units for which an automatic or remote start-up is provided, at local control stations must have means to disable automatic or remote control. In the event of a malfunction of the automatic or remote control, the local control must be retained.



Alarm system (AS).

The alarm system must be independent from control systems and protective devices, i.e. malfunctions and damage to the latter should not affect the operation of the alarm system.

The possibility of partial unification of these systems is in each case a subject of special consideration by the Register.

Self-control of the AS should be provided: at least in case of such damages as short circuit, open circuit and being earthed, as well as in the event of a power failure, the AS signal should be given.

The AS system must simultaneously give light and sound signals. In this case, the possibility of simultaneous signaling of more than one malfunction must be ensured. Acknowledging of one signal must not interfere with the acknowledgment of another. Failure of one element (device) of the system should not cause failure of the entire AS system.

Instrumentation must be resistant to vibrations that are possible at the installation site.

Replaceable elements requiring their adjustment, as well as places of control measurements (sockets, terminals) must be located in such a way as to provide free access to them.

Adjustment elements must be protected against spontaneous change of the adjustment made. This protection should not exclude the possibility of reconfiguration.

The design of the actuators should exclude the possibility of spontaneous changes in their position.

Sensors measuring the temperature of flammable, toxic and pressurized liquids, vapors and gases must be isolated from the controlled environment.

It should be possible to check and calibrate pressure sensors at the points of their connection to the control points without dismantling.

All elements, devices and control points should be clearly and permanently marked, preferably near them.

The location of the instrumentation should allow for maintenance, repair and replacement of faulty sensors.

- the level of control and management of the technological process (controller level);
- human-machine interface level.

Field level – is the level of sensors, signaling devices and actuators associated with technological equipment. At this level, the following are carried out:

- Measurement of technological parameters;
- Providing with information to the controller level.

Controller level – is the level of the controller and I / O modules. At this level, the following are carried out:

- collection and processing of information of the technological process level;
- high-speed collection and logical processing of signals from primary sensors, development of actions on actuators in accordance with control, protection, blocking and signaling algorithms,



information exchange with the operator station and the bus, as well as self-diagnosis of a malfunction.

Backbone network level (network level) – is the level that communicates between the PLC and the automated workstation (AWP) of the operator. The basis of this level is the industrial network.

Human-machine interface level – is a level that includes automated workstations consisting of:

- operator's workstation;
- communication equipment.

Requirements for methods and means of communication between the components of the automatic control system of technological process.

Network organization between the controller and the workstation.

The physical environment over which information is exchanged -

The protocol used is TCP / IP (Ethernet).

Communication equipment must meet the following requirements:

- using of Ethernet technologies or other technologies;
- construction of load-balanced networks;
- using of the Ethernet Switch / Hub.

4.9 Requirements for components, starting and operational raw materials / materials as well as finished products.

- The equipment must be free from defects in accordance with materials or work, or as a result of actions or omissions of the contractor, during the normal use of the equipment supplied under conditions typical of Uzbekistan.
- Supplier must make all offered equipment operational and include in its offer all components (including fasteners) necessary to fulfill this requirement.
- Each equipment supplied must be functional and provide with the manufacturer's intended functionality as a separate component.
- The operating conditions of the equipment are determined by its technical characteristics.
- All equipment offered for delivery must have a warranty of the supplier or manufacturer for a period of 2 (two) years.
- The supplier must ensure that the supplied goods are new, previously unused, not discontinued by the manufacturer at the time of delivery.

4.10 Marking requirements

Equipment must be marked in Russian or English and must be clearly marked. Also indicate the manufacturer, batch number and date of manufacture. The marking must be retained for the entire service life of the supplied equipment. The marking must comply with the requirements of state standards of the Republic of Uzbekistan and do not contradict and are not inferior to international generally accepted standards. The marking of the goods must contain the де́йств



name of the equipment, the name of the manufacturer, the address of the location of the manufacturer and the date of production.

4.11 Sizing and packaging requirements

Packaging should ensure the safety of the goods during transportation, loading and unloading operations and moving the goods to the place of their installation. Packaging must comply with the requirements of state standards of the Republic of Uzbekistan and internationally accepted standards. The packaging must strictly comply with the product labeling. The equipment must be supplied in its original packaging. The packaging should not have any mechanical damage and traces of exposure to adverse climatic conditions. During transportation, it is necessary to be guided by the requirements for packaging and transportation of the Equipment specified in the manufacturer's documentation. Equipment damaged during transportation must be replaced with a new one at the expense of the Supplier on the basis of an act issued by the Customer.

