



VOLUME 3 TECHNICAL REQUIREMENTS

PART 2 GENERAL TECHNICAL REQUIREMENTS

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1. GENERAL CONDITIONS APPLICABLE TO REHABILITATION WORKS

1.1 Scope, object and validity of the General Conditions

1.1.1. These general conditions define the general technical requirements applicable to the equipment, installations and Technical Units/works included in the contract for the rehabilitation of the Pressure knot related to Stejaru HPP.

1.1.2. The General Technical Conditions presented in this volume shall be read together with the specific technical conditions specified in the Tender Specifications of each equipment/installation/Technical Unit included in the rehabilitation action. The technical conditions specific to each equipment/installation/Technical Unit are set out in "**Part 3. Tender Specifications**".

If there are differences or ambiguities, the requirements of the specific Tender Specifications shall prevail.

1.1.3. It is specified that when drawing up the technical-economic documentation for the rehabilitation of the pressure knot related to Stejaru HPP, the principle of uniqueness of information or requirement was observed so that for all equipment, installations and Technical Units/works included in the Contract it is mandatory to consult and comply with the data and conditions grouped in the following parts/sections/chapters:

PART 1 **GENERAL INFORMATION ON STEJARU HYDROPOWER PLANT**

PART 2 **GENERAL TECHNICAL REQUIREMENTS**

PART 3 **TENDER SPECIFICATIONS**

Section 3.2. **TENDER SPECIFICATIONS. BASIC WORKS. PRESSURE KNOT**

Chapter 3.2.A **Butterfly valve chamber. Electrical-mechanical equipment.**

3.2.A.1 Butterfly valve installation, including penstock ventilation installation

3.2.A.3 Control, automation and VF signaling installations

3.2.A.4 Earthing installation (including the area of penstocks)

3.2.A.5 Low voltage cables and secondary circuits

PART 4 **ECONOMIC PART**

1.1.4. The content of the volumes/parts/sections/chapters referred to in point 1.1.3 shall be submitted in Romanian.

Note: A number of the information contained in the drawn part is presented in Czech.

When drafting these technical conditions, the validity of the principle of equivalence between the singular and the plural was taken into account. This means that where the expression is in the singular and similar pieces of equipment or technical units are included in the Contract, the respective requirement refers to each of them and to their totality.

1.1.6. During the performance of the Contract, the Beneficiary and the Contractor may agree to amend one or more provisions of the Tender Specifications. If such a change affects the price and/or the execution schedule of the Contract, the Contractor may start the operation of the change only after the signing with the Beneficiary of an addendum to the Contract.

1.1.7. The Contractor shall strictly comply with these General Conditions, together with the special technical conditions contained in the Equipment Tender Specifications. The contractor will carry out the entire work in a professional manner, in accordance with modern technological methods. The entire design, all calculations, materials and equipment, manufacturing, verifications and tests will be in accordance with the latest standards in force.

1.1.8. During the rehabilitation of the equipment and installations provided in the Contract, the Contractor will comply with all the regulations applicable to such works and will follow all the instructions given by the Beneficiary.

1.1.9. The following general definitions are used in these technical conditions:

The Beneficiary is the contracting authority of the rehabilitation works for the equipment within Stejaru HPP

Contractor is a legal person specialized in carrying out the rehabilitation works of equipment similar to those existing at Stejaru power plant, which concludes the Rehabilitation Contract with the Beneficiary. The contractor is the supplier of equipment and services for the main works which shall be carried out on site.

Subcontractor is a legal person specialized in executing rehabilitation works similar to those required for the equipment in Stejaru HPP. The subcontractor can also be a supplier of equipment for the works they carry out on site.

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Consultant is the legal person employed by the Beneficiary, recognized for the consultancy services related to the activities carried out under the rehabilitation contract and whose services can determine the resolution of the problems arising during the performance of the works.

The **specialist** is the private person recognized for training in a field related to the activities carried out within the rehabilitation contract and whose services can determine the resolution of the problems arising during the performance of the works.

Designer = the company employed by the Contractor, for:

- drawing up the detail design, the execution details and the sizing calculations of the equipment and installations which, with the consent of the Contractor, will be made available to the Beneficiary for endorsement/approval;

Supporting in front of the Beneficiary the documentation subject to analysis, approval, approval and the provision of any additional information, requested by him or by the Consultant.

Distinct deliverable equipment is an equipment usually manufactured in series production based on factory norms and which is tested and approved for operation in hydropower plants. The total liability belongs to the Contractor for the selection of the type and characteristics of such equipment.

Technical Unit is the set of installations that contribute to the performance of a service or a distinct function within the technological process in the hydropower plant for which the rehabilitation requirements can be presented as a whole and the guarantees can be checked separately. Also, **Technical Unit**, within these technical conditions, means all the equipment and materials that require the same categories of rehabilitation works for which common requirements can be defined or which can be subcontracted by the Contractor to a specialized unit.

Rehabilitation Contract is the Contract for the rehabilitation of the "REMAINING TO BE EXECUTED" equipment and installations within the Pressure knot related to Stejaru HPP, whereby the Contractor undertakes to take full responsibility and to carry out, with its own units or by subcontracting, all the works required for the design, manufacture, assembly, commissioning, including for the "remaining to be executed" equipment and installations in the rehabilitation action so that, after their execution, in the operation of Stejaru plant and its equipment the purpose defined in point 1.2 is achieved. For each Technical Unit, the Rehabilitation Contract means the performance of all works so that in the end a complete Technical Unit is handed over to the Beneficiary, in perfect working order, perfectly connected to the site and that corresponds to the functional, reliability and safety requirements necessary for a correct, safe and lasting operation.

The hydro unit (group, unit) is the turbine + generator + ancillary and auxiliary installations within their limits, which ensures the operation under the imposed conditions and contributes to the achievement of the nominal parameters of the turbine and the generator for the generation of electricity and the operation in synchronous compensator.

Block within secondary circuits = the devices or equipment that perform a given function within a scheme.

Life cycle represents the duration expressed in years from the completion of the rehabilitation to the time when it will be necessary to replace or recondition some vital components of the respective equipment.

Special event is the case in which it is necessary to decommission a hydro unit or an equipment to replace or recondition some of its vital components before the end of its life cycle.

The general rehabilitation program is the program that must be submitted in the tender, and it will highlight the important stages of the rehabilitation works that the Contractor undertakes to carry out.

The detailed rehabilitation program is the program the Contractor will have to present after the signing of the Contract and which, in addition to all important stages, will highlight the deadlines and phases specific to each technical unit within the rehabilitation works. Upon the Beneficiary's approval, this program shall become binding to the Contractor.

Major defects, inside and outside the guarantee period, define the defects that lead to the decommissioning of the respective equipment for a period longer than 21 calendar days.

The corrosion protection system represents all the layers of primer and paints and auxiliary products that are used on the surface of an equipment to give it its resistance to corrosion.

Design change is the situation in which during the rehabilitation works of one or more equipment it is necessary to change the technological solutions or the volume of works provided in the basic design due to specific conditions found at each technical unit or as a result of technical progress in the field.

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1.2. The scope of the rehabilitation

By rehabilitating the equipment and installations within the Pressure knot related to Stejaru HPP, the Beneficiary wishes to obtain:

Fulfilling, for all equipment and installations, the functions and parameters specified in the Tender Specifications;

- the minimalization of the plant unavailability period;
- the compliance with the overall dimensions of the current construction part;
- the reliability indicators of the groups and of all the plant installations at the level of those reached at similar hydropower fittings worldwide;
- the provision of the possibilities of monitoring the main operating parameters of the groups and installations and transmitting them to the hydropower dispatcher by diagnosing the possible causes on the occurred events;

ensuring environmental protection, in accordance with the provisions of GEO no. 195/2005, approved by Law no. 265/2006 on environmental protection and those of the Water Law no. 107/1996 as subsequently amended and supplemented, by providing clean materials and technologies, by eliminating oil leaks and other polluting materials.

1.3. Volume and limits of the Contract

1.3.1. The rehabilitation contract of the power units and of the mechanical and electrical equipment from Stejaru hydropower plant will be a **rehabilitation contract**. The volume of works is established in these General Technical Conditions, in the General Conditions of Contract and in the Specifications.

1.3.2. The works included in the Contract are detailed in the Specific Tender Specifications by Technical Units. In Appendix no. 1, the list of correspondence between the Technical Units and the Specific Tender Specifications is presented.

1.3.3. The requirements for each technical unit/work are presented in the Tender Specifications nominated in *point 1.1.3*. These tender specifications include requirements for the execution of all works and the provision of all materials, permanent and temporary equipment, tools, accessories for dismantling, transport to and from the site, including loading, unloading, if necessary reloading, storage, protection of equipment and materials against weather effects, cleaning, drying, complete assembly, painting, testing and commissioning of all equipment and accessories necessary for the execution of the works.

1.3.4. In order to fully and correctly meet all the requirements of the Contract for the rehabilitation of hydro units and ancillary installations in Stejaru hydropower plant, the Contractor shall meet all the provisions of the Tender Specifications and these General Conditions.

1.3.5. The responsibility of the Contractor, as a legal entity, extends from the effective date of the rehabilitation contract until the end of the guarantee period of the installations/equipment included in the contract.

1.3.6. The opinions made during the execution of the works by the Beneficiary cannot be interpreted as entailing a takeover or division of responsibility between the Beneficiary and the Contractor. These opinions retain the character of a "green light" for the continuation of the work programme.

1.3.7. The Beneficiary's responsibility is committed only if it imposes in writing changes in the provisions provided by the Contractor for the performance of the works, although there is a negative opinion of the Contractor.

1.4. Activities undertaken by the Contractor

1.4.1. The activities that are the responsibility of the Contractor derive from the fulfillment of the requirements of *point 1.2* for all the installations/equipment nominated in *point 1.3.2*.

1.4.2. The following categories of works shall be included in each Technical Unit:

- Analysis of the existing situation;
- Drawing up a report, where necessary, with the results of the surveys of the existing works/equipment and submitting it for approval to the Beneficiary;
- Drawing up the execution and assembly documentation (including disassembly) for each Technical Unit;
- drawing up the As-Built documentation;

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- presentation of the designs for endorsement and approval of the Beneficiary, in the deadlines established in the contract and making the requested additions and changes according to the agreed procedures;
- Organization, management and performance of actual rehabilitation works, including but not limited to: dismantling, disassembly works (under the conditions of *point 5.5.5.*), rehabilitation of the component parts of the equipment (where applicable), replacement of unusable parts with new ones, construction of new parts or equipment with the required performances, installation of the rehabilitated technical unit, performance of functional tests until the fulfillment of the required guarantees;
- Loading on the vehicles, transport and unloading of equipment/ subassemblies/ materials resulting from the activity of rehabilitation/dismantling/repairs to constructions/consolidation, including the resulting waste;
- Verification of the quality of the existing construction works and verification of the conformity of the execution of the gaps and the parts embedded in concrete with the projects that were their basis, made available by the Beneficiary;
- Corrections of the construction part in the areas affected by the installation of new equipment;
- Ensuring the software for the management of the automatic operation and exploitation processes of each piece of equipment and of the power plant assembly and/or arrangement;
- - Providing lubrication materials (oils, grease) in the necessary quantities until the first maintenance work required after commissioning;
- Execution of consolidation/restoration works for the construction part of the development objects (where applicable) included in the rehabilitation contract;
- Restoration of finishes at the construction part on the areas affected by the rehabilitation works;
- instructing the operation personnel
- Delivery into service of the rehabilitated and accepted technical units.

The content of the technical documentation for rehabilitation is presented in Chap. 3.

1.4.3. Within the limits set for each technical unit, the Contractor has the obligation to achieve complete specifications and deliver a complete assembly, in working order, responding to all contractual functional requirements. Defining the limits of each technical unit in these Technical Specifications does not exempt the Contractor from the obligation to ensure that there is no discontinuity within the same technical unit, between the technical units included in the rehabilitation program or at their connection with the other installations of the arrangement.

1.4.4. The Contractor will design, execute, supply, transport, install, test and put into operation the equipment and installations that are part of the Contract in perfect working order, equipped with all the necessary accessories for a continuous, reliable and long-lasting operation even if certain requirements are not expressly stated by the Beneficiary.

1.4.5. The Contractor will use competent and experienced personnel for the training and technical assistance of the Beneficiary's operating personnel for the entire period until the commissioning and operation of the equipment. If the Beneficiary requests it, it will be agreed, by agreement between the parties, to extend this period even after the end of the trial operation.

1.4.6. The equipment/installations provided by the Contractor shall be designed for a life cycle starting from the date of commissioning, under the normal operating conditions and in compliance with the operating and maintenance conditions stipulated in the manuals submitted by the Contractor.

1.5. Applicable standards and units of measurement systems

1.5.1. The works included in the Rehabilitation Contract of the hydro-units and of the main mechanical and electrical equipment of Stejaru hydropower plant will be carried out at the level of exigency provided in the national, international or equivalent profile standards, in force at the date of design and execution of the technical units that are the object of the Contract.

The standards issued by the following international or national bodies with the following indications are highlighted:

- EN-European Norm, equivalent to SR EN - Romanian Standard;
- ISO-International Organization for Standardization, equivalent to SR ISO or SR EN ISO - Romanian Standard;
- IEC-International Electrotechnical Commission (SR CEI);
- DIN- German Industrial Standards (Deutsche Industrie Normen) -VDE;

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- ANSI-American National Standard Institute;
- ASTM - American Society for Testing and Materials.
- AWS-American Welding Society;
- ASME-American Society of Mechanical Engineers;
- IEEE-The Institute of Electrical and Electronics Engineers Inc.;
- NEMA - National Electrical Manufacturer Association.
- EIA-Electrical Industry Association;
- OSI-Open System Interconnection;

1.5.2. The list of standards presented above is for information purposes only. This list will be finalized by the Contractor at the end of the "execution project" phase and will be approved by the Beneficiary together with the execution project of each technical unit. It is specified that the Contractor may use other standards or norms that are not named in *point 1.5.1*, provided that they are established and published by bodies independent of it and internationally recognized. The use of these standards is permitted only if they ensure the quality of the equipment, installations or services at least at the level specified in the standards listed above.

