

TECHNICAL DESCRIPTION OF THE PROJECT

“Pilot Telemetry and Management System for the Electric Power Supply Demand by Residential and Small Commercial Consumers and Implementation of Intelligent Networks”.

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1. PROJECT DESCRIPTION

“Pilot Telemetering and Management System for the Electric Power Supply Demand by Residential and Small Commercial Consumers and Implementation of Intelligent Networks”.

1.1. Introduction

The purpose of electronic smart meters is to provide information related to the energy consumption of each consumer. These meters shall change the consumers' energy consumption habits in the short term, and shall also provide an important step towards the creation of intelligent networks in the future. This particular technology shall help consumers to save money from their electricity bills and contribute to the reduction of carbon dioxide emissions. For the consumers, the estimated bills shall no longer be issued. Therefore, the consumers themselves shall be able to manage their consumption (and the energy cost) more efficiently and it will become easier for them to select and switch between different energy suppliers. On the other hand, the energy suppliers shall be able to offer a wider range of reduced-cost packages - including the supply of energy during off-peak hours.

Smart meters and the technological field of telemetry play together an important role as regards the reduction of consumed energy, and the emissions of carbon dioxide. They also improve the quality, accuracy and range of services provided by energy suppliers. In the long term, telemetering will become a very important factor for the creation of smart energy grids.

One of the main tools used for implementation of the open energy market is the Metering Device combined with the related recording and data acquisition equipment, which constitute an integral part of the Distribution Network. Responsible for installing and operating the metering device shall be the owner of the Distribution Network. An integral part of the Metering Devices shall also be the Telecommunications and IT System (Automated Meter Reading - Data Processing Center) used for exploitation of the Metering Center.

1.2. Legal Framework

The legal framework that is in force in our country and under which the Greek Electricity Market operates is the following:

- Law 2773/Government Gazette 286/22.12.1999 (LIBERALIZATION OF ELECTRICITY MARKET - REGULATION OF ENERGY POLICY ISSUES AND OTHER PROVISIONS)
- M.D.D5/B/F1/oik. 8988 (Government Gazette Issue B 623/25-5-01): "Approval of Electricity Transactions Code" (Chapter A: Meters, G: Measures Quantities)
- M.D.D5/B/F1/oik. 8989 (Government Gazette Issue B 654/30-5-01): "Approval of System Administration Code" (Chapter F: Meter Readings)
- Law 3175/GGI207/29.8.2003 (EXPLOITATION OF GEOTHERMAL POTENTIAL, REMOTE HEATING AND OTHER PROVISIONS)
- M.D D5-HL/B/F5/OIK.8311/9.5.2005 (Government Gazette, Issue 655/B/15.5.2005): "Approval of System Administration and Electricity Transactions Code".
- "Readings Management and Periodical Network Suppliers Settlement

Manual" (RAE Decree No. 4308/2009)

- LAW No. 3855 - Meters for improving energy efficiency in the final utilization stage, energy-related services. (Through the provisions of this law, the Greek Laws are harmonized with Directive 2006/32/EC of the European Parliament and the European Council, dated April 5, 2006, regarding "energy efficiency in the final utilization stage, and energy-related services, and repealing of Directive 93/76/EEC of the European Council".
- Member States shall ensure that the electricity consumption charges are based on the actual energy consumption and are made quite often, so that consumers can adjust their energy consumption (2006/32/EC).
- Member States shall implement smart energy metering systems by 2022 (80% coverage must be achieved by 2020).

1.3. Scope

PPC S.A. plans to implement a Pilot Program for the installation, testing and operation of approximately 160,000 meters in selected geographical areas of the distribution network, which will enable the documentation, on a technical and economic basis, of the selection of an appropriate combination of Meter, Telecommunication and Metering Data Collection and Processing Center technology.

The areas at which the pilot program will be implemented are as follows:

- Xanthi Prefecture
- Lesvos Prefecture
- Limnos Prefecture
- Ag. Efstratios Island
- Lefkada Island

The System aims at expanding the existing infrastructure and at creating the necessary new infrastructure and organization in order to achieve:

- Effective and reliable acquisition, processing, management and storage of metering data from customers and Distribution Network users in general.
- Provision of access to such information to any legally eligible parties.