4.12 Requirements for spare parts and consumables

The delivery set should include spare parts for a two-year operation period, specific tools and accessories for repair and maintenance, according to the manufacturer's passport.

The complete set of spare parts must ensure operation for two years, taking into account consumption rates and the presence of high-wearing parts in the structure (indicating the name and quantity in the technical proposal)

Cooling system elements installed for providing uninterrupted operation of the system: filter, sight glass, thermostatic valve, solenoid valve, high-low oil level switch, flow switch, etc.

5. REQUIREMENTS AS PER RULES FOR DELIVERY AND ACCEPTANCE

5.1 Procedure of delivery and acceptance

Factory acceptance tests.

The supplier must submit for approval prior to the beginning of factory acceptance test details on the acceptance and test criteria and procedure of testing and acceptance. Prior to the beginning of factory acceptance tests, the Supplier must ensure the completion of the manufacture of the Unit, the adjustment of all systems and interfaces, the internal commissioning test and have a fully functioning Unit that meets the requirements of this document and has been agreed with the Customer by design documentation.

Manufacturer's test reports and quality assurance certificates must be available for each component at the time of factory acceptance testing. Factory acceptance tests should only be carried out after the final versions of all software and hardware modules have been fully integrated into the production system.

The factory acceptance test program shall consist of at least the followings:

- Verification of executive documentation (certificates, test reports), confirming the quality of the Unit;
- Visual control of quality, layout, designations, finishing painting.
- Metrological tests of all operating and reference measuring instruments Units.



1. - Full functional tests in all modes and with various types of calibrated flow meters, including checking of all the devices, instruments and equipment to confirm performance (operating characteristics);
- Checking of the main and specialized software of the control system. All test results listed above shall be recorded with appropriate comments in the supplementary test documentation.

The supplier must provide all additional materials / equipment for carrying out of the satisfactory factory acceptance testing. Acceptance for trial operation after completion of commissioning is carried out in a volume similar to the factory acceptance tests, and is also supplemented by a stage; metrological certification of the Unit, the Equipment is considered to be delivered properly and accepted from the moment of signing of the Acceptance Certificate, signed after completion of installation and commissioning works, performance of metrological certification, trial operation, training of the Customer's personnel and transfer of the Unit to industrial operation. Additional conditions for the acceptance of the Equipment are established by the Agreement between the Supplier and the Customer.

5.2 Requirements for handing over of the technical and other documents to the customer during delivery of equipment.

- The supplier is obliged to provide with the following documents confirming the compliance of the product with the established requirements:

- Certificates (declarations) of compliance with the requirements of GOST (GOST or TS) and safety;
- Specification of the main components of the equipment with an indication of the manufacturers, as well as the attachment of certificates of conformity for them;
- Documentation on installation, commissioning and operation in Russian or English;
- 1. Functional description with indication of the technical parameters and operating conditions;
- 2. Interconnection Diagram;
- 3. Process functional diagram showing all monitoring and control devices;
- 4. General-arrangement drawing (location of the main components);
- 5. Description of operator stations (user interface), including the general drawing, lists of all signals, keyboard and screen functions;
- 6. Description of power supplies and their connection diagrams;
- 7. System cabling diagram;
- 8. List of used elements with specification of technical parameters;
- 9. Description of the software and a list of its tests by the developer;
- 10. Typical diagrams of input / output circuits;
- 11. Description of behavior in case of malfunctions;
- 12. Test program;
- 13. Operation manual;
- 14. Installation and maintenance manual.



- All supplied equipment undergoes incoming control, with a representative of the participant during receipt of the equipment at the warehouse;

Acceptance committee;

The Customer is provided with the Design and Operational Documentation for

Unit in English or with translation into Russian, consisting of:

- Passport of the Unit;
- Instructions for installation and adjustment of the Unit;
- Design documentation for the Unit (layout drawings, technological, mechanical, electrical, instrumentation and automation; diagrams for installing devices on the measuring table during testing; electrical wiring diagrams and cable log; external wiring diagrams; specifications and bills of equipment and materials with dimensional drawings, indicating weight and other technical characteristics; engineering and technical documentation of cabinets; layout diagrams of equipment: general arrangement diagrams of equipment; power supply and protective grounding diagrams; drawings of screen interfaces (displays) of operator stations; description of control algorithms of the Unit; controller program code);
- Manuals for operation, maintenance and repair of the Unit;
- Description of the software and the Programmer's Engineer's Manual for the maintenance of the software complex in the part of the controller and operator station;
- Recommendations for the minimum level of spare parts, tools and components for maintenance and repair of technical equipment;

5.3 Requirements for equipment insurance

The equipment must be insured in accordance with the CIP delivery terms (Incoterms 2010).