1.5.3. The Contractor is responsible for obtaining the Beneficiary's approval for the standards proposed for adoption prior to the manufacture or ordering of the respective equipment and materials. The standards used for the design and execution of the works shall be made available to the Beneficiary in Romanian.

1.5.4. In the event of a disagreement between the standards and the provisions of the Tender Specifications, the provisions of the Tender Specifications shall prevail.

1.5.5. In all activities related to the rehabilitation of the hydro-units and of the main mechanical and electrical equipment of Stejaru hydro power plant, only the measurement units of the International System of Units (SI) are allowed.

1.6 Content of the Technical Tender

1.6.1. The Technical Tender shall be drawn up in accordance with the requirement to carry out the rehabilitation works for all the equipment and installations of the Pressure knot related to the HPP: Stejaru, included in the Contract.

1.6.3 The technical tender shall contain the following information and shall be structured as follows:

1. General schedule for the execution of the rehabilitation works;
3. The schedule for ensuring the technical documentation for all the technical units included in the Contract;
4. The general schedule for quality control of rehabilitation works;
5. Description of the planned rehabilitation works for each technical unit;
 - 5.1. Subject matter of the Tender Specifications;
 - 5.2. Functional description and presentation of the technical characteristics of each Technical Unit after rehabilitation;
 - 5.3. Specifications of the equipment or subassemblies to be rehabilitated;
 - 5.4. Technical surveys for equipment similar to those proposed.
 - 5.5. Hydraulic diagram of the butterfly valve installation;
 - 5.6. Overall drawings of the butterfly valve installation;
 - 5.7. Data sheets from the specifications, filled in.
6. Compliance with the conditions imposed in the TS regarding the observance of the requirements imposed upon assembly, checking, testing and commissioning;
7. Confirmation of the requirements of the Tender Specifications regarding the training of the personnel;
8. providing servicing during the post-guarantee period
9. List of mandatory spare parts for each technical unit;
10. List of recommended spare parts for each technical unit;
11. List of spare parts, consumables, equipment for configuration, testing, parameterization, toolkits, measuring devices, devices and special equipment for checking and maintaining all the equipment offered;

1.6.3. The general schedule for the execution of the rehabilitation works will include and provide:

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- the time of commencement of the works, their duration and the time of commissioning of each Technical Unit included in the Rehabilitation Contract;
 - The schedule for the elaboration of the technical documentation and for the transmission of the documentation to the Beneficiary;
 - the delivery and installation schedule of the butterfly valves. Correlated to these will be presented: the periods of total shutdown and the periods of withdrawal of the hydro-units from each line of the penstocks.
- 1.6.4. The schedule for ensuring the technical documentation shall include the deadlines for submitting to the Beneficiary all the documentation, from the technical design to the final As-Built documentation.

1.7. Facilities provided by the Beneficiary

Throughout the duration of the Contract, the Beneficiary shall provide the Contractor with the following facilities, within the limits of availability:

- the technical documentation regarding the execution of the equipment subject to rehabilitation and the construction part of the power plant;
- access to existing installations to collect information about the current technical condition of the equipment, their operating conditions, the behaviour in operation at the time of the documentation visit, requirements regarding the correlation with the operating conditions of the other equipment of the plant etc.;
- information on the behaviour in operation from commissioning until now and the repair works performed at the technical unit included in the Contract;
 - studies and works, measurement reports, passports, regarding the technical units that are the object of the rehabilitation works;
 - available spaces near the power plant for organizing the works;
 - existing lifting equipment;
 - spaces and assembly devices used so far for carrying out the disassembly / assembly works of equipment or other works that must be carried out inside the power plant;
 - the warehouse in the immediate vicinity of the power plant, with all its facilities for receiving and dispatching the transported equipment;
 - The services and the corresponding command and supervision personnel for the existing installations and equipment in the power plant, not included in the rehabilitation contract.

1.8. Correspondence and official language

1.8.1. The official language used in the correspondence between the Beneficiary and the Contractor, drawings, technical books, calculation notes, reports and other documents related to the rehabilitation of mechanical and electrical equipment in Stejaru hydropower plant, for the entire period of the Contract, is Romanian.

1.8.2. All correspondence between the Beneficiary and the Contractor will be in writing on paper with original signatures. Agreements established in telephone conversations will be confirmed in writing by each of the parties on paper with original signatures. E-mail correspondence will be confirmed in writing on original signed paper.

1.8.3. The responsibility for keeping and coding the correspondence related to the activities carried out for the rehabilitation contract of the mechanical and electrical equipment in Stejaru hydro power plant lies with both the Beneficiary and the Contractor.

2. REQUIREMENTS FOR ORGANIZATION AND MANAGEMENT OF WORKS

2.1. Requirements for the organization of works

2.1.1. Levels of organization

2.1.1.1. It will be taken into account that the main levels of organization regarding the rehabilitation works of the equipment in Stejaru power plant are :

- a) The Beneficiary,
- b) Contractor, Subcontractors,
- c) Consultants.

The following clarifications are made:

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Specialists employed as private individuals by the Beneficiary or Contractor are not included in the organizational levels regarding the rehabilitation works in Stejaru hydropower plant because they are not legal entities. They are accountable to the legal person who hired them and have the same role as the Consultants.

2.1.1.2. The main activities carried out at each of the levels of organization specified in the previous point for the rehabilitation of Stejaru hydroe power plant will be:

a. The beneficiary:

will correlate the overall rehabilitation work schedule with the operating conditions of the plant in its entirety;

- will monitor the compliance with the provisions of the Contract by the Contractor and will provide it with the services undertaken by the contract;

- will execute with its own staff and with its consultants the quality control of the execution of the works at all phases of work;

- shall request and coordinate its consultants' activity;

- will organize the acceptance of the rehabilitated technical units;

- will verify the compliance with the quality control program at all phases of work and at all levels of organization;

- will follow the observance of the requirements regarding the Occupational Safety and Health, the environment protection and the fire protection measures, for all the works at the construction site.

b. The contractor shall be directly liable to the Beneficiary and shall carry out, in addition to the activities referred to in paragraph 1.4, the following:

- the detailed rehabilitation program (maximum 30 days after the signing of the contract);

- correlation of rehabilitation works with the operating conditions of each technical unit

- the organization of the works on the site and its own factories

- the coordination of the activity on site or factory of its subcontractors and consultants

checking how the quality control program is fulfilled at all stages of the rehabilitation contract and at all subcontractors.

Subcontractors are liable to the Contractor, are jointly and severally liable with the Contractor and shall fulfill all obligations of the Contractor in the rehabilitation contract with regard to the parts, equipment or technical units they have subcontracted in correlation with the activities carried out at the other technical units or operating conditions of equipment in operation.

c. Consultants are liable to the Beneficiary or the Contractor, under the contract, and shall provide specific consultancy services regarding the opportunities or conditions for carrying out the rehabilitation works of each technical unit so as to meet all the requirements of the tender specifications and also the purpose of the works.

2.1.2. Rehabilitation program

2.1.2.1. The activities necessary for the rehabilitation action will start after the signing and entry into force of the Contract.

The maximum duration of the rehabilitation activities and the maximum deadlines for the commissioning of the hydro units is the one indicated in the schedule of works.

2.1.2.2. The Contractor shall draw up and send to the Beneficiary the Rehabilitation Program in which it shall propose the performance of the works included in the Contract until the delivery in operation of the last rehabilitated technical unit. The rehabilitation program will take into account the important phases of execution of the works proposed in the rehabilitation schedule presented in the Tender, annexed to the Contract. The program will include data and deadlines regarding the design of new equipment and installations, their manufacture, transport on site, preparation of the site, disassembly of existing equipment and installations, rehabilitation of subassemblies that are reused, installation and commissioning, tests of operation, acceptance of works, decommissioning of the site etc.

2.1.2.3. The periods of total or partial withdrawals from operation for various technical units, for the realization of provisional states or transfers from the old installations to the new ones will be mutually agreed between the Beneficiary and Contractor.

2.1.3. Organization of works on site

2.1.3.1. The Contractor is responsible for all works carried out in the work spaces provided by the Beneficiary on site, regardless of whether they are assigned to its own units or to units of its Subcontractors.

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2.1.3.2. The organization of work spaces on site will be done taking into account the specifics of the works being performed, namely: dismantling equipment and installations, sorting components according to their destination, packaging and road shipping to warehouse or factory, effective transport of parts by road to / from the warehouse or plant, rehabilitation by works on site, acceptance and receipt of new or rehabilitated parts from suppliers, test or technological assembly of components on functional subassemblies, installation of subassemblies on site, performance of all functional tests and handing over the rehabilitated equipment for operation.

2.2. Occupational safety and health

2.2.1. As early as the project preparation phase, the Contractor shall draw up its own health and safety plan which shall be kept up to date throughout the performance of the works covered by the Contract. The safety and health plan will take into account all types of activities that will take place in the plant and on site and will indicate the areas where they will take place.

2.2.2. The Contractor shall present to the Beneficiary its own safety and health plan, harmonized with the safety and health plan of the site, within 30 days from the date of signing the Contract.

2.2.3. The own safety and health plan will be kept by the Contractor for 5 years from the final acceptance of the work.

2.2.4. Before starting work on site, the Contractor shall submit its own safety and health plan, for consultation and approval, to the safety and health coordinator appointed by the Beneficiary, the occupational physician, the members of the safety and health committee or representatives with specific responsibilities in the field of safety and health of works.

2.2.5. Regarding the content of its occupational health and safety plan, its obligations regarding the measures to ensure the health and safety of the personnel, as well as the certifications and reports it must submit during the execution of the work, the Contractor will comply with the provisions of the following laws in force, as supplemented and amended that may occur until the start date and during the contract execution:

- GD no. 300/2006 – Decision on the minimum safety and health requirements for temporary or mobile construction sites;

- Law no. 319/2006 - Occupational health and safety law;

- GD no. 1425/2006 approving the Methodological Norms of Law 11/10/2006 on enforcement on safety and health at work no. 319/2006.

2.3. Environmental protection

2.3.1. The Contractor is responsible for compliance with the legislation in force on occupational safety, fire protection, environmental protection and water protection throughout the Contract execution, in the work spaces and in the site organization area. Regarding environmental protection and water protection, in all the activities carried out, the Contractor shall take into account the compliance with the provisions of GEO no. 195/2005, approved by Law no. 265/2006 on environmental protection and those of the Water Law no. 107/1996 amended and supplemented by Laws no. 310/2004 and 112/2006.

2.3.2. The Contractor must ensure that its activities cause as little damage as possible to the environment both in the location of the works and in the external areas and warehouses made available by the Beneficiary.

2.3.3. The waste resulting from the rehabilitation works execution will be transported and stored, by the Contractor, only in the places and under the conditions specified by the Beneficiary, under the conditions of the contract for each type of waste. The Contractor shall organize the dismantling and temporary storage of the waste until the date of transport to the landfills arranged or until the delivery to the Beneficiary of the quantities of recoverable waste. The delivery is made periodically, based on the delivery-receipt documents and depending on the situations assessed weekly.

2.3.4. The tenderer shall prove that it has implemented an appropriate environmental management system according to ISO 14001.

2.4. Demobilizing and restoring the environment

2.4.1. Upon completion of the work, the Contractor shall decommission, at its own expense:

- all temporary work it has performed for its own convenience or for the protection of installations;
- all additional materials and equipment not required by the Beneficiary;

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- all waste from storage areas;
 - all offices, buildings and temporary accommodation provided by him;
 - all fences, gates, markings, poles, cables and temporary devices that are no longer required.
- 2.4.2. The Contractor shall repair at its own expense the external areas, rooms and plant damaged during the execution of the rehabilitation works.
- 2.4.3. The warehouses, the offices used and the entire site will be left in a clean and neat condition.

2.5. Meetings and reports on the performance of the Contract

2.5.1. During the Contract execution, at its important stages or at the occurrence of special problems between the Beneficiary and the Contractor, scheduled or operative meetings will be organized in order to define the stage of the Contract execution and to determine how to solve problems occurred.

2.5.2. The meetings will be organized by the Beneficiary according to the schedule of the important phases of the Contract or whenever deemed necessary, at its own initiative or at the request of the Contractor.

2.5.3. At each meeting, a report will be concluded which will record: the purpose of the meeting, the names of the participants, the point of view of the participants and the resulting conclusions. In justified cases, technical reports of specialists or consultants on the issues under discussion and the substantiation of proposals on their solution shall be attached. The number of copies of the meeting report shall be at least equal to the number of the levels of organization represented at that meeting.

2.5.4. The following important stages of the Contract for the rehabilitation of the hydro-units and of the main mechanical and electrical equipment of Stejaru hydro power plant are defined:

- Checks, measurements and evaluation of the technical condition of the technical units to be rehabilitated;
- approval of the Detailed Rehabilitation Schedule;
- Elaboration of the execution designs based on the approved technical designs;
- Executing the rehabilitation works, including the delivery of the spare parts for each technical unit;
- Performing the quality control of the works, in stages, established according to the Contract;
- Performing acceptance tests on phases of each technical unit;
- acceptance for commissioning of each rehabilitated Technical Unit;
- final acceptance of the Contract.

2.5.5. During each important stage, the Beneficiary and the Contractor will define the work phases specific to each technical unit or each functional unit within the same technical unit so as to ensure the conditions necessary for the completion of the works on time and at the required quality level.

2.6. Progress Reports

The Contractor shall send, before the end of the 10th day of each month, 2 (two) copies (electronic and paper) of the monthly Progress Reports, which shall include the works performed during the previous month. The report shall be drawn up according to the template agreed with the Beneficiary and shall include at least the following:

- A brief presentation of the works performed during the period to which the report refers;
- The stage of works execution included in the general rehabilitation program of each technical unit included in the Contract. On the general schedule for the performance of the works, agreed with the Beneficiary, the completed works shall be marked until the date to which the report refers;
- The list of all activities planned for the next two months, including their performance schedule, highlighting any problems that have generated delays and the actions taken to eliminate them;
- Financial statement with details of the invoices sent, invoices paid and a summary of all financial activities from the beginning of the work. The report is accompanied by the works required for payment and the supporting documents based on which these works are requested for payment.

2.7. Photographs

2.7.1. For each technical unit, the Contractor will include in the reports mentioned above color photographs with images representing the significant moments in the rehabilitation works.

2.7.2. The situations that will be photographed and the angles from which the photographs will be taken will be agreed with the Beneficiary.