1.4. Implementation

The supplied automated Telemetering center shall be able to support **up to 200,000** independent metering points, during the current phase. Moreover, it shall be expandable in order to cover any future needs of the entire national territory. The system shall therefore be expandable in order to receive data from **7,300,000 additional** metering points. The requirement for expanding the center in order to support a total of 7,500,000 metering points shall be notified to the Contractor before signing the provisional acceptance document for the project; the cost for this expansion shall not be included in the EU funding.

At this stage and in the scope of this project, the metering points to be included in the Main System shall be approximately 160,000.

For the installation of the Center, all suitable areas have been provided.

Furthermore, provision will be made to ensure that following its completion, it will be staffed with PPC S.A. personnel.

The operation of the Center shall be undertaken by the contractor until the final acceptance of the project; the operation shall include repair of any faults in the installed metering and communication equipment.

During this process, complete data shall be recorded in order to enable statistical processing of the number and type of faults. Such data shall be made available to PPC at any time. It shall be possible to include PPC staff in the operation of the center even prior to the final acceptance, for purposes of training and familiarization with the operating procedures.

Following the final acceptance of the project, the Contractor shall be assigned with the complete operation of the Center, using Contractor's personnel, for the next five (5) years (with possible five-year extension), which shall include repairing of any faults/malfunctions of the installed metering and communications equipment.

The provision of operation, technical support, System maintenance and fault repair services for the overall metering and communication equipment by the Contractor shall be performed using procedures fully documented in manuals supplied to PPC.

At Corporation's discretion, PPC personnel shall participate in such operations for purposes of continuous training and familiarization with the relevant procedures.

The Main System shall also include a Backup System (with similar capacity), which shall be installed in a different area and shall be kept in "hot stand-by" status against the Main System.

1.5. Work Schedule

The term (duration) of the Project is described in the relevant article of the Draft Agreement in the Commercial Part and in this Technical Description of the Project.

The tenderers shall submit a works schedule, meeting, as regards the temporal requirements, the period for the completion of the Project. According to the Indicative Project Schedule, this period is 18 months. This schedule shall include the main parts of the Project and their terms (study, equipment supply, construction and operation).

The Contractor is required to submit a detailed work schedule within 15 days following the date of signing of the Contract in consultation with the Supervising Department.

This schedule shall completely, clearly, and accurately cover all categories and phases of the works to be performed by the Contractor in order to ensure timely construction and delivery of a well-constructed and fully operational System to the Corporation.

The overall detailed project implementation schedule shall be approved by the Supervising Department within five (5) days or, in case of conflict, the Contractor shall be informed in writing. The schedule to be submitted for approval is required to include a provision for implementing, in the first phase, within a maximum of six months (one hundred eighty, 180 days) from the effective date

of the Contract, the installation and operation of the Main System. The replacement and integration in the System of all meters and communication media (modems) of the electric points at the Regions of Distribution must have been completed within 18 months in total.

The Contractor is required to submit the Monthly schedule of the next month for approval to the Supervising Department, at least one week prior to the commencement of the works.

The Supervising Department is required to approve the schedule within two (2) days, or, in case of conflict, shall notify the Contractor in writing.

1.6. List of Metering Points

The location and the number of metering points are laid down in the Notice Tender.

PPC S.A. shall provide, following written request from the Contractor and within five (5) calendar days, a detailed list of all Metering Points, which shall include the following:

1. Name of Customer - Metering point
2. Address (City, Prefecture, etc.).
3. Contact telephone (if available)
4. Any other information available to PPC

The above information shall be delivered to the Contractor after signing a Confidentiality Statement for the information being made available to him for the purpose of project implementation, and after he expressly binds that following the completion of the whole project all such information - data shall be deleted - destroyed from any database or other file in their possession.

1.7. Works in customer's premises

The Contractor is required to perform in due time all necessary steps towards the customer representatives, for notification and planning of any works required for replacement and integration in the communications system of customer's metering device.

It is clarified that the Contractor shall proceed to all of the above actions with his own resources and at his own expenses (PPC is only responsible for approval of the required documents) and will not, therefore, be entitled to receive any special remuneration since the relevant costs are included in the prices of the services offered.

Prior to the commencement of the works, PPC shall send to the Customers, together with their monthly bills, a notification letter regarding the project implementation and the details for contacting the Contractor.