6. TRANSPORTATION REQUIREMENTS

Delivery of equipment is carried out at the expense of the Supplier by shipment of products by road and / or rail transport to the address of the consignee, other methods of shipment can be made only with the written approval of the Customer.

In the event of an erroneous shipment of equipment to the wrong address, the Supplier, on its own at its own expense, redirects the products to the destination specified in the contract.

Destination: Customer – «Shurtan Gas Chemical Complex» LLC, The Republic of Uzbekistan, Kashkadarya region, Guzar district, Shurtan settlement, 180300, www.sgcc.uz, sgcc@sgcc.uz

It is allowed to pack measuring instruments in packages according to the rules for the transportation of goods, approved by the relevant departments, as well as use reusable containers in accordance with GOST 9557-87.

Transportation of measuring instruments must be carried out in accordance with

the rules for the transportation of goods acting for each type of transport.

The terms of transportation for measuring instruments in packaging concerning the exposure of climatic factors and transport shaking should be as follows:

- air temperature from minus 50 ° C to plus 50 ° C;



- transport shaking with an acceleration of no more than 30 t / s at a frequency of impacts from 80 to 120 per minute;
- relative humidity not more than 98% at temperature of 35 ° C.

The equipment must be insured in accordance with the CIP delivery terms.

7. STORAGE REQUIREMENTS

Shall be in accordance with the manufacturer's technical documentation.

During storage of the spare parts, avoid harmful effects such as high temperature and aggressive environment and provide with protection against mechanical damage.

8. REQUIREMENTS FOR THE SCOPE AND / OR DURATION OF WARRANTIES

- Diesel generators equipped with automation equipment must have a warranty period of operation not less than the warranty period of operation of a diesel engine in accordance with GOST 10150-75.
- The warranty period for the supplied materials and equipment is not less than 24 months. The beginning time of the warranty period shall start from the moment the equipment is put into operation.
- The supplier must, at his own expense and within the time frame agreed with the customer, eliminate any defects in the supplied equipment, materials identified during the warranty period at the expense of the supplier.
- In case of equipment failure, the supplier is obliged to send his representative to participate in drawing up an act for fixing of the defects, for agreeing on the procedure and terms for their elimination no later than 5 days from the date of receipt of a written notice from the customer. In this case, the warranty period is extended accordingly for the period of elimination of defects.

9. MAINTAINABILITY REQUIREMENTS

All devices and equipment of the unit must be maintainable during operation.

To provide with frequency, scope and schedule of repair and maintenance;

The equipment must be free from defects (hidden defects) related to design, materials used or manufacturing defects.

All equipment offered for delivery must have a supplier's or manufacturer's warranty for a period of at least a year.

10. SERVICE REQUIREMENTS

10.1 Service requirements

Shall be in accordance with the manufacturer's technical documentation.

The supplied spare parts must be designed for continuous operation around the clock under specified conditions during the specified warranty period.

- The supplier is obliged to provide with the following documents confirming the compliance of the product with the established requirements:

- To provide with Certificates (declarations) of compliance with the requirements of GOST (GOST or TS) and safety;
- To provide with Specification of the main components of the equipment with an indication of the manufacturers, as well as the attachment of certificates of conformity for them;
- To provide with Documentation on installation, commissioning and operation in Russian or English;
- All supplied equipment undergoes incoming control, with a representative of the participant during receipt of the equipment at the warehouse;
- Acceptance of products by quantity is carried out in accordance with the requirements of the Instruction on the procedure for acceptance of industrial and technical products and consumer goods;
- During accepting of the products, the following is carried out:
 - external inspection of containers and packaging;
 - checking of the conformity of the number of shipped and received delivery places; checking of the compliance of the contents with the packing lists and the characteristics specified in the shipping documentation.

10.2 Service maintenance requirements

The supplier is obliged to perform service maintenance during the warranty and post warranty period.

10.1 All work must be carried out in compliance with the fire safety regulations, EIC (Electrical Installations Code), labor protection rules, Interindustry rules on labor protection (safety rules) during the operation of electrical installations (IIOT R M-016-2001), sanitary norms and regulations, industrial safety, requirements of internal regulatory documents of the Customer's.