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2.7.3 Each photograph will include: location, date and time of shooting, photograph title and a brief description of the situation in the image.

2.7.4. All photos shall be encoded and handed over to the Beneficiary on CD/DVD/stick, together with the monthly reports on the performance of the work.

2.7.5. Special situations from the rehabilitation works will be filmed with digital cameras. The films shall comply with the same requirements as the photographs.

3. SPECIFIC REQUIREMENTS IMPOSED TO THE TECHNICAL DOCUMENTATION

3.1. Classification of designs

For each technical unit, the Contractor shall prepare the following documentation:

- a) Documentation for the organization of works;
- b) Technical Designs (Basic Design) and Execution Designs (DDE) related to each technical unit;
- c) Final As-Built Documentation.

The documents will be drawn up in accordance with the Specific Specific Specifications and the tender accepted to the contract.

3.2. Documentation assurance programme

The deadlines for the elaboration of the technical projects for each Technical Unit can be merged or staggered according to the work execution schedule agreed with the Beneficiary.

The execution designs related to each technical unit will be drawn up on the basis of the approved technical design.

The final execution documentation in accordance with the execution will be made available to the Beneficiary within maximum of three months from the commissioning of each technical unit or installation that is the object of the Contract.

3.3. Requirements for the content of documentation

3.3.1. Documentation for organizing the works:

- the spaces necessary for the storage of the equipment specifying the conditions that they must meet (closed or open space, temperature conditions, humidity, etc.)
- spaces necessary for the execution of the works, including the eventual decommissioning and/or additional, temporary or definitive arrangements;
- the spaces necessary for the administrative technological organization outside the storage spaces and the spaces on the site of the works (workshops, offices, etc.)
- the qualification of the personnel used. by specialties
- technological utilities required on site
- the need for electricity, water etc. and consumption forecasts;
- Necessary works on the existing construction part, including its restoration on the affected areas.

3.3.2. Basic design

The basic design for the technical units where it is requested in the specific documents shall include:

- a. Presentation of the solutions for the execution of the works with their justification in relation to the imposed conditions;
- b. Overall drawings, in sufficient detail to understand the proposed technical solutions.
- c. Drawings:
 - Drawings and functional diagrams of the equipment;
 - Diagrams of auxiliary mechanical installations.
- d. the sizing calculations of each piece of equipment and technical unit and the special calculations provided in the specifications of each technical unit;
- e. Specification of the subassemblies of each technical unit on the following important categories (where applicable) : new parts, rehabilitated parts, reused parts.

Each subassembly or item in the specification shall be coded with a reference number to be used later in drawings and other documents.

f. Specification of the works envisaged for each subassembly of the technical units with indication of the weight and the material used.

g. Scheme of loads taken over by the construction part.

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3.3.3. Detail design

The detail design of each technical unit will include the following data:

- Technical Report with detailed description of the technical unit;
- General drawings and execution drawings of each component of the technical unit;
- Assembly documentation, including assembly drawings and diagrams of use of assembly devices;
- Execution, assembly and test passports for all equipment and installations included in the contract;
- Values of loads (static and dynamic) transmitted to the construction part;
- Documentation of checks and tests;
- Operating and maintenance instructions, with a full description of the maneuvers and operations that will be applied both in normal operation and in exceptional cases of operation;
- Packaging, transport and storage documentation;
- Welding procedure specification;
- Documentation for the implementation of corrosion protection;
- Work organization documentation;
- Certificates concerning the chemical composition of parts of alloy steels and major parts;
- Specification and schedule of factory and site tests;
- Spare parts documentation;
- Characteristics of the oil required for actuation and lubrication and other lubricants, indicating the quantity and quality for each assortment.
- Quality and guarantee certificates for distinctly deliverable products and equipment;
- Derogation reports for materials or execution;
- classification of all standardized component parts with the specification of the standard or normative act on the basis of which they were designed and executed;
- - Other documentation that the Contractor deems necessary (software use licenses, etc.).

The designs for the execution of component parts or sub-assemblies will highlight: technical solutions adopted, dimensions, materials, quality conditions, acceptance conditions. The drawings for the execution of the parts, which must comply with the principle of interchangeability, will have the effective dimensions and tolerances specifically indicated.

The mounting documentation will include:

- Detailed description of the dismantling technology of the equipment and installations that are being rehabilitated;
- assembly drawings of all equipment and installations
- the necessary maneuvering installations and transport equipment (if applicable);
- the schedule and the way of performing the tests during the mounting;
- tolerances allowed during installation;
- interpretation of measurements made during mounting and testing.

Operating and maintenance instructions shall describe for each technical unit all maneuvering operations in normal situations and in case of failure, with the necessary details for their correct execution, the sequence of operations, the points that require supervision during the maneuvers, the necessary adjustments, preventive maintenance measures, current repairs required (frequency and duration of these repairs, time interval between two successive interventions etc.), lubrication rules (lubrication points, type of lubricant for each point, lubrication schedule etc.)

Packaging and transport documentation will specify: the maximum weight and maximum gauge to be transported, the weight and gauge of the largest part (subassembly) to be handled during assembly, the gauge dimensions and the location on the means of transport.

The documentation will take into account the conditions of transport of the equipment so that the dimensions and masses of the packages correspond to these conditions. The Contractor will present the study of the route on which the transport will be made.

Welding control documentation must contain complete information on the filler material (electrodes, welding powders etc.), details of welding preparations, place and order of welding, preheating temperatures, temperature during welding and conditions under which subsequent treatments are performed, if appropriate. The welds will be classified in execution classes according to SR EN ISO 5817 on control groups

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according to the importance and the degree of demand of the welds. For each group will be specified: the procedures and the volume of the control, the admissible defects, the conditions for remedying the defects.

Corrosion protection documentation will refer both to the works that are executed in the factory and to those that are executed in the site and will include, at least:

- list of parts with indication of surfaces that are protected against corrosion
- documents and standards that are respected
- the type of protection required depending on the environment with which the respective surfaces come into contact (water, air, oil, corrosive agents)
- the procedure for executing the protection
- the color of the decorative layer
- quality check procedure
- areas where temporary corrosion protection is applied
- the areas to which the definitive corrosion protection is applied.

Corrosion protection documentation which will be performed on site will specify the conditions regarding:

- preparation of metal surfaces (sandblasting, cleaning with a wire brush etc.)
- application of basic paint coats (fundamental)
- application of coatings
- checking the quality of corrosion protection
- handling of metal construction protected against corrosion
- corrosive protection repairs
- composition of layers, drying times
- control of the application of protection
- ambient temperature and humidity conditions
- the technological requirements for the projects regarding the arrangement of the places necessary for the realization of the anticorrosive protection (platforms or halls, special working conditions)
- the conditions to be ensured during the execution of the works from the point of view of labor protection and fire protection.

The documentation shall also include instructions for checking the corrosion protection during the guarantee period.

Spare parts documentation shall contain:

- parts execution details
- preservation, packaging and protection solutions, including storage instructions that will include preservation, packaging and protection restoration work
- stationary life limit indications.

3.3.3. As-Built documentation

The documentation will be prepared and handed over to the Beneficiary for each technical unit included in the Contract and will include all the data listed in point 3.3.2, specifying that both the drawings from the initial edition and the drawings on which the modifications which appeared during execution, assembly and commissioning were made.

For each technical unit accepted, quality documentation in accordance with ISO 9001 requirements shall be provided.

The documentation will be handed over both on paper, in the number of copies agreed with the Beneficiary, and electronically, on DVD or CD.

3.3.5. Miscellaneous documents

Separately deliverable equipment, measurement and control equipment, electrical protections, transducers, programmable automata, MV electrical equipment respectively 110 kV, etc. are delivered to the construction site accompanied by the following documents and documentation:

- certificate of conformity - 1 true copy;
- manufacturer's inspection and test report (s) - 1 true copy;
- homologation certificate in Romania (if applicable);
- Technical Book - 1 true copy plus translation into Romanian;

These documents condition the acceptance of the equipment for payment.

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3.3.6. Technical book

The Technical Book shall be drawn up according to GD no. 766/1997. The Contractor shall make available to the Beneficiary the **technical book** of each separate technical unit or deliverable equipment included in that technical unit, which shall include at least the following data:

- description of the technical unit or separate equipment available
- functional diagrams and diagrams for driving systems
- functional diagrams and diagrams for the automation system
- list and characteristics of control, signaling, measurement and protection installations
- list and main characteristics of transducers, including specification of location and lay-out;
- complete list of all motors and electrical equipment with their characteristics;
- list of standards and norms for materials and subassemblies
- calculation abstract regarding the main efforts and safety coefficients adopted
- the hypothesis of strength calculations regarding the fatigue characteristics of materials and stress concentration coefficients
- functional characteristics of the equipment
- technical mounting conditions and mounting and test passports
- the Contractor's guarantees for the respective technical unit
- the list of tests and controls provided for the guarantee period
- the list of controls indicated in the post-guarantee period
- the list of assembly/disassembly devices and their use schemes
- list of devices for tests
- drawings and identification data of wear parts with regular replacement (normal wear) with the specification of renewal materials
- the list of spare parts for the guarantee period
- list of recommended spare parts for a period of 5 years;
- list of normal and special tools
- quality certificates for the materials used
- certificates of acceptance upon execution phases
- factory test certificates
- corrosion protection execution technology.

3.4. Form of presentation of drawings

3.4.1 All drawings submitted by the Contractor, including those included in the Tender, shall provide sufficient details indicating the type, dimensions and arrangement of the equipment and installations, the description of the material, the quantity and weight of each component, packaging, transport and any other information specifically required in the specifications or by the Beneficiary.

Each drawing submitted by the Contractor shall be marked with the name of the Beneficiary, the name of the Contractor, the name of the installation, equipment or part, the title and code of the drawing, the name of the project, the scale. All titles, notes, markings and text in the plans will be in Romanian. All dimensions will be to scale and will be expressed in the metric system.

3.4.3. All drawings shall be complete, dimensioned, legible and shall allow a quick and safe identification of their object.

3.4.4. Format of drawings and diagrams:

- all drawings, diagrams and diagrams shall be presented both in electronic format (Autocad drawings and diagrams, diagrams in Excel) and on paper;
- all drawings, diagrams and diagrams will be represented in color; in the hydraulic diagrams the colors will be different depending on the fluid and the functional role of the circuit (main pipe, purge, drainage, etc.);
- representative general arrangement drawings and technological diagrams will be drawn up in 3D;
- diagrams of water, oil, air will be represented axonometrically in format (*.dwg) with the possibility to identify and view all the components of the assembly.
- All the details in the drawings and all the information contained therein must be readable in electronic format (on the screen) in the default settings as well as in the "zoom" reading mode.

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3.4.5. The drawings will be copied on white paper, resistant in time and will be presented, as agreed with the Beneficiary, either folded to standard sizes A4 (210 x 297 mm), the title appearing on the visible side of the plane, or in A3 (420 x 297 mm) format, not folded.

3.4.6. The drawings will be grouped in folders according to their equipment and purpose, and the folders will be coded uniformly on all the technical documentation for the execution of the works. For the coding of the drawings, the KKS criteria shall be taken into account.

3.5. Requirements for handing over, verification and approval of documentation

3.5.1. All projects (both written and drawn) will be prepared and submitted to the Beneficiary for approval in accordance with the program agreed upon the signing of the Contract.

3.5.2. The entire documentation, from the first draft to the final draft, will have the serial number corresponding to the general list of documents agreed between the Beneficiary and the Contractor. Each delivery of documentation will be accompanied by a list with the number and full name of each attached document.

3.5.3. The documentation drawn up by the Contractor starting with the technical design and up to the final as-built documentation will be endorsed or approved by the Beneficiary. The approval of the designs does not diminish in any way the responsibility of the Contractor in terms of ensuring the integrity, strength and operational safety of the delivered equipment and installations.

3.5.4. The Beneficiary will ensure the endorsement / approval of the designs submitted by the Contractor within the deadlines established by the Contract. If the Beneficiary requests modifications or corrections of the projects in order to comply with the provisions of the technical specifications or of the contract, the Contractor will make the required modifications and will retransmit the projects to the Beneficiary for approval with all the modifications visibly marked. The time required by the Contractor to operate these changes and to obtain the approval of the Beneficiary will not extend the deadline of completion of the contract.

The documentation sent for approval will be in three copies. Upon verification, the Beneficiary will return to the Contractor a copy marked with "approved" or "approved with corrections". After making the changes, the Contractor will submit to the Beneficiary an original and the number of copies agreed upon signing the contract for the designs definitively approved by it.

3.5.6. The execution of the works provided in the contract will be in strict accordance with the approved documentation. Any deviation will be permitted only with the written consent of the Beneficiary.

3.5.7. Commencement of manufacturing or purchase of materials from sub-suppliers prior to approval of the projects by the Beneficiary is at the risk and expense of the Contractor.

3.5.8. The responsibility for controlling and coordinating the projects of all technical units included in the Contract rests entirely with the Contractor.

3.5.9. The Contractor will hand over the assembly projects signed and stamped by the MEC certified verifier in accordance with the Government Ordinance no. 95/1999 regarding the quality of the assembly works of the industrial technological facilities, approved as further amended by Law no. 440/2002. The Contractor is also responsible for the ISCIR approval of hoisting equipment projects (rehabilitation, modernization, assembly).

4. DESIGN CONDITIONS

4.1. General conditions

4.1.1. The Contractor is fully responsible for the content and the correctness of the provisions of the elaborated designs.

4.1.2. The technical units will be designed from assemblies and subassemblies whose dimensions will allow transport to the site by road.

4.1.3. The rehabilitation works of the equipment included in the Contract must not impose essential changes to the existing equipment or construction. Only special remedies or treatments of concrete and changes in the foundations of equipment or cable and pipe routes are accepted.

4.1.4. If possible, the parts embedded in the concrete shall be fully reused.

4.1.5. Changes to the existing design, executed by the Contractor on the construction parts, shall be made on the basis of Law 10/1995 updated, art.

4.1.6. The equipment will be made in such a way as to ensure the activity of revisions and repairs with a minimum of assembly operations and a minimum of technical personnel.

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4.1.7. All bearings, except those made of self-lubricating materials, shall be provided with lubrication devices. Hard-to-reach points will be provided with extension tubes grouped in easily accessible places (walkways, platforms etc.).