The Contractor is required to set up and operate an appropriate help desk, which shall provide information about the project and shall facilitate arrangements for the time / period required for performance of the relevant works in each customer premises (telephone appointment).

The Contractor's crews who shall perform works on the customers metering devices, may be accompanied by authorized PPC staff, at the discretion of the latter. For this purpose, the Contractor is required to notify PPC in writing about the daily works schedule, at least two working days in advance.

1.8. Operating requirements of the Pilot Program

The policy and strategy to be applied for the pilot program are aimed at examining the trends in the Greek market for electricity, as well as the special requirements of PPC, and at ensuring the effective and valid functionality of the meters, as to be determined by the company.

The special requirements of the universal AMM/ AMI system also depend on the national needs and the needs of the distribution company, as each time these arise. However, the options available include the following features:

- Remote interval reading
- Remote special reads
- Remote disconnect and reconnect
- In-home displays providing information to consumers
- Time-of-Use or Critical Peak Pricing
- Capacity Regulation
- Loss of supply notification
- Tamper alert
- Pre-payment
- Meter data management

The selection of the functions is critical for the system's economic performance: more specifically, features such as the wireless disconnect/ reconnect, the tamper alerts, the quality control and the pre-payment options may significantly contribute to the economic benefits of the program.

1.9. Architecture of the AMM Pilot System

The architecture of an AMM/AMI system is related to the network topology, i.e. the meter interconnection methods and the methods for transferring metering data and other orders from and to the meters. The system's architecture will be formed in such a way so as to implement various modern telecommunication technologies for telemetering, such as:

- Power Line carrier - PLC and Distribution Line Carrier - DLC
- Internet protocols (TCP/IP)
- Wireless GPRS/GSM technology
- Radio frequency (RF Mesh)

It is indicatively stated that the installation of meters per technology must be as follows:

- PLC-DLC -40%
- TCP/IP - 40%
- GPRS/GSM - 10%
- RF - 5%
- Undetermined (at the tenderer's discretion) - 5%

For each of the aforementioned technologies, the system architecture shall include all the necessary communication media (modems, routers, concentrators), as well as the metering data acquisition and management system.

Moreover, the system architecture shall also feature:

- In home display, as well as
- Web portal,
providing the consumers with data about their energy consumption, statistics, invoice details, etc.

1.10. Project Implementation Phases.

The Contractor is required to provide for the timely procurement and delivery to his warehouses of all required System equipment, and of all required metering and communication equipment to be installed at the metering points.

For each delivery, the Supervising Department shall be notified in written form in order to perform the required material quality acceptance tests as specified in the PPC technical description for the material in question.

The Contractor is solely responsible to certify the successful integration of each metering point into the System.

The total term (duration) of the project shall be eighteen (**18**) months. The contractor is required, within six months following signing of the Contract, to perform the following tasks:

1. Set up / prepare the areas indicated by PPC (installation of air conditioning - firefighting - security system - UPS etc) for installation of the Main and backup systems.
2. Install the H/W-S/W of the AMI system.
3. Arrange all details with the IT department of PPC for proper data transfer and correct issuing of customer bills.
4. Upon completion of the above, the system's qualitative and quantitative acceptance shall be performed.

Following completion of the above works, the works for meter replacement and integration into the AMI system shall commence.

Prior to the commencement of the works for the replacement of the meters by the Contractor, it shall have performed pilot meter replacement works (according to the invoices for each type of services), which shall be approved by the Supervising Department and shall be strictly followed by the Contractor's crews. The Contractor's staff is required to enter the data concerning any dismantled meter and the data for any new meter in PPC's "HERMES" IT system.

For this purpose, a terminal station (computer) shall be available in PPC's premises, so that the Contractor's personnel, after being trained, shall register at a daily basis the changes of the Customers' metering data which are integrated in the remote reading system.

Invoicing for the replacement works and for the meters and communication media shall be carried out following verification of such works by engineers authorized by the Corporation for this purpose, and after registering the

customer in the "HERMES" IT system and in the WEB server which the Contractor shall develop.

The Contractor must implement all the technologies cited in point 1.9 in the first 10,000 meters and at the respective proportions.