10.2 The Contractor is responsible for damage of property and equipment of the Customer during delivery and installation.

10.3. The contractor shall provide with copies of documents confirming qualifications of specialists (employee identification, certificates, certificate for electrical safety, fire safety, labor protection, safety, industrial safety, etc.).

11. ENVIRONMENTAL AND SANITATION REQUIREMENTS

According to the acting laws and regulations in the Republic of Uzbekistan.

The equipment offered for delivery must create favorable conditions for normal operation conditions:

If a diesel generator is replaced with a new one, the system must comply with the environmental standard. Fire and explosion safety requirements must be observed.

12. ENERGY EFFICIENCY REQUIREMENTS

The diesel generator must always be ready to provide electricity with less energy consumption in high temperature and cold weather conditions.



Basic protective measures for safety:

Basic protective measures for safety:

- To protect personnel and equipment from the effects of short-circuit currents, lightning discharges, static electricity, as well as to equalize the potentials, appropriate protective measures must be taken in accordance with the requirements of the EIC (Electrical Installations Code) of the Republic of Uzbekistan and other regulatory documents in addition to protective measures against the external high voltage on the external communications during entering a modular building.

The lightning protection must meet the requirements of the EIC of the Republic of Uzbekistan.

The design of the technical means of installation should be carried out in such a way as to ensure that there are no inappropriate actions by personnel or failure of technical equipment during installation, adjustment, operation, maintenance and repair.

The protective grounding system must meet the requirements of GOST 12.1.030-81 and regulatory documents of Uzbekistan.

The resistance of the protective earth cables must not exceed $4\ \Omega$ between any cabinet (device) and earth.

Individual structural units such as cabinet rack, case, enclosure or panel section must be connected to an isolated ground loop.

In the manual for the operation of electrical equipment, specific sections with requirements for safe installation and maintenance should be given.

The installation, assembly, maintenance, repair and operation of all technical devices must be carried out in accordance with the electrical installation rules.



- General specifications shall be in accordance with the requirements of other international standards with similar requirements for the design and manufacture of the goods.

The supplier must develop a set of manufacturer's documentation (hereinafter - TA) for the goods in the amount according with the requirements of this technical assignment, and agreed it with the "Customers".

17.2 Manufacturing and inspection requirements

Manufacturing of the Unit must be carried out in the factory, in accordance with the requirements of this Terms of Reference (hereinafter referred to as TOR) and a set of design documentation agreed with the Customer;

The Supplier is obliged to carry out Factory Acceptance Tests of the Unit with the obligatory participation of two representatives of the Customer;

The Unit can be shipped only after completion of the factory acceptance tests with a positive assessment from the Customer.

17.3 Requirements for installation supervision

- Installation is carried out at the expense of the supplier.
- To perform this type of work, there must be sufficient qualified specialists who have previously performed this type of work.
- Installation supervision shall be carried out by the Supplier's specialists.
- The specialists shall be qualified and previously performed this type of work.
- Specialists in the field of this type of work must have a certificate for this type of work.
- Equipment after installation, pre-commissioning and commissioning will be subjected to comprehensive operational tests guaranteed by the technical parameters.

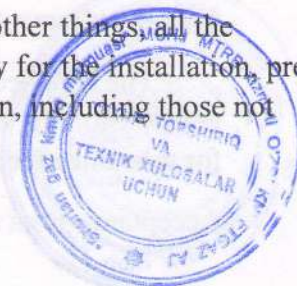
17.4 Pre-commissioning requirements

- The supplier shall carry out:
 - Pre-commissioning of equipment at the Customer's site.
 - Equipment testing and trial run with guaranteed production capacity in all parameters.
 - Follow-up and support during operation
- The supplier must provide a warranty for the equipment with indication of hours or days of operation.

Testing within 72 hours after installation.

The supplier shall carry out of pre-commissioning and metrological certification.

Pre-commissioning works mean that the Supplier provides, among other things, all the necessary materials, tools, consumables, auxiliary equipment necessary for the installation, pre-commissioning and commissioning of the Unit and its normal operation, including those not listed in the technical assignment.



General requirements for safety during operation of the units should be given in special sections of the operation manual.

Scheme of linking of the Unit to the existing communications of the Customer (power supply, water supply, sewerage), shall be carried out taking into account the requirements of the current norms and rules for fire safety of the Republic of Uzbekistan (as part of the design documentation).