4.1.8. Identical equipment within the same technical unit shall be interchangeable.

4.1.9. Both the actuation points and the measuring and control devices will be easily accessible, located in visible places and will be provided with identification marks in order to reduce the risk of wrong maneuvers.

4.1.10. The pipes will be provided with support brackets, in removable solution, stiffened by concrete anchored parts.

4.1.11. The Contractor shall carry out its own chemical analyses of the water on site.

4.1.12. For all the rehabilitated equipment within Stejaru HPP, the identification and coding system will be KKS.

4.2. Calculation conditions

4.2.1. The task of correlating the functional and calculation parameters of the technical units included in the contract, with the characteristic data of Stejaru HPP site lies entirely with the Contractor .

4.2.2. The sizing calculations from the point of view of the resistance of each component part of the technical units will be made using the specific safety coefficients, currently applied in the hydropower developments. These coefficients will be explicitly presented in the calculation summary sheet of the technical unit. The maximum unitary efforts given by the hydrostatic load and the heaviest operating conditions shall not exceed 1/3 of the minimum flow limit and no 1/5 of the minimum material breaking strength.

4.2.3. The sizing or verification calculations for all components and equipment included in the Contract will be made taking into account the most unfavorable conditions to which they will be subjected during manufacture, transport, assembly, tests or during operation.

4.2.4 All pipes will be sized to withstand the greatest stresses that may occur in operation.

4.2.5. The calculation abstracts that formed the basis of the constructive solutions adopted by the Contractor and the dimensioning of the various elements of the equipment will be subject to Beneficiary's approval, together with the drawings, before the beginning of the manufacture.

Calculation abstract must include at least:

- calculation hypothesis and applied rules;
- the formulas used, for the unusual formulas there shall be specified the bibliography;
- Units of measurement (in SI) for all sizes used in the formulas;
- Features of the materials used;
- Safety coefficients adopted.

The Contractor will provide, at the request of the Beneficiary, the detailed calculation and any document or information that they request for the understanding of the calculation briefs.

4.3. Material conditions

4.3.1. The materials used for the performance of the supply must be of top quality, free of defects, in accordance with the rules in force. The choice of materials will be made so that they correspond, from the point of view of the physical-chemical characteristics, the states of stress and the efforts to which the respective parts are subjected.

4.3.2. The contractor may purchase materials, parts or subassemblies of the equipment from suppliers only if they are accompanied by quality certificates and if they meet the quality conditions imposed by the design. Materials without quality certificates or with incomplete certificates will not be used.

4.3.3. The requirements regarding the chemical composition, the thermal treatment, the mechanical characteristics of the material, the non-destructive control, the acceptance conditions in terms of appearance in the case of steel parts are presented in Table 4.1:

Table 4.1.

	Cast fittings	Open-die forged				Laminates	
Chemical composition of steel	The chemical composition of the steels must comply with the provisions of the standards and norms used. The analyses will be performed on specimen test tubes that are performed for each type of semi-finished product, according to the provisions of the standards adopted for each batch of delivered materials. By agreement between the Beneficiary and the Contractor, there may be provided in the Contract restrictions or enlargements of content limits for some component elements.						
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Heat treatment	The heat treatment will be performed according to the technological process in compliance with the heat treatment diagrams, the heating and cooling rate, the temperature and the time provided for maintaining the prescribed temperature. Checking the quality of the treatment is performed on standardized specimens that are usually subjected to heat treatment simultaneously with the basic parts. The Beneficiary may request from the Contractor the details of the heat treatment control.		
Mechanical characteristics	The mechanical characteristics that are checked are: breaking strength, yield strength, elongation at break, resistance to KCU, Brinell hardness. The values of the mechanical characteristics must comply with the values provided in the standards and norms for the type of steel and semi-finished product considered. For the performance of the samples and the sampling of the specimens, the prescriptions of the standards and norms used shall be observed.		
Issues	The castings must be cleaned, deburred, smoothed of roughness and free from defects influencing the use in operation.	Cracks, forging or rolling creases, local overlaps of materials, cracks, non-metallic inclusions, oxide impressions, etc. are not allowed on the outer surface of forged parts that are not subject to machining. Defects such as: superficial peeling, overlapping of material, etc. are allowed on the outer surface of the parts that are subject to chipping processing if the size of these defects does not exceed 2/3 of the processing addition. The front surfaces must not have cracks, segregations, non-metallic inclusions visible to the naked eye.	The surfaces must be flat, uniform, without corrugations, grooves or excavations beyond the limits provided by the standards or norms of the semi-finished products considered.
Non-destructive testing	Non-destructive testing (visual, PT, MT, UT), will be performed according to the detailed quality control plan and control specification, proposed by the Contractor and endorsed by the Beneficiary after signing the Contract. Areas where non-destructive ultrasound control is not relevant (in case of doubt) will be checked radiographically.		
Elimination of defects	Defects that do not affect the appearance and functionality of the parts may be accepted by the Beneficiary on the basis of a Non-Compliance Report signed by the designer of the respective component. Defects that do not belong to the category mentioned above will be corrected according to the repair procedures proposed by the Contractor and approved by the Beneficiary by specialized consultants. The repair procedure will also contain the controls that are performed after the repair.		

The materials will be fully defined in the execution drawings by specifying both the standard and the class, quality and all characteristics provided in the standard so that the conformity of the material with the requirements can be verified. It will be taken into account that for the parts of the technical units that are part of the Contract, materials are used in the form of the following semi-finished products:

- steel plates for the execution of welded constructions
- forgings and castings which are subsequently machined mechanically
- materials in the form of laminated bars
- special bearing materials
- steel pipes for subsequent shaping and welding
- rubber and other non-metallic materials.

4.3.5. All valves and fittings shall be made of steel and the steel pipes, drawn, seamless.

4.4. Correlation of projects with the existing situation

4.4.1. For the design of equipment and installations, the dimensions and parts embedded in the primary concrete of the existing constructions shall be taken into account. The safety and traffic spaces will be ensured according to the regulations in force.

4.4.2. The data regarding the existing construction part, the disposition of the equipment, the gaps and the embedded parts, the level quotas and the calculation tasks necessary for the Contractor to elaborate the designs will be provided by the Beneficiary.

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4.4.3. The Tenderer shall make its own measurements of the gaps in primary concrete and assessments of the bearing capacity of the existing constructions and embedded metal parts. The existing gaps and parts embedded in the primary concrete shall be used as far as possible without compromising the safety and performance of the equipment. If it is necessary, in the report drawn up as a result of the site visit, the Tenderer shall propose modification solutions, respectively consolidation works.

4.4.4. After drawing up the designs, the Contractor shall submit to the Beneficiary the loads transmitted to the construction part by the rehabilitated equipment. Modification of loads for which the constructions have been designed is not accepted.

4.4.5. The contractor will ensure the correlation of the dimensions and calculation parameters of the technical units included in the contract with the dimensions and calculation parameters of the works and constructions not included in the contract.

4.4.6. When designing the circuits of the water, oil and air pipes, it will be taken into account to make the correspondence between them and the sections with which they are joined, existing in the concrete construction of the plant. The task of carrying out the measurements on site and the responsibility for ensuring the continuity of the circuits belongs entirely to the Contractor.

4.4.7 The contractor is obliged to take appropriate measures to ensure the tight closure of all pipes embedded in primary concrete (existing or to be provided by himself) which communicate with enclosures to be flooded after the commissioning of the object or which can be accidentally flooded.

4.5. Conditions regarding the operation of the equipment

4.5.1. The equipment and technical units shall be designed so that the dismantling of one assembly does not require the dismantling of another assembly not directly connected with that in question. Also, the maintenance and repair operations should not require exceptionally qualified personnel and special tools other than those provided in the contract.

4.5.2. All gears, with priority given to those currently involved in operation, shall be easily accessible. Stairs, traffic floors and work platforms will be provided for access, designed and executed according to the labor protection norms.

4.5.3. The equipment shall be provided with all safety devices (surveillance, signaling and protection) capable of:

- ensuring the equipment operation at nominal parameters
- providing to the supervisory personnel, at any time, information on the working mode, the state of loading of the equipment, signaling (optically and acoustically) when exceeding the allowed limits
- prohibiting the continuation of the maneuvers that would result in exceeding the allowed limits, making possible only the maneuvers that restore the normal working conditions;

The wiring diagrams of the safety devices must be designed in such a way that in the event of faults which prevent the performance of the protection function, the protected installation or equipment is automatically switched off.

4.5.4. If certain enclosures are provided with the electric heating, such appliances shall be provided with protection against accidental contact and fire.

4.5.5. All enclosed spaces, with a fire hazard, shall be provided with at least two routes for the exit of the intervention personnel.

4.6. Conditions for ensuring the interchangeability of parts

The identical equipment within the same technical unit will be made in such a way as to comply with the principle of interchangeability which requires that:

- each piece can be replaced with an identical one from another unit
- each of the identical parts which do not have a positioning required by the technical requirements may be mounted on any of the mounting positions of the respective parts or subassemblies
- each spare part can be mounted on any identical equipment in the technical unit
- only the execution errors that condition the achievement of the interchangeability are allowed to be remedied during mounting, all other errors require the replacement of the respective parts.

The interchangeability requirement also applies to identical equipment/components belonging to distinct but identical technical units.

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4.7. Spare parts requirements

4.7.1. Mandatory spare parts are part of the supply and represent those parts within the technical unit that have a high probability of failure: wear parts, sealing elements etc.

The tenderer will complete the list of mandatory spare parts required in each technical unit with the parts it deems necessary, so that the time to remedy deficiencies between 2 scheduled repairs depends only on the speed of work of the intervention teams.

Where the Tender Specifications contain the specification of the required spare parts, the list submitted by the Tenderer will not be shorter than that.

For the electrical equipment included in the mechanical specifications (transducers, sensors, limiters and other electrical control equipment), mandatory spare parts will be provided in the proportion of 20%, but not less than 1 piece of each type of device, classical or electronic related to the respective technical unit.

4.7.2. Taking into account the results of the calculations performed and their own experience regarding the wear resistance of the used parts, the Tenderer shall also include in the tender the list of recommended spare parts for each technical unit.

When drawing up the lists of recommended spare parts, the identical equipment within each technical unit shall be taken into account.

4.7.3. The spare parts shall comply with the condition of interchangeability with the part to be replaced during operation.

4.7.4. The mandatory and recommended spare parts lists shall include at least the following information: technical unit, identification code, quantity, unit price.

4.7.5. The final lists of spare parts, mandatory and recommended, for each technical unit will be agreed with the Beneficiary.

4.8. Conditions for the electrical part of the equipment

4.8.1. General technical conditions for electrical equipment

4.8.1.1. The equipment, the own supply/automation boxes and the used equipment must be made according to the modern technologies, to be reliable, robust, with the smallest possible gauge and with efficient technical characteristics through which the safety in operation of the installations is ensured.

4.8.1.2. The products shall have, throughout their lifetime, the relatively constant average operating time between two defects. The Contractor will specify the ratio between the average repair time following a damage and the qualified life of the equipment (respectively the duration of the wear period).

4.8.1.3. The entire equipment and equipment that is part of the technical units must have, according to Law no. 608/2001, the pan-European logo < CE >.

4.8.1.4. When establishing the components of the transducers and the execution elements, respectively of the apparatus, the following shall be taken into account:

- supply / operating voltages in the plant:

☐ 380/220 V (+10%; -15%) 50 Hz

☐ 220V_{DC} (+10%; -15%)

☐ 24 V_{DC} (+ 20%; -20%) via 220 / 24V converters.

- input / output signals:

☐ analogue

4 ☐ 20 mA unified signal

☐ binary

potential-free relay contact with capacity:

- at closing: 1 A at 220 V_{AC}, 50 Hz; 220 V_{DC}

- at break: 1 A at 220 V AC 50 Hz; 0.5 A at 220 V_{DC}

The contractor will correlate the installations and earthing systems of the equipment and installations related to all voltage levels within the specifications:

4.8.1.6. The Contractor has the obligation to install the same software version on the other butterfly valve installation upon completion of the rehabilitation of the last butterfly valve installation.

4.8.2. Technical conditions for electrical equipment - primary circuits

4.8.2. The indoor medium voltage stations will be equipped with prefabricated cells, closed, in metal cabins, with detachable trolley, with locking mechanism in paperback position, with earthing knives with actuation from outside the cell, with interlock.

4.8.2.2. The transformers shall be provided with a steel plate casing fixed on a metallic substructure and trolley with wheels, with a folding position.

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**4.8.3. Technical conditions for electrical cabinets/panels**

4.8.3.1. The local cabinets and boxes as well as all the accessories necessary for the assembly shall be made of metal, industrial type, with dimensions corresponding to the volume of the appliance placed inside and on the doors.

4.8.3.2. The cabinets shall be placed on functional fronts (direct current, alternating current, unit) in closed rooms, and the local boxes next to the installations served, indoors or outdoors.

4.8.3.3. Partition walls shall be made between the cabinets of the same front in order to prevent the extension of a possible fire appeared in one of the cabinets and to the adjacent cabinets.

4.8.3.4. All metal works and accessories for mounting will be treated anti-corrosively before painting in electrostatic field, in accordance with the RAL code; the color will be established in agreement with the Beneficiary.

4.8.3.5. The necessary equipment for 0.4kV power supply and distribution shall be placed in metal cabinets, of classic type, with withdrawable devices and internal metal appliances a corresponding to the necessary installation.

4.8.3.6 The chosen IP degree of the cabinets and boxes will be according to the specifications of EN 60529 for the mounting environment.

4.8.3.7. The arrangement of the appliance on the doors and inside the cabinets will correspond to an optimal operation of the equipment and an easy operation and maintenance.

4.8.3.8. The interior equipment shall be installed in the classic cabinets shall be done on prefabricated holders. The devices must correspond to the rated data in the single-wire diagram.

4.8.3.9 The equipment used must be reliable, robust, with technical features to ensure operational safety.

All devices with contact outputs shall be provided with at least 1 "normally open" contact and 1 "normally closed" vacant terminal.

4.8.3.10. All measuring and control equipment supplied shall be delivered in accordance with the conditions of the commercial part of the Contract.