The project shall also include, for all Distribution sub-stations at the Areas cited in point 1.3:

- Installation of error occurrence indicator with teledisplay.
- Collection of transformer and ambient temperature data, water level data, sub-station door opening data etc., with respective teledisplay.
- Collection of sub-station loading, balancing, overload alarm data.

Compliance with the requirements for project's materials storage conditions (humidity, temperature, water-tightness of storage areas, security guard, etc.) is the sole responsibility of the Contractor.

PPC is entitled to inspect the storage conditions following oral or written request to the Contractor.

For project implementation, the following phases are provided:

- 1) Procurement and storage of the equipment for the main system, in Contractor's warehouse.
- 2) Installation and Programming of the main system (and of the backup system) in the areas provided by PPC, and testing of the operation of both systems.
- 3) Procurement - inspection - certification and storage of meters and modems in contractor's warehouse.
- 4) Programming and testing of meters and communication devices for the metering points.
- 5) Removal of the existing meter, installation of the new meter and communication medium in the metering device to enable its successful integration into the system.
- 6) Supply of materials by PPC, if required, for upgrading the metering devices (including new installation), wherever required.
- 7) Restoration of metering point seals, using standard PPC seals of different color and following PPC's Sealing Instructions.
- 8) Integration of the metering point in the readings acquisition System, in the "HERMES" System, and metering data transfer.
- 9) Delivery of dismantled materials to PPC warehouses.
- 11) Detection and recording of events related to data malfunctions and problems encountered during the execution of the Project.

1.11. Materials supplied by the Corporation

The Contractor shall obtain the following from the Corporation:

- Electronic meter placement boxes
- Plastic seals for sealing the meter boxes
- Miniature circuit-breakers

If, under specific circumstances, the supply of the above materials is not carried out, the Contractor shall not be entitled to request any indemnity for the delay of

the project, and, correspondingly, the penalty clauses provided for shall not be imposed for the project delay, since PPC shall be responsible for the delay.

2. TECHNICAL DESCRIPTION

2.1. General

This technical description covers the design, the preparation of all required operation and construction studies, the supply of all required metering, IT, communication and electromechanical equipment, the installation of such equipment, and finally the acceptance of the operational Automated Meter Reading and Metering Data Management System.

According to the following technical description, the technical specifications of the Project and of all partial equipment, the Tenderers are required to submit for assessment and approval a detailed construction and operation study and a complete schedule for the project.

The Contractor is required to design and construct a complete System, ready for continuous, satisfactory and reliable operation. To this effect, the Contractor is required to make provisions for all parts of the Project and for all required equipment, in every detail, even if no specific provisions are made for such items herein.

The Contractor is required to submit his tender, in accordance with his complete study so that the overall project layout will conform to this description, to the Corporation for approval.

Any equipment, procedure or parts not included in this technical description, but which are essential for the complete, safe and streamlined operation of the project shall be included in Contractor's tender.

The Contractor shall ensure physical and operational compatibility of the Project with the existing infrastructures and standards of the Corporation.

2.2. System Configuration

For the utilization and rational operation of the metering center of PPC S.A. provision is made for the design, supply, installation and commissioning of an Automated Meter Reading and Metering Data Management System in areas owned by PPC S.A., which shall be made available for this purpose:

- In Athens area, in distinct spaces, for the Main and Backup System.

In particular, the System shall include all required equipment as defined in the Tenderer's study and shall meet the automated meter reading and data management requirements for 200,000 metering points. It shall also be possible to expand the System in order to receive data from **7,500,000** metering points **in total**.

All equipment of the main and backup Systems shall be installed in indoor areas with suitable configuration. Inside the building, separate rooms shall be provided for the main IT and communication system and for the system users.

It is pointed out that the Contractor shall be responsible for the provision of telecommunication services, as well as the resolution of any communication problems.

The Contractor shall fully undertake the preparation of the complete study and

the construction of the System and shall deliver it to PPC ready for operation ("Turn key job").