- All work must be carried out in compliance with fire safety rules, EIC, labor protection rules, Interindustry rules on labor protection (safety rules) during the operation of electrical installations (IIOT R M-016-2001), sanitary norms and regulations, industrial safety, requirements of internal regulatory documents of the Customer's.

14. REQUIREMENTS FOR QUALITY AND CLASSIFICATION

The quality of the goods must be confirmed by a quality certificate issued by the manufacturer's factories.

15. ADDITIONAL (OTHER) REQUIREMENTS

The quality of the product should ensure the possibility of its intended use without negative consequences. The permissible level of radio interference of electrical equipment of diesel generators must comply with the "All-Union Norms of Permitted Industrial Radio Interference" or the level agreed with the customer.

16. REQUIREMENTS FOR THE QUANTITY, COMPLETING, PLACE AND TIME (PERIODICITY) OF DELIVERY

The unit is subject to delivery with the complete set described in section 4 of this technical assignment.

It must be delivered to the customer's address in the first half of 2020.

For the quantity of upgrading equipment, see table 4.2.

The equipment must be delivered to the following address: «Shurtan Gas Chemical Complex» LLC, the Republic of Uzbekistan, Kashkadarya region, Guzar district, Shurtan settlement, 180300, www.sgcc.uz, sgcc@sgcc.uz.

Delivery conditions according to the CIP delivery basis.

Delivery of equipment is carried out at the expense of the Supplier by shipment of products by road and / or rail transport to the address of the consignee, other methods of shipment can be made only with the written approval of the Customer.

In the event of an erroneous shipment of equipment to the wrong address, the Supplier, on its own at its own expense, redirects the products to the destination specified in the contract.

17. REQUIREMENT FOR RELATED SERVICES IN THE SUPPLY OF EQUIPMENT

17.1 Requirements for the implementation of project documentation

- The supplied goods are considered to be accepted after installation / assembly, pre-commissioning, commissioning and successful completion of comprehensive performance tests for guaranteed technical parameters.

Acceptance tests are carried out in accordance with the technical specifications.



17.5 Requirements for customer personnel training

Training of the Customer's personnel on the features of control and maintenance of automated stationary diesel generators shall be provided.

It is necessary to provide with training of personnel on the basis of the rules of operation, maintenance and principles of operation of the system, the test bench. After completion of training on the basis of control works, practical exercises and interviews, trainees must receive the certificates of training and ability of operation and maintenance of the Unit. During training of personnel, it is necessary to provide for the possibility of interchangeability. The training should include theoretical and practical training on benches, mounted equipment, including during the pre-commissioning period.

Hardware and software training should include the following topics:

- Design and composition, principle of operation;
- General, principle of operation, configuration and programming of hardware and software of the controller and operator station;
- Maintenance, repair and operation of devices and equipment. Training should be carried out according to the training program developed by the Supplier and approved by the Customer.

17.6 Other related services

No requirements.

18. REQUIREMENT FOR THE FORM OF SUBMITTED INFORMATION

No requirements.

19. LIST OF ACCEPTED ABBREVIATIONS

No	Abbreviations	
1	AWP UPS PLC SCADA	Automated workplace Uninterrupted power supply Programmable logic controller Supervisory Control And Data Acquisition
2	TA SRO EIC <u>SanPiN</u>	Technical assignment Self-regulatory organization Electrical installation code Sanitary Regulations and Standards
3	ACSTP WPS	Automatic Control System Of Technological Process Warning Protection System
4	IA	Instrumentation and automation

Working draft, consisting of:

- specification;
- program description;
- text of the program;
- programmer's guide;
- the manual of the ACSTP engineer.



Developed by:

Leading foreman of The instrumentation
and automation shop:



S. Karimov

Agreed by:

Deputy Chief Metrologist:

Chief of The instrumentation and automation shop:

Chief Head of The instrumentation and automation shop:

Lead engineer of The Material and
technical resource management service:



O. Achilov

Z. Jalilov

U. Abdullaev



M. Khobiev

1	SCADA	1
2	TA	2
3	WPS	3
4	WPS	4
5	WPS	5
6	WPS	6
7	WPS	7
8	WPS	8
9	WPS	9
10	WPS	10
11	WPS	11
12	WPS	12
13	WPS	13
14	WPS	14
15	WPS	15
16	WPS	16
17	WPS	17
18	WPS	18
19	WPS	19
20	WPS	20