4.8.3.11. Local cabinets and boxes / panels must have labels with codes on the front and back (even if they only have front doors, when they are not wall mounted). The labels shall be placed at the top, on the fixed side of the cabinet (not on the door).

4.8.3.12. All devices shall have labels corresponding to the symbols in the distribution and control diagrams, and in the development diagrams of protections and automation etc.

4.8.3.13. The texts of the labels shall be written in Romanian.

4.8.3.14. The sections, and the minimum mechanically permissible diameters of the cable conductors laid under normal operating conditions, checked under the conditions provided in NTE 007/08/00 are the following:

-minimum sections:

- 2.5 mm² for current circuits,
- 1.5 mm² for voltage circuits, control, signaling,

- color:

- red - phase
- black - null
- green with yellow - neutral protection
- blue - c. cont.
- light brown - monitoring

in the case of remote control cables with copper conductors, the minimum diameter of the conductor shall be 0.5 mm for cables laid only inside buildings and 0.8 mm for cables laid underground or in outdoor sewers.

4.8.3.15. Conductors shall be marked at both ends; the marking plates shall bear the origin / destination of the circuit.

4.8.3.16. The conductors shall be laid down in gutters inside the cabinets.

4.8.3.17 The terminal blocks are made with clamps ensuring a very secure fastening of the internal conductors and of the conductors inside the cables (fastened with screw and separator). Special clamps will be fitted for testing and checking;

4.8.3.18. The clamp strings shall be organized according to the voltage and the nature of the signal.

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4.8.3.19. The cables will be chosen according to the type of signals - shielded, with stranded conductors and will be labelled before exiting the panel and on the route according to the cable log;

4.8.3.20. The cables are accessed by packing boxes through the bottom of the cabinets.

All cables will have labels with the cable mark stamped according to the cable log. Labels are placed at the cabinet outlet/inlet and on the route.

4.8.3.21. The distribution bars shall be made of copper, shall be sized for the installed power and must be checked for voltage faults, and together with the support elements, for short-circuit current and thermal stresses.

Bar colors:

- for direct current

- red bar (+)
- blue bar (-)

- for alternating current

- red R-phase
- yellow S-phase
- blue T-phase
- black N phase
- green with yellow stripes - PE

4.8.3.22. All metal constructions and apparatus casings will be connected to the grounding terminal with a flexible conductor of Cu 4 mm².

The earthing terminal is connected to the power plant earthing belt.

4.8.3.23. Local cabinets and boxes will be provided with interior lighting and working socket; the lighting will be dependent on the position of the door; cabinets and boxes will also be provided with heating resistors with manual connection and thermostat operation.

4.8.3.24. Local cabinets and boxes/panels shall have the doors constructed so that the interchangeability of their opening direction (left / right) is possible.

4.8.4. Technical conditions for digital equipment

4.8.4.1. The management and supervision of the units and installations in the power plant will be performed with modular digital equipment (PLCs) dimensioned hard and soft according to the Tender Specifications, specific ensuring, for each one, an active reserve of at least 20% of the total inputs/outputs.

4.8.4.2. For all digital equipment that is part of SCADA, they shall be provided with an active reserve of 20% for digital inputs and 10% for analog inputs.

4.8.4.3. All digital equipment shall be of the industry standard type:

- with continuous operation mode;
- corresponding to a process with a cycling speed of 5 msec.;
- with sufficient backup hardware - at least 20% of the installed one.

4.8.4.4. The equipment will maintain its performance under the voltage variation and ambient conditions specified in Volume 1, Part 1 "General information on Stejaru hydropower plant".

4.8.4.5. The input/output modules shall have galvanic / optical isolation.

4.8.4.6. The same types of modules shall be used for similar functions to ensure interchangeability.

4.8.4.7. The equipment shall be provided with protection against disturbing fields, overvoltages and their harmonics.

4.8.4.8. The equipment shall ensure that event sequences are performed and shall remove the false values. They will be provided with the possibility of testing, configuration, local and / or remote programming.

4.8.4.9. The equipment, through appropriate hardware and software, shall also perform the following functions:

- partial redundancy in the important command and automation, or procurement centers;
- gradual operation;
- self-testing;
- fault detection in installations and on the network;
- fault tolerance;
- error logging.

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4.8.4.10. Output signals and equipment status information, fault detection, self-inspection, etc. shall be locally displayed and submitted to the higher hierarchical system.

4.8.4.11 The pull-in time module must allow the synchronization with the time of a higher hierarchical equipment (with one second interval synchronization).

4.8.4.12 The equipment shall be able to test and isolate the hardware and software for online or offline operation.

4.8.4.13. The supply of the APs presented in the tender. for the purpose of delivery to the power plant. shall be:

- produced ..state of art
- available for sale on the market in the next 7 years;
- part of the same product family;
- available on the market as spare parts for the next 10 years after the equipment will no longer be in production:
- It will be provided with technical support (for repairs) for the next 15 years after the equipment is no longer in production.

4.8.4.14 Software must be open to allow signal acquisition and transmission to third-party applicants. The language of the software will be English.

4.8.4.15. Software (development, application etc.) will be presented/handed over to the Beneficiary accompanied by the license and documentation necessary for interconnection with other systems or for further development without the involvement of the Contractor.

4.8.4.16. All PLCs shall allow communication:

- with the upper level on optical fiber with standard OPC-UA communication protocol;
- with the lower level on optical fiber or copper, with standard communication protocol, according to IEC 61158;
- the programming language on the PLC will be according to IEC 61131.

4.8.4.17. The final solution of the software application shall be agreed by both parties (so-called "soft frozen-design" solution. This solution will be installed tested for all the units provided until the completion of the commissioning tests at the DLC. The Contractor shall take this into account in the works schedules and financing schedules.

4.8.4.18. The digital equipment shall be radially supplied, from the power strips formed in the 220V_{DC} cabinets and dedicated to powering digital control equipment.

5. EXECUTION CONDITIONS

5.1. General provisions

5.1.1.The execution of the equipment will be done in accordance with the execution drawings endorsed by the Consultant and approved by the Beneficiary, strictly observing the geometry, quotas, tolerances, surface quality, technical conditions for materials, specifications, norms and internal and international standards in force.

5.1.2.The Contractor is responsible for ensuring the operational integrity, strength and safety of the delivered equipment and materials as well as for the correctness of the works performed.

5.1.3 All component parts of the equipment must be made in such a way that no residual deformations, loosening of the joints or enlargement of the clearances occur during operation, regardless of the stresses that may occur.

5.1.4. The year of manufacture of the equipment, parts and appliances in their composition must be after the year in which the procurement begins for the technical units included in the rehabilitation contract for Stejaru HPP. The equipment and devices supplied must be made with modern technologies, be reliable, robust, with the smallest possible size and with high-performance technical characteristics that ensure maximum efficiency and safety in operation.

5.1.5. If during the rehabilitation works, in order to eliminate deficiencies or for the purpose of improving the performance of a technical unit, the Contractor makes a change to the approved design, by its care, it will apply the change to all identical technical units, even if they are in operation and have already been accepted.

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5.2. Works in the factory

5.2.1. All manufacturing technologies are adopted and performed at the full responsibility of the Contractor in such a way that the delivered equipment meets the required safety and performance conditions.

5.2.2. The materials used shall be procured in accordance with the provisions of the standards nominated in the as-built documentation. If it is necessary to replace some materials during the performance of the contract, including the use of high quality material, the Contractor will request the consent of the Beneficiary.

5.2.3. Materials of unknown origin and without quality certificates cannot be used for the execution of the parts related to this contract.

5.2.4. The factory inspection and testing programmes, drawn up by the Contractor, will be subject to the approval of the Beneficiary. On this occasion, the works that must be inspected will be established.

5.2.5. Welds and anti-corrosion protection, including decorative painting, shall comply with the requirements of items 5.3 and 5.4, specifying that the last layers of protection and decorative protection shall be made after the assembly test.

5.2.6. All parts shall be assembled for factory trials.

5.2.7. After the completion of all operations in the factory, the acceptance control of the works will be performed in which the representatives of the Beneficiary and the Contractor will participate.

5.2.8. If during the manufacture it is found that the main part shows a serious defect and the Contractor considers that it can be repaired, he must notify the Beneficiary before starting the repair works. The Beneficiary has a period of 15 days to oppose the repair and to refuse the part. After the expiry of this term, the Contractor will proceed to repair the part under the conditions communicated to the Beneficiary, but it is entirely its responsibility regarding the repaired part. The Beneficiary may request additional tests, including test specimens or samples on which the tests were performed, which may be resorted to in case of subsequent litigation.

5.2.9. The following recommendations are made regarding the choice of materials:

a. Steel plates

- for metal constructions, alloy steel with a high yield strength and high resistance to fragile fractures will be used
- the following types of steels will be used: ordinary construction with guaranteed resilience, resistant to aging if they are subjected to cold deformations, plated with at least 3 mm thickness of stainless steel sheet from the ferritic-martensitic or austenitic class;
- the impact resistance or breaking energy may not be less than 27 J at the working temperature;
- for the execution of the parts with complex shape and increased stress concentrations due to welds and remaining stresses, steel plates with guaranteed resilience at -20°C shall be used, regardless of the working temperature;
- the plates will be delivered according to the additional standards and requirements regarding homogeneity and resilience.

b. Castings

- depending on the destination, carbon and poorly alloyed steels in normalized state, ferritic-martensitic stainless steels resistant to variable stresses, austenitic stainless steels, normalized cast iron shall be used;
- if metal casting models are used, their geometrical accuracy must be checked before each use. All corrections to the castings are made at the manufacturer before the final thermal processing. The cast semi-finished products will be delivered according to the special technical conditions;
- no welding remedies are allowed for cast parts, except for construction welds provided in the work drawings;
- the special conditions for the cast semi-finished products will be agreed with the Beneficiary.

c. Forged and semi-finished parts in the form of bars

- for forgings, the following types of steels shall be used: carbon and low alloy steels with the guaranteed chemical composition in the normalized state if they are subject to welding of the construction, carbon steels belonging to the group of steels with the guaranteed mechanical properties in the normalized state, carbon and low alloy steels in the improved state if they are subject to mechanical processing, steels in the form of drawn or rolled bars of carbon or low alloyed steel with guaranteed mechanical properties;
- for important forgings, steel from electric ovens, Martin ovens, etc., shall be used

d. Steel tubes

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Seamless steel pipes and cold drawn pipes shall be used, checked under hydraulic pressure in the supplier's laboratories. The pipes will be delivered according to the provisions of the standards nominated in the documentation.

5.2.10. The semi-finished products will be delivered marked according to the prescriptions in order to be possible to identify them both in terms of the norm or standard of execution and the material from which they are made. The forged or cast parts to be thermally and mechanically processed will be accompanied by the results of mechanical tests and chemical analyzes performed in the laboratory of their supplier. All documents regarding the quality of the materials used for the semi-finished products are kept until the completion of the execution and are handed over to the Beneficiary together with the parts.

5.3. Welding works

5.3.1. The quality conditions for the welding works will correspond to the provisions of the EN 729 standard "Quality requirements for welding", "Fusion welding of metallic material" or other profile regulations.

5.3.2. The quality of the welding filler material, the qualification of the execution and control personnel as well as the technical condition of the devices and equipment used to perform the works will correspond to the provisions of the execution documentation.

5.3.3. During the performance of the actual welding, check:

- preheating temperature of parts to be welded or to be maintained during welding
- compliance with the prescribed welding regimes and the prescribed sequence for the execution of welds
- the quality of the cleaning of the deposited layer before applying the next layer of additive material
- precision of the welding seams at the root
- compliance with the temperature and humidity conditions provided in the design.

5.3.4. It is recommended to avoid as much as possible the intersection of the welding seams.

5.3.5. The Contractor shall obtain the Beneficiary's consent for the following operations prior to the welding:

- analysis of the chemical composition of the filler metal
- how to accept welded joints
- chemical composition and mechanical characteristics on samples taken from basic materials (where required by the supplier's documentation)
- the appearance of surfaces and processed edges in order to detect superficial defects such as cracks, material overlaps, inclusions, burrs, etc.
- plant and devices used in the execution of welded joints.

5.3.6. The following requirements must be met when selecting and using the electrodes:

- the chemical composition of the additive material shall be close to the chemical composition of the starting material, unless otherwise specified;
- for the important welds of the construction, basic coated electrodes shall be used;
- due to residual stresses and varying stresses, the filler must have a guaranteed temperature resistance at least 20 °C lower than the temperature at which the resistance of the base material is guaranteed;
- only filler materials in original non-degraded packaging, which have been preserved according to the supplier's instructions, shall be used. The electrodes used will have a maximum of 6 months from manufacture and will be accompanied by the quality certificate.

5.3.7. The filler material and the selected welding process must ensure that the seam has at least equal strength properties to those of the base material.

5.3.8. All welders used for welding must be qualified for the quality class of the welds to be performed. The Contractor will send to the Beneficiary, in advance, the certificates of attestation of all welders to be used in the execution of the works. The certificates shall specify the data relating to welds carried out by the welder up to that point and the results obtained at the checks. The Beneficiary may personally verify the qualification of the welders. The important welding seams will be marked with the punch of the welder who executed them. The discovery of welding seams with serious faults entails the withdrawal of the notice for the further use of the welder who executed them.

5.4. Corrosion protection and decorative painting

5.4.1. The corrosion protection system is the totality of primer layers and paints and ancillary products that are used on the surface of an equipment to make it resistant to corrosion.

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5.4.2. All equipment made of iron-based materials will be protected against corrosion by the Contractor in the factory or on site, depending on where the components are executed.

5.4.3. Protective coatings shall be made by painting, ensuring, for each component of the equipment and materials included in the contract, the protection against corrosion and/or erosion corresponding to the environment in which they operate. Note that the most difficult conditions relating to corrosion protection are found on equipment operating alternately in water and air environments. In this case, the corrosion protection must be resistant to: humidity up to 100%, the influence of water pressure, chemical agents, corrosive particles contained in water, etc.

5.4.4. The Contractor shall provide a non-polluting and non-health damaging corrosion protection system. The applied system must withstand a period of at least **5 years**. The following quality criteria shall be taken into account for corrosion protection: adhesion to metal, impermeability, resistance to mechanical shocks due to handling during transport and assembly, resistance to chemical agents in water, oil and air, resistance to temperature variations, abrasion resistance, low roughness. For all these criteria, the Contractor shall provide guarantees.