2.3. Main parts of the Project

The following are considered as main parts of the Project:

- . FULL LAYOUT AND FURNISHING OF THE INSTALLATION AREAS (EQUIPMENT AND OPERATOR STATIONS):
 - IN THE MAIN SYSTEM AREA, FOR AT LEAST SIX (6) USERS AND TWO (2) ADMINISTRATORS.
 - IN THE BACKUP SYSTEM AREA, FOR AT LEAST SIX (6) USERS AND TWO (2) ADMINISTRATORS.
 - SUPPLY, INSTALLATION AND COMPLETE COMMISSIONING OF HARDWARE AND SOFTWARE FOR THE MAIN AUTOMATED METER READING - METER DATA PROCESSING SYSTEM.
- SUPPLY, INSTALLATION AND COMPLETE COMMISSIONING OF HARDWARE AND SOFTWARE FOR THE BACKUP SYSTEM
- SUPPLY, INSTALLATION AND INTEGRATION IN THE SYSTEM OF THE METERS, THE IN-HOME DISPLAYS AND THE COMMUNICATION EQUIPMENT OF THE METERING POINTS.
- HARDWARE AND SOFTWARE FOR OPERATION OF THE WEB APPLICATION
- SETTING UP THE SYSTEMS DATABASES AND BACK UP OF THE MAIN AND BACKUP SYSTEMS' DATA FILES.
- SECURITY AND PROTECTION SYSTEMS (FIREWALL, ANTIVIRUS etc.).
- UNINTERRUPTED POWER SUPPLIES (UPS) FOR THE EQUIPMENT
- INSTALLATION OF A SECURE ACCESS AND FIRE SAFETY SYSTEM AND SAFETY PORTS FOR ALL SPACES OF THE CENTRAL AND BACKUP SYSTEM
- USER TRAINING
- LIGHTING, AIR-CONDITIONING, FIRE PROTECTION AND VENTILATION FOR THE AREAS
- PROJECTORS INSIDE THE SPACES INTENDED FOR THE USERS OF THE MAIN AND THE AUXILIARY SYSTEM, A CENTRAL PRINTER (COLOUR LASER), A SCANNER, AS WELL AS A FAX MACHINE BOTH FOR THE MAIN AND FOR THE BACKUP SYSTEM.

The parts of the Project shall not include the following:

- The housing space for the equipment, consisting of two rooms of 30 and 40 sq.m. approximately (one for the system and one for the users), and the corresponding room for the backup system.
- Connections of the above areas with public utility networks.
- The supply of telecommunications system of the building (connection with the telephony network), as well as telephone appliances.

The Contractor shall be responsible for any works additional to the aforementioned, which may be necessary for the sound and safe operation of the System.

2.4. Project design

The bid submitted by each tenderer shall include:

- All required studies, specifications, technical descriptions, drawings and data, with detailed information regarding the design and operation principles for each part of the offered Project Equipment, according to the Technical Specifications and to the extent required in order for the Tender to be complete.
- Adequate presentation of the project including the proposed general methodology and approach, the system architecture, any specific advantages of the proposed solution, and the individual operations of the proposed system.
- Description of the provided services for each work, of the corresponding methodology and of the proposed Project implementation procedures
- Moreover, the project implementation teams and the project management method must be stated in total.

Given that the method for classification and organization of the acquired and generated information is significantly important, the tenders shall include in detail:

- The methods used to examine data validity and the methodologies for replacing and correcting any lost or erroneous data.
- The coding method, the data and system update mechanisms, the display of information and the access methods depending on its classification.
- Details regarding the creation of reports by the System. In particular, the standard reports prepared automatically by the System, and their type and creation frequency shall be defined, as well as the process employed for the preparation of reports by the users according to their needs
- Warehouses. According to the project's time schedule, it is required to maintain adequate stock in the Contractor's warehouse to ensure the uninterrupted work of the crews.
- Special attention shall be paid to the professional capabilities / skills of the technical staff employed for the execution of the Project.

The approach and methodologies being applied shall be documented with extensive reference to the corresponding practices of other power utility companies by submitting detailed data (e.g. technical specifications of similar systems).

2.5. Offered Equipment and Services

The Tender's Technical Folder is required to include a detailed description of all offered equipment and provided services.

As a minimum and in accordance with the requirements of the Tender Notice, it is required to:

- Present / describe all hardware and software.
- Describe in detail the methodologies employed for management of the project

- Describe the proposed contingency and risk management plan

Moreover, a description of the following shall be included:

- User training and support services prior to the commencement of the test run period.
- Provision of operation, maintenance and system support, and fault repair services for all metering and communication equipment following provisional acceptance of the system.