5.4.5. Corrosion protection systems shall be applied according to the instructions of the paint manufacturers. These instructions shall include, at least:

- a. Presentation of the anti-corrosion protection adopted (application technology, special equipment, devices necessary for control and repairs);
- b. The composition of the base coatings and coatings, including the total thickness of the protection, graphs showing the maximum drying time, the maximum and minimum painting time depending on the temperature, the maximum and minimum operating temperatures, the flash point;
- c. The conditions of application, including the temperature and humidity of the air and the temperature of the surface to be painted, the preparation of the surfaces, the consumption of paint per square meter, as well as other data that the paint supplier deems necessary (compatibility and methods of application, efficiency, packaging and storage, data on the quality parameters provided for protection, consumption of diluents etc.).

5.4.6. The paints used for the execution of the corrosion protection must be made by recognized manufacturers and must be technically approved for application in Romania. Only paints complying with the World Health Organization (WHO) recommendations on the protection of personnel and the environment shall be accepted. The Tenderer shall submit references from previous similar works where the proposed paints were used.

5.4.7. When preparing the surfaces for corrosion protection, the following shall be taken into account:

- a. Surfaces prepared for the application of corrosion protection shall comply mainly with the technology recommended by STAS 10166/1-77, SIS 05-5900, SSPC-V1S1, ISO 8501-1, ISO12944-3:1998 or the requirements of the documentation prepared by the supplier of corrosion protection;
- b. Sandblasting shall be performed under the environmental conditions defined by STAS 10702/1-83, norms SIS 05-5900, SSPC-V1S1, ISO 8501-1, unless otherwise specified by the supplier of corrosion protection;
- c. The material used for sandblasting shall be quartz sand STAS 11317-83, cast iron or corundum buckshot according to STAS 7482-86 or any other material to ensure the degree of cleanliness and roughness prescribed in the recipe for corrosion protection;
- d. As sandblasted surfaces are particularly sensitive to oxidation, it is necessary to provide for the immediate application of a base coat or other preparation for temporary surface protection according to STAS 10166/1-77.

5.4.8. When executing and controlling the corrosion protection, the provisions of ISO 12944-7 shall be observed.

5.4.9. The equipment and materials purchased as standard products (electric pumps, electric compressors, water and oil filters, fittings, etc.) will be protected in compliance with the requirements imposed on the other corrosion protection works within the Contract.

5.4.10. The fasteners that are not required to be of the stainless steel in the Tender Specifications shall be zinc or aluminum coated with a layer thickness determined as to ensure their corrosion protection throughout the lifespan of the metalwork.

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5.4.11. For the closed (inaccessible) spaces of the metal constructions, where corrosion protection works cannot be applied, tests shall be performed to check the tightness in the plant and on site. The reports for the sealing tests will be presented together with the documentation attesting the quality of the equipment.

5.4.12. The decorative protection layer shall be made observing the RAL code used in the hydropower plants. The choice of the protection system and the colour of the decorative layer will be made with the consent of the Beneficiary.

5.4.13. The mounting holes, as well as the processed surfaces that are not painted, will be protected against rust with a thin layer of technical grease. The grease will be removed before mounting on site.

5.5. Disassembly - mounting conditions

5.5.1. The Contractor is fully responsible for the schedule and quality of the disassembly-assembly operations of all the technical units that are the object of the Contract

5.5.2. The mounting works shall be carried out in accordance with the requirements of the mounting documentation, documentation approved by the Consultant and approved by the Beneficiary and verified in accordance with the provisions of Government Ordinance No. 95/1999 regarding the quality of the assembly works of the industrial technological facilities, approved as further amended by Law no. 440/2002.

5.5.3. The mounting works will comply with the Contractor's quality system.

5.5.4. The Contractor shall provide all the tools and devices that are necessary for the dismantling, disassembly, assembly and mounting of all equipment subject to the rehabilitation activity.

5.5.5. The dismantling works shall be correlated with the schedule of works. Acquiring the general information on the work and carrying out its own "in situ" technical inspection, based on the experience in the field, the Contractor shall propose in the Tender and then develop in the dismantling technology project, which it shall submit to the Beneficiary for approval, the technical solution that it considers will meet all the requirements of these Tender Specifications.

In the case of equipment to be rehabilitated by full replacement:

- The Contractor together with the Beneficiary shall establish the list of equipment that after dismantling shall be made available to the Beneficiary;

- dismantling, disassembly and transport to the locations mentioned by the Beneficiary are the responsibility of the Contractor ;

- the equipment and materials resulting after dismantling and disassembly will be dismantled and sorted as usable and recyclable (iron, copper, aluminum, etc.) and handed over to the Beneficiary in the storage area on the heavy equipment platform;

- all disassembly activities will be carried out by the Counter-contractor. The materials will be capitalized by the Beneficiary in accordance with the norms in force on the date of the dismantling works

The dismantled electrical panels are excepted and the boxes with secondary circuits will be transported and handed over to the Beneficiary, on the heavy equipment platform.

5.5.6. The Contractor shall provide all the temporary metal works necessary for the assembly (platforms, scaffolding, lids, stairs, garments, etc.) which will remain or will not remain in the possession of the Beneficiary (to be established in the Contract).

5.5.7. All the dismantling / assembly works will be carried out under the operating conditions of the plant so that the moment of access to work, for the installations serving the equipment in operation, will be agreed by the Contractor and the Beneficiary.

5.5.8. During the dismantling/assembly works, the Contractor will take all measures to prevent accidents of any kind, being directly responsible in case of their occurrence considering the fact that there are installations in operation with a high risk of accidents.

5.5.9. After the completion of the assembly, the Contractor will perform for itself, in order to prepare the tests in the presence of the Beneficiary, the following checks:

- dimensional control of the assembly according to the provisions of the mounting data sheets included in the detailed design

- pressure checking of equipment, individually or mounted in the installation

- dry and water operation tests, respectively;

- correct operation of all safety devices within the installations.

During the assembly works, the Contractor must notify the Beneficiary of any discrepancies between the supply and the existing construction part and not to continue the assembly until after their resolution.

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5.6. Packaging, transport and storage

The packaging, keying and protection of the equipment on the means of transport, as well as the formalities regarding the dispatch and transport to and from the site of the equipment and materials, are the responsibility of the Contractor.

The Contractor shall be liable for any damage or loss of the packages during the transport.

5.6.1. Packaging

The solutions adopted for packaging must ensure the protection of subassemblies and parts during transport and storage against damage of any kind which would have an adverse effect on their technical and functional condition.

Parts weighing more than 50 t or exceeding the gauge permitted for carriage by rail shall be dispatched by special motor transport.

The dimensions and masses of the packages shall correspond to the standards in force.

Each package shall bear a marking comprising at least:

- data for content identification
- the address to which the package must arrive
- the special conditions to be taken into account during transport and handling
- storage conditions.

The package shall have a letter marked with paint in a visible place corresponding to the type of storage required:

A - for closed and heated storage; B - for closed storage; and C - for unheated or outdoor storage.

Parts requiring special protection, indicating devices, small components as well as fasteners shall be shipped in crates. Indicator devices shall be placed first in polythene bags or the packaging crates shall be lined with asphalt cardboard to protect them against water penetration during transport and storage. Packaging of small materials in crates will be carried out in the order of fine-tuning, interposing layers of paraffin paper. Packaging containing temperature sensitive materials shall be marked appropriately.

Appropriate inscriptions shall be made on the crates:

- "Top side"
- "Do not roll over" etc.

The crates containing the devices will be marked with:

- "Warning, devices"
- "Handle with care" etc.

Parts heavier than 2 tons will be shipped fixed on sleds covered or not covered with tarpaulin.

The spare parts will be protected and packed in such a way as to ensure that they are kept in perfect condition, whatever their storage period. The machined surfaces shall be covered with a very resistant protective varnish.

5.6.2. Transport and storage

If there are delays in the transport on site of parts of the supply accepted in the factory, the Contractor will take all necessary measures for the proper storage and preservation of the packages.

The storage of parcels transported by rail, before being brought on site, can be done in the spaces made available by the Beneficiary according to the contract. Information on the size and nature of the storage spaces (open or closed, heated or unheated spaces, their endowments with lifting equipment, utilities, etc. will be provided by the Beneficiary.

The Contractor shall take the necessary measures to ensure that the packages are dispatched on time and to avoid their prolonged storage.

Mandatory spare parts will be packaged for storage for a minimum storage period of 10 years.

6. CONDITIONS FOR QUALITY CONTROL

6.1. Generalities

In all phases of the Contract, the Contractor shall provide a quality management system in accordance with the provisions of ISO 9001, "Quality management systems-Requirements" and ISO 9004, "Quality management systems-Guidelines for performance improvements".

6.1.2. The Contractor shall submit to the Beneficiary the general quality plan of the work for analysis and acceptance before the conclusion of the Contract.

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6.1.3. For each technical unit included in the Contract, the quality plan drawn up by the Contractor and approved by the Beneficiary shall include:

- the program of tests and verifications in the Contractor's factories
- the program of on-site checks and tests during and at the end of the installation
- the program of checks and tests for commissioning
- the program of checks and samples for the final acceptance.

6.1.4. The Contractor shall be responsible for the complete and correct performance of all tests, verification and testing programs at each technical unit.

6.1.5. The Beneficiary reserves the right to check the measuring and control devices the Contractor has used or will use for tests. The verification will be done at the expense of the Contractor by an independent, officially authorized institution.

6.1.6. The Tenderer shall submit in the Tender its organizational structure for the implementation and management of the Quality Control Program.

6.2. Conditions for factory tests and checks

6.2.1. The parts to be delivered by the Contractor or its suppliers / sub-suppliers shall be tested at the premises of the supplier / sub-supplier or the Contractor, in agreement with the Beneficiary. The Contractor shall inform the Beneficiary 28 days before the start of each category of tests in order to allow him to send his representatives. The notice shall contain all the information on the tests with detailed tables and graphs on the latest version of the characteristics of the equipment to be tested, the type and schedule of tests, the tools, apparatus and devices used etc.

6.2.2. If the Beneficiary has not sent a representative on the set date, the Contractor shall perform the tests itself, shall draw up the reports on the results obtained and shall proceed to the next stages of the rehabilitation program. Regardless of whether the Beneficiary has participated in that stage of control, the Contractor shall transmit to the Beneficiary the minutes of the tests performed for each piece of equipment. These will include: the way the tests were performed, the results of the tests, comments and interpretations of the results, conclusions and recommendations.

6.2.3. The periods necessary to carry out the control operations may not, under any circumstances, be invoked by the Contractor to justify delays in carrying out the rehabilitation program.

6.2.4. All formalities and costs necessary for carrying out the tests shall be borne by the Contractor. The number of persons participating in tests and trials in the factory, during the performance of the Contract, shall be established by mutual agreement between the Beneficiary and the Contractor.

6.2.5. The volume of checks and acceptance tests of the different parts and subassemblies shall be established on the basis of the provisions of the documentation in compliance with the standards and regulations in force.

6.2.6. Electrical tests shall be performed according to the agreed testing standards, schedules and procedures. The tests shall include but not be limited to heating, charging, overloading, leakage tests.

6.2.7. The Beneficiary has the right, without diminishing in any way the responsibility of the Contractor, to supervise the performance of the works and to control the execution of the equipment both in the Contractor's factories and in those of its subcontractors.

6.2.8. In order to facilitate the Beneficiary's activity regarding the quality control of the execution of the equipment included in the Contract, the Contractor and its subcontractors have the following obligations:

- to ensure the access of the Beneficiary's representatives in the factories and at the working points
- to ensure all the necessary conditions for the representatives of the Beneficiary to be enlightened on the quality of the execution of the works
- to make available to the Beneficiary all the documents (technical specifications, methods of examination and verifications during manufacture, delivery terms, etc.) necessary for factory supervision
- to make available to the Beneficiary's representatives all the information regarding the stage of execution of the equipment and works.

6.3. Conditions for on-site tests and verifications

6.3.1. Upon arrival on site, in the presence of the Beneficiary, the Contractor shall identify the supply and the accompanying quality documentation.

6.3.2. The checks, tests and special trials to be carried out at the site for each technical unit shall be carried out in accordance with the instructions of its supplier.

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6.3.3. The Beneficiary may request repeated measurements to verify compliance with the data in the factory bulletins and the integrity of the supply if there are doubts about the integrity of the supply upon delivery.

6.3.4. During the installation, the commissioning and the test operation, the Contractor shall perform, at agreed intervals, all the checks and tests in the presence of the Beneficiary to demonstrate the correctness of the works, according to the Contract.

6.3.5. Unless otherwise provided in the Contract, all costs for on-site inspections and testing and related fees shall be paid by the Contractor. These costs will include the properly calibrated measuring devices and any accessories that will be used by the Contractor throughout the performance of the checks and tests.

The Contractor shall make all necessary tests and checks to certify the execution of all works and the successful operation of the equipment and installations included in the Contract.

6.4. Requirements for controlling the execution of works

6.4.1. Control of mechanical processing

6.4.1.1. Any part to be subjected to mechanical processing will be controlled from the point of view regarding the quality of the material before starting the processing.

6.4.1.2. The raw material from which the test samples are taken must be part of and representative of the component of the subassembly. The samples shall be taken in the presence of the Beneficiary, who shall mark them with a control stamp. During the processing of test samples, care shall be taken not to damage these stamps. Only samples with a clear stamp shall be accepted for the tests. All samples shall be kept together with the subassembly (part) from which they come.

6.4.1.3. All the materials used in the manufacture of the basic components for the refurbishment of the equipment as well as the tests performed will be found in the respective equipment projects and the test results will be recorded in special sheets that will mention: material type, quality, origin, etc.

6.4.1.4. If during the processing it is found the occurrence of defects that could not be detected in advance, the Contractor shall proceed to the analysis of the conditions for repairing the defect found or the rejection of the respective part.

6.4.1.5. Defects found during mechanical processing shall be communicated to the Beneficiary and if the defect is repaired, the repair technology shall also be presented.

6.4.1.6. After processing, each part shall be subject to control in terms of dimensions, shape and tolerances.

6.4.1.7. The Beneficiary's representative shall be invited to participate in the controls performed on the important subassemblies.

6.4.2. Welding control

6.4.2.1. The control of the welded joints for the equipment, parts and preforms related to them is performed according to the documentation "Technical conditions and quality control program of the welded joints".

6.4.2.2. Welding control consists of operations that are performed before the actual welding operations begin, during and after they are performed.

6.4.2.3. Welding control includes the following preliminary phases:

- a. Control of the existence of the approval of the way of performing the welds;
- b. Electrode control;###_09\$##
- c. Welder qualification control.

6.4.2.4. Defects exceeding the allowed values shall be remedied according to the technology established by the Contractor, in compliance with the rules in force. All welded joints which have undergone repairs, shall be subject to a new control, in a volume equal to the initial one.

6.4.2.5. Welds shall be refused upon visual acceptance in the following cases:

- existence of linear interruptions of welding seams
- existence of a large number of defects with diameters greater than 3 mm per unit area
- separate defects with diameters greater than 4 mm
- defects with cracks at the base of the joint, regardless of their length.

6.4.2.6. The results of the control of the welded joints will be included in the acceptance documentation of the respective part or subassembly.

Welding control reports must include: description and type of welding, control devices used, test data and angle of incidence under which the tests were performed, description and positioning of defects, clearances at the root of the weld seam (in case of triple welds), the name of the person who performed the control, the test date and the analysis date of the report drawn up by the inspector.

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6.4.3. Corrosion protection control

The control of the anti-corrosion protection will be carried out by the Beneficiary in the presence of the Contractor, according to the quality plan related to this activity and will include the following phases:

6.4.3.1. Control after blasting

The appearance of the sandblasted surface will be visually checked, by comparison with the STAS 10166/1-77 standard. The surface must be clean, with no puncture marks of burn or rust. The appearance of the surfaces after blasting shall be recorded, for each subassembly, in a control report.

6.4.3.2. Control after application of each corrosion protection layer

In good light conditions, the following checks shall be carried out:

checking the appearance of the film (the film must be homogeneous, of uniform thickness, continuous, without pores, inclusions of foreign materials, detachments)

- checking the gloss of the film according to STAS 10157-75 or by visual comparison with the gloss standard of the paint, delivered by the supplier and accepted by the Beneficiary

- visual verification of the color, according to the ISO 3668, by comparing the color of the film on the part with the color standard of the paint supplier.

6.4.3.3. Final thickness control of the coating

The final thickness will be checked by the electromagnetic method, according to ISO 2808 or by another non-destructive method proposed by the Contractor and approved by the Beneficiary. Measurements shall be made by selecting three areas with an area of 1-2 dm², for each 4 m² of the controlled area. In each verification area, measurements shall be made at three points chosen by sampling.

The measured value of the coating thickness shall be taken as the arithmetic mean of the measurements. This value shall be recorded in the coverage control report.

The surfaces where the measured value of the coating thickness is below the value specified in the specifications or in the design approved by the Beneficiary, shall be painted with the necessary layers of paint, until this thickness is reached or exceeded.

6.4.3.4. Control of coating adherence

The adherence of the coating will be checked, according to ISO 2409, by the grid method. After the execution of the test, on the controlled areas the corrosion protection which has been damaged in order to carry out the control, will be restored. The adherence of the coating can be considered good if it corresponds to figure 2.

6.4.3.4. Corrosion protection shall be checked before the expiry of the guarantee period. Within the limits of the contractual provisions, it may be allowed on this occasion to remedy the defective surfaces.

7. CONDITIONS RELATING TO GUARANTEES

7.1 The Contractor shall guarantee that each technical unit/work, in its entirety, including machinery, appliances, materials or clothing, shall have no design, material or manufacturing malfunctions and shall comply, in all respects, with the requirements specified in these general conditions, in the specifications and in the contract.

7.2. The Contractor shall ensure that each technical unit included in the Contract comprises all necessary subassemblies and parts, delivered complete with all the respective accessories, spare parts and documentation, corresponding to the volume contracted with the Beneficiary.

7.3. The contractor will guarantee the quality and service life of the spare parts (in accordance with the rules of the supplying factories and with the standards in force). The replacement of these parts will be carried out by the Beneficiary, as necessary, in accordance with the indicated guarantee.

7.4. The Contractor shall ensure that no major defects occur throughout the lifespan of the equipment (new or rehabilitated).

7.5. The Contractor shall ensure that new and rehabilitated equipment does not pose a risk of fire, personnel injury or environmental pollution.

7.6. The period of commercial guarantee of the equipment covered by the contract, except for special specifications in the contract or in the specific specification, is 36 months from the commissioning acceptance (operational) to their designed capacity.

7.7. In case of equipment defects due to the Contractor's fault during the guarantee period, including failure to meet the guaranteed parameters, the guarantee period defined in item 7.6. will be extended accordingly with the time of non-use of the equipment due to the defect produced.

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7.8. All equipment will be guaranteed in terms of vibration, noise and degree of protection according to the requirements of the specifications of each piece of equipment.

7.9 Unless otherwise specified in the Specifications, for all equipment it shall be ensured that the operating noise level does not exceed the level of 80 dB, measured one meter away from the noise source, in any position.

7.10. For all moving equipment, unless otherwise specified in the Tender Specifications, the following conditions regarding the effective intensity and speed of vibrations in operation shall be guaranteed (according to SR 691:2012):

- the vibration intensity on the bearings - will fall within the range $10 \div 32 \text{ } \mu\text{m}$;
- the effective vibration speed will be within $1 \div 2.8 \text{ mm/s}$.

7.11. For hidden defects, the Contractor shall be liable for the entire life cycle of the supply.

8. CONDITIONS REGARDING THE ACCEPTANCE OF WORKS

8.1. Acceptance of the Works

8.1.1. The acceptance of the rehabilitation works related to each of the technical units included in the Contract and their totality implies, according to GD no. 51/1996, completing the following stages:

- Acceptance upon the completion of the works
- Commissioning acceptance
- Final acceptance

The acceptance of the associated construction works and related installations shall be carried out in accordance with the GD no. 273/1994 in the following stages:

- Acceptance upon the completion of the works
- Final acceptance

8.1.2. All activities related to the separate and total acceptance of the technical units included in the Contract, at each stage of acceptance, will be in accordance with the specifications of the "Regulation for the acceptance of assembly works for plant, equipment, technological installations and the commissioning of generation capacities", in force at the date of their performance and the specifications below.

8.1.3. By accepting, with or without reserves, the acceptance of a stage of the contracted works, the Beneficiary certifies that the Contractor has fulfilled its obligations related to the respective technical unit or to the entire works, in accordance with the requirements of the specifications and the contract.

8.1.4. Each stage of acceptance entails that, in advance, the preliminary control and specific verification activities were carried out, which are meant to prove the fulfillment of all the requirements related to the respective stage, at all the previous stages of execution. These activities are performed in the presence of the Contractor and the Beneficiary, and each activity is finalized with a report on: the conditions under which the control was performed, the names and responsibility of the participants, the results obtained, the conclusions regarding the approval of the respective stage, including the additional works that must be carried out in order for the stage to be approved.

8.1.5. The control activities, prior to each acceptance phase related to the works of execution of components or complete technical units, are carried out by each Subcontractor or Contractor at the suppliers, in factories or on site, according to the procedures for ensuring the quality of their own activity. These procedures must be communicated to the Beneficiary when the Contract is signed. In these activities, the Beneficiary will be invited to participate, but if it communicates in writing the non-participation, the control and the verifications will be made only in the presence of the Contractor. Through these activities, the fulfillment of all the requirements imposed on the equipment and installations is checked until the respective phase, so that, by continuing the works, a technical unit will finally be obtained at the required level. The conclusion of the report on the control or tests carried out by the Subcontractors or the Contractor is intended to prove to the Beneficiary that the ordered product meets all the requirements and does not present hidden faults/defects.

8.1.6. Also, as a stage prior to the phased acceptance, the verification and approval of the technical documentation is constituted according to *item 3.5*. The purpose of these activities is to establish to what extent the equipment offered meets the requirements of the tender specifications and of the contract.

8.1.7. The participation of the Beneficiary and of the Contractor (and, as the case may be, of its Subcontractors) is mandatory at each acceptance stage. The experts of the Beneficiary, the Contractor and those of the Subcontractors may also be invited.

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8.1.8. Acceptance at the stages of **completion of the works and commissioning** will be done both separately on each technical unit and on the entire technical units of an object and of the entire arrangement.

8.1.9 The **final** acceptance stage can be declared only when all the technical units have passed the commissioning acceptance and correspond to the requirements for this stage.

8.1.10. Regarding the provisions of the regulation specified in *items 8.1. and 8.2*, in connection with the activities preceding each acceptance stage, the following clarifications are made:

a. Measurements shall relate to compliance with the design of the equipment/ installation:

- material quality (physical-chemical characteristics);
- the overall dimensions of the parts, subassembly or equipment;
- geometric shapes of parts, subassembly or equipment etc.

b. Functional tests aim at:

- the commands performance in operation
- operating parameter level
- operating conditions in terms of vibrations, noises and shocks.

c. Factory inspections and tests shall cover:

- control of the materials that make up the technical unit
- quality control of welding seams
- control of dimensions and tolerances after each main manufacturing phase
- checks of the degree of surface preparation of metal constructions
- checks of the application of corrosion protection in the factory
- equipment assembly conditions.

d. At the factory assembly tests there will be checked:

- the existence of all quality reports of the activities performed in the factory
- the existence of all quality certificates of materials or subassemblies
- the correct execution of the joints
- overall dimensions
- the dimensions of connection with other subassemblies (the imprint of these dimensions will be made)
- the quality of corrosion protection.

e. On site assembly tests there will be checked:

- the existence of the factory acceptance protocol
- the correct execution of the joints
- assembly clearances made in relation to the requirements in the documentation
- overall dimensions
- the dimensions of connection with other subassemblies (these dimensions will be imprinted)
- the quality of corrosion protection
- quality of sealing systems.

f. The operation tests include:

- dry running tests;
- water operation tests.

8.1.11. In carrying out each stage of testing or acceptance, the principle of "priority of the previous test" will be applied so that a new stage will not be carried out until all deficiencies have been eliminated and the results of the previous test have been approved.

8.1.12. The exact content of the tests required for each technical unit shall correspond to the requirements specified in the Tender Specifications for that technical unit.

8.1.13. After the completion of the commissioning tests and if the result is favorable, the Contractor shall request in writing the commissioning acceptance, respectively the decision to put the respective technical unit into industrial service. The Beneficiary will assess whether on that date the technical unit operates in good conditions compared to the provisions of the Contract. In case of a favourable response, the **commissioning acceptance of the technical unit is considered accepted**.

8.1.14. Approval of the commissioning acceptance at the designed load signifies the passing of the respective technical unit into operation and the beginning of the guarantee period for it.

8.1.15. During the warranty period, the following shall be monitored for each Technical Unit:

- operating conditions;

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- vibration intensity;
- operating parameters
- reaching the nominal parameters and the required guarantees;
- the quality of the seals.

8.1.16. If, during the guarantee period, deficiencies occur that imply the withdrawal from operation of an equipment and the Contractor cannot replace it with a new one, the guarantee period shall be extended with the time elapsed from the withdrawal from operation until its recommissioning.

8.1.17. **The final acceptance** for the technical units that were the object of the rehabilitation contract, is pronounced at the end of the guarantee period if the following conditions are met:

- all the works have been carried out according to the contract;
- all the documentation provided in the contract has been handed over to the Beneficiary;
- the complete and correct training of the operating personnel has been carried out;
- the conclusions of each stage of acceptance are favourable;
- the tests on the functional parameters have been performed, and the conclusions are favorable;
- all the works to remedy the deficiencies found during the previous acceptance phases and those found during the guarantee period have been carried out;
- the operation of the respective technical unit is performed within normal limits of vibrations, noises or shocks, throughout the operating range and under all conditions;
- all commands required for remote control and control are performed;
- all required operating modes have been met;
- all guaranteed parameters have been met.

The acceptability criteria from the quality control specifications performed at the initial reception of the supply components, in the factory, will be valid also at the control performed before the final acceptance.

8.2. Verification of Guarantees

8.2.1. The verification of the guarantees of the equipment and installations that are the object of the contract will be done partially during the commissioning tests, and the results will be finalized during the guarantee period.

8.2.2. The tests, trials and verifications will be performed by the Contractor with the participation of the Beneficiary.

8.2.3. The program and methodology regarding the verification of the guaranteed parameters will be drawn up on the basis of the specifications from the technical conditions specific to each technical unit and the recommendations from the international technical publications.

8.2.4. If a test to verify the guaranteed data cannot be performed for a reason for which the Contractor is not responsible, the test will be postponed to a date agreed with the Beneficiary. The delay of the test and the reason for the delay shall be recorded in the acceptance report.

9. TRAINING OF OPERATING PERSONNEL

9.1. The Contractor shall take all necessary measures to familiarize the Beneficiary's personnel with the rehabilitated equipment. For this purpose, it will provide training to the personnel who will subsequently carry out the operation of the equipment and installations.

9.2. The training of the operating personnel shall be carried out both in the Contractor's or its Subcontractors' factories and on site. The number of trained persons will be established by mutual agreement between the Beneficiary and the Contractor upon signing the contract.

9.3. All expenses for the training of the Beneficiary's staff are an integral part of the contract and will be explained in an annex of the commercial volume.

9.4. The Beneficiary's personnel undergoing schooling will not be able to receive any task that commits the responsibility of the Beneficiary, except for exceptional derogations, confirmed in writing by the Beneficiary.

9.5. During the acceptance and commissioning tests and until the end of the guarantee period, the Contractor has to respond to all the problems raised by the operating personnel regarding the technical units included in the Contract.

9.6. The Beneficiary's personnel can participate in all phases of the tests and verifications performed on site, at each technical unit, regardless of whether or not they have a direct responsibility in making decisions.

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9.7. The Contractor shall prepare and deliver to the Beneficiary operating and maintenance instructions (see section 3.3.2.) which will include sufficiently detailed information to allow the Beneficiary to maintain, dismantle, reassemble, adjust and operate all the equipment and installations included in the contract.

The Contractor shall consider two different types for personnel training:

a) Training of the members of the Project Implementation Unit (PIU) team

- before the factory acceptance tests;
- before commissioning on site;
- according to the specifications in the specifications.

b) Training of the Beneficiary's operating personnel, which shall be carried out before commissioning, based on the Operating and Maintenance Instructions;

All requirements in the GTC and in the specifications are maintained.

10. CONDITIONS FOR REJECTING THE WORKS AND PENALTIES

10.1. The Beneficiary may reject any material, equipment or part of the work during the manufacturing, mounting and guarantee period under the following conditions:

- if the works are not performed according to the provisions of the Contract
- if the equipment has suffered damage, faults, deformation, etc. during manufacture, transport or assembly due to faults in design, workmanship or materials
- if the results of the checks and tests prove that the equipment or materials do not comply with the contractual guarantees.

10.2. The Beneficiary will decide whether the rejected part of the installation will be repaired or replaced.

10.3. Any material or equipment rejected by the Beneficiary shall be replaced or repaired by the Contractor at its own expense, while maintaining the quality and guarantee requirements of the final product.

10.4. Any technical unit that has not passed a test stage **is considered rejected**, and the Contractor is obliged to carry out at its own expense all the necessary works and equipment replacements so as to bring the respective technical unit to the parameters required for that stage.

10.5. Any technical unit that has not reached the guaranteed parameters **will be considered as ultimately** unaccepted so that in order to fulfill all its contractual obligations the Contractor is obliged to carry out at its own expense all the works and replacements of equipment necessary to bring the technical unit in question to the guaranteed parameters.

10.6. The Contractor will replace, at his own expense, all the equipment already accepted under the rehabilitation contract, the parts foreseen to be interchangeable if it is found that the type size used does not correspond to one of the equipment undergoing rehabilitation.

10.7. Penalties will be charged, in the amount provided in the contractual clauses, in case of failure to meet the requirements for:

- the deadlines for carrying out the rehabilitation works
- the guarantees undertaken for the quality of the works and the functional parameters of each technical unit
- the guarantees undertaken regarding the nominal parameters of each hydro unit
- the performance of the necessary remedies on schedule following the appearance of deficiencies.

In order to remedy defects during the guarantee period, the Contractor shall bear the cost of repairs, including the dismantling and reassembly works involved in carrying out the repairs.

10.9. Any independent equipment from the composition of the technical unit that fails during the guarantee period and for the remedy of which are necessary more than 15 days, **will be completely replaced** with a new one, at the expense of the Contractor.

11. MINIMUM LIST OF RECOMMENDED STANDARDS AND REGULATIONS

For the design, execution, assembly and commissioning of the technical units, the Contractor will use Romanian and / or international standards, in force at the date of execution of the works, including:

A. General requirements

PE 003/79 Standard of checks, tests and trials regarding the mounting, commissioning and putting into service of energy installations.((Amendment 1/1984)

PE 006/81 General instructions for the protection of the work for the ELECTRICAL AND

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	ELECTRONIC MEASUREMENT units
PE 009-93	Norms for prevention, extinguishing and endowment against fires for the branch of electrical and thermal energy
PE 017/83	Regulation on technical documentation in operation
PE 022/2 - 89	General design requirements for hydropower developments
PE 029/97	Normative for the design of information systems for the management by dispatcher of the energy installations from the national energy system
PE 101/85	Standard for the construction of electrical installations for connections and transformers with voltages over 1 kV (republished in 1993).
PE 102/86	Standard for the design and execution of connection and distribution installations with voltages up to 1000 V a.c. in energy units (republished in 1993).
NTE 007/08/00	Standard for the design and execution of electrical cable networks (replaces PE 107/95)
NTE 001/03/00	Standard on insulation selection, insulation coordination and protection of electromagnetic installations against over-voltages (replaces PE 109/92)
PE 112/93	Standard for the design of direct current installations in power plants and power stations
PE 114/83	Regulation for the technical operation of direct current sources
PE 116/94	Standard for tests and measurements performed on electrical installations and equipment
NTE 002/03/00	Test and measurement standard for protection, command, control and automation systems in the electrical part of power plants and stations (replaces PE 116-2/1992)
PE 118/92	General regulation of maneuvers in electrical installations
PE 124/95	Standard for the establishment of power supply solutions for industrial and similar consumers
PE 131/95	Regulation for the operation of electric engines
NTE 006/06/00	Standard regarding the calculation methodology of short-circuit currents in electrical networks with voltage below 1 kV (replaces PE 134-2 / 1996).
PE 506/83	Regulation for the technical operation of secondary circuit installations
PE 507/73	Regulation for the technical operation of the measurement and automation installations of the technical processes in the power plants
PE 829/73	Technical conditions for low voltage equipment used in internal services
PE 843/74	Technical requirements for panels, desks and automation cabinets
PE 865/74	Technical conditions for electrically operated valves
PE 867/74	Technical conditions for level transducers, used in thermal power plants
PE 930/89	Regulation for the technical operation of electrical installations in industrial and similar enterprises
PE 290/77	General rules for fire protection in the design and construction of buildings and installations
NP-I7-01	Normative regarding the design and execution of consumer electrical installations with voltages up to 1000 Va.c. and 1500 Vd.c.
I7-98	Norm on the design and execution of electrical installations to the consumer with voltages up to 1000 Va.c.
I14-76,	Norm for the protection against corrosion of buried metal constructions
Law no. 319/2006	Occupational safety and health
Law no. 333/2003	Security of objectives, goods, values and protection of persons
GD no. 1010/2004	for the approval of the methodological norms and the documents provided for in Article of Law no. 333/2003 regarding the security of the objectives, belongings and values and persons protection
Law no. 182/2002	on the protection of classified information
Law no. 212/1997	regarding fire protection
Law no. 10/1995	regarding construction quality
Law no. 440/2002	for the approval of the Government Ordinance no. 95/1999 on the quality of

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assembly works for plant, equipment and industrial technological installations

B. Regarding the mechanical part of the works

a. International standards:

□ *ISO - International Organization for Standardization:*

ISO/R 286 :1, 2- 2010	Basic standard for design
ISO/R 1829:	General tolerances and deviations
ISO 2768/89	Permissible processing deviations without specification of tolerances
ISO 68: 1998	
ISO 262; ISO/R 724	
ISO 2394	General principles for checking the safety of construction
ISO / R 82	Tests to determine stresses in metal parts
ISO / R 83; ISO / R 84	Resilience tests of metal parts
ISO/R 85	Testing of bending steel materials

b. Romanian standards:

□ *SR EN - equivalent to EN, European standard;*

□ *SR ISO and SR EN ISO - equivalent to ISO:*

ISO 4628/3	Rust scale
ISO 8044	Corrosion of metals and alloys Vocabulary
ISO 9223	Corrosion of metals and alloys Atmospheric corrosion. Classification
ISO 1940-1	Mechanical vibration. Quality conditions for balancing rigid rotors
STAS 10702 / 1-83	Corrosion protection of above-ground steel constructions. Protective coatings. General Technical Conditions
STAS 10128-86	Corrosion protection of above-ground steel constructions. Classification of aggressive environments
STAS 10166 / 1-77	Corrosion protection of above-ground steel constructions. Mechanical surface preparation
SR 6910: 2012	Energy units. Permissible vibrations. Requirements

c. American standards:

□ *ASTM – American Society for Tests and Materials:*

ASTM - A 370	Methods and definitions of mechanical testing of steel parts
ASTM - E 23	Resilience tests of metal parts
ASTM - E 165	Control with Penetrants
ASTM - E 94	Recommendations for radiographic tests
ASTM - E 190	Bending tests of welded joints

□ *AWS - American Welding Society:*

AWS, Group B	Checking the quality of welding
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d. German standards:

□ *DIN - German Industrial Standards (Deutsche Industries Normand):*

DIN 8560; DIN 4100	Checking the quality of welding
DIN 50049	Material testing certificate

e. Swedish standards:

□ *SSI – Swedish Standardization Institute*

SIS 05 - 5900	Sandblasting of metal surfaces for corrosion protection
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C. Regarding the electrical part of the works

STAS CEI 947-1-92	Switching devices up to 1000 V AC (1200 V dc) and up to 4000 A. Technical conditions
STAS 2612/87	Protection against electric shock. Allowable limits
STAs 8275-87	Protection against electric shock. Terms and definitions
SR EN 60269 – 1 :	Low-voltage fuses General conditions (replaces STAs 4173/1-91).

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2001

SR EN 60947- 2	Low voltage equipment Part 2. Switches
SR EN 60947 – 4-1 :	Low-voltage switchgear and controlgear. Part 4-1. Contactors and motor-starters.
2001/A2 : 2006	Electromechanical contactors and motor-starters
SR EN 60529	Normal degrees of protection provided by housings. Classification and verification methods
STAS 7944/79	Current conductor bars. Maximum permissible currents lasting. Requirements
STAS 8779-86	Signal cables with PVC insulation and sheath
STAS 9570 / 1-89	Marking and sighting of pipeline and cable networks in towns
STAS 12604-87	Protection against electric shock – General requirements
SR EN 61810- 2	Electrical relays. Part 23. Functional characteristics of the contacts
STAS 12604/89	Protection against electric shock by indirect contact. Fixed electrical installations General Requirements
STAS 12604 / 5-90	Protection against electric shock by indirect contact. Fixed electrical installations Design, execution and verification requirements
RE-I 191-88	Technological instructions for operation of USOL type low voltage LV automated circuit-breakers
STAS 4002-74	Auxiliary materials for electrical networks and installations. Chain clamps for circuits with copper and aluminum conductors. Special technical quality conditions
SR CEI 60050 (461) + A1 :	International Electrotechnical Vocabulary. Chapter 461: Power cables;
SR ISO 181; 1998	Plastics. Determination of the flammability characteristics of rigid plastics in the form of small specimens in contact with an incandescent bar
STAs 4481/1,2/85	Power cables with paper insulation impregnated in lead jacket
STAS 6007	Winding cables, pipes and conductors Terminology
STAS 7137	Plastics. Determination of flammability of materials
STAS 7335/1 ÷ 11	Norm for the protection against corrosion of buried metal constructions
SR CEI 60287 - 1 - 1 + A1: 2001	Electric cables. Calculation of the allowable current intensity. General information
STAS 8778/1,2 - 85	Signal cables with PVC insulation and sheath
STAS 9436 / 1,2,5	Electrical cables and pipelines. Classification and symbolization.
STAS 8822	Flexible and highly flexible power cables with PVC sheath and insulation for rated voltage up to 750 V
SR EN 12163 : 2002	Copper and copper alloys. Bars for general applications
SR CEI 60189	Low frequency cables and pipes insulated with PVC and in PVC sheath. Part 1. General test and verification methods
SR CEI 60227	Polyvinyl chloride insulated conductors and cables with rated voltages up to 450 / 750V
SR CEI 60228:2005	Conductors for insulating cables.
SR CEI 60885	Test methods for electrical cables. Part 1. Electrical tests for conductors and wires for a voltage less than or equal to 450 / 750V
STAS 9192	Colors of PVC insulation of pipes and flexible cables. Requirements
STAS 10955	Electric cables. Calculation of the permissible current in cables, in permanent mode. Requirements
SR 1907-1-97	Heating installations. Necessity for calculation heat. Calculation requirements.
SR 1907-2-97	Heating installations. Necessity for calculation heat. Conventional internal temperature calculation;
STAS 1797 / 1-79	Power plant heating installations. Sizing of heating elements. General Requirements
IEC 34/34.1÷ 34.13	Rotary electric machines
IEC 72 (72 A)	Dimensions and output values of rotative machines
IEC 85	Thermal classification of electrical insulation
IEC 93	Methods for testing the transverse and surface resistivity of electrical insulation

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	materials
IEC 136	Brush dimensions for electric machines
IEC 167	Methods for testing the strength of insulation materials
IEC 243	Methods for testing the dielectric strength of insulating materials
IEC 279	Resistance measurement on AC machines
IEC 529	Classification of the degree of protection
IEC 894	Methods of measuring losses tg d
IEC 270	Methods of measuring partial discharges

In addition to the general international standards, the verification, design and execution of the equipment and installations will be carried out based on the IEC norms valid on the date of entry into force of the Contract :

IEC 270	Methods of measuring partial discharges
IEC 439; VDE 0660-500	Low voltage cabinets
IEC 60889	Aluminium conductors
IEC 60216	Electrical insulating materials
IEC 60332	Tests for electrical cables
IEC 60684	Flexible cable insulation sleeves
IEC 62155	Pressurized and non-pressurized ceramic and glass insulators used in electrical equipment with voltage above 1000V
IEC 85	Thermal classification of electrical insulation
IEC 93	Methods for testing the transverse and surface resistivity of electrical insulation materials
IEC 167	Methods for testing the strength of insulation materials
IEC 243	Methods for testing the dielectric strength of insulating materials
IEC 529	Classification of the degree of protection
IEC 894	Methods of measuring losses tg d
IEC 270	Methods of measuring partial discharges

D. Regarding construction works:

SR EN 10058	Wide steel;
SR EN 10060-	Round steel
SR EN 10297-1	Hot-rolled steel tubes
ISO 3834-2	Quality requirements for welding
ISO 4034	Safety washers;
ISO 4016	Raw hex head screws;

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List of Technical Units

Tender Specifications	TU Code	Name of the Technical Unit
3.2.A.		Butterfly Valve Chamber
3.2.A.1 + part of 3.2.A.3	U10	Butterfly valves (left line), including: - Butterfly valve installation (upstream valve and downstream valve), including by-pass installation - Ventilation installation of the penstock for the left line penstock - Electrical installations for supply and distribution of alternating current and automation;
3.2.A.1 + part of 3.2.A.3	U11	Butterfly valves (right line), including: - Butterfly valve installation (upstream valve and downstream valve) - Penstock venting installation for the right penstock - Electrical installations for supply and distribution of alternating current and automation;
3.2.A.3	U12	Control, automation and signaling system
3.2.A.4.	UT17	Earthing installation (including the area of penstocks)
3.2.A.5	Part of	Low voltage cables and secondary circuits

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The undersigned, CHELU G. Roxana Elena, authorized translator by the Ministry of Justice of Romania, for English, authorization no. 38800/14.06.2021, I certify as authentic and accurate the present translation made in English, signed by me, with the original text in Romanian and that through the translation, the original document was not distorted by meaning or content.

Authorized translator, Chelu Roxana Elena