2.6. Execution of Checks/Tests.

The Contractor is required to submit the check and testing procedures for the whole project, as well as any other information required for proper documentation of the equipment to be installed. As such are considered all drawings, technical brochures, presentations and any other technical documentation material.

The Contractor, following the installation of software, is required to deliver a perfectly and entirely checked system, thus establishing that the project fully meets the specification requirements according to the provisions of the tender notice.

To meet this obligation, the Contractor shall apply a methodology for testing IT systems, and shall document the test results. The methodology used by the Contractor shall not be different from the one presented in its tender.

It should be noted that all checks/tests (check/test scenarios) shall be designed under the form of delivery failure (critical-major-minor) and implemented by the Contractor, following approval by the Supervising Department.

The successful performance of the checks/tests is a prerequisite for the commencement of the test run period. Within ten (10) days following the completion of the checks/tests, PPC shall consider the results and decide whether the checks were successful, thus enabling the commencement of the test run period.

If the checks/tests are unsuccessful, the Contractor is required to make all necessary improvements in order to repeat the checks until they are successful. Any resulting delays shall affect the project completion period, with all relevant consequences (penalties) for the Contractor, as provided in the Contract. The delivery time for the check/test scenarios shall be shown in the project implementation schedule.

2.7. Project documentation

The Contractor, following the completion of the checks/tests at the system level, is required to deliver the complete system with full documentation, according to the project specification requirements. The documents shall be classified as technical, operational, supporting, etc., according to the implementation methodology as described in the tender.

This phase includes the following minimum deliverables:

- Manufacturer manuals (with brief or detailed instructions in Greek and English language).
- System operation manuals / instructions in Greek language.
- Support Manuals / Instructions for troubleshooting, risk management, in Greek language.
- Manual - Operation rulebook for the remote meter reading center.
- Other required deliverables.

2.7.1. Administrator and User Training

Training shall be provided for the system administrators and users, according to the Special Terms and Conditions of the Tender Notice and according to the project requirements.

2.8. Test Run Period

Following the successful completion of all checks/tests and the acceptance thereof by PPC, the Test Run Period shall commence, as provided in article 15 of the Special Terms.

During this period, the applications shall operate under real conditions and the Contractor is required to have readily available all staff deemed as necessary for supporting system's operation, as agreed with PPC S.A.

During the test run period, if the system exhibits any operational or availability problems, or its performance deviates from the operational requirements, the system shall be considered as defective and shall be rejected. In such case, the test run period shall be suspended and the Contractor shall be required to resolve the problem within five (5) days at maximum.

The Contractor shall submit a written notification to PPC, stating that they corrected the malfunction or fault, how they corrected it, and the date on which they want the new test run period to commence.

From the observations and unresolved issues recorded by the Contractor, a need may arise for specific interventions or corrections in the operation of the IT system. The Contractor, following consultation with PPC, shall proceed to any necessary corrective actions, which shall be completed within the test run period.

PPC is entitled to perform any supplementary checks/tests or to repeat the initial checks/tests in order to establish whether the malfunctions or faults that caused the suspension of the test run period have been rectified.

The new test run period shall commence upon recommendation of PPC.

Support, during the test run period, shall include:

- Problem resolving - user support
- Collecting user observations
- Error correction / management.

2.9 Additional system capabilities

The system shall include a test environment platform for the purpose of running special applications, in an environment different from the one of the Main and Backup Systems.

3. TESTS

3.1. General

All hardware to be used by the Contractor for constructing the System, all individual structural and operational parts constituting the System, and the overall System as a complete and self-contained structural and operational block, shall be tested using appropriate tests to demonstrate that all specification requirements are met.

The tests can be divided into two categories:

- equipment / hardware tests
- systems and operational tests

The cost of all tests to be performed shall solely burden the Contractor.

The Contractor shall be responsible for performing all necessary tests as soon as possible, so that any subsequently required corrections/rectifications shall not delay the completion of the Project.

Within ten (10) days prior to the performance of any systems tests, or any operational and acceptance tests on the System, the Contractor is required to submit to PPC the final and detailed programs and schedules for such tests. The test schedules shall be accompanied with accurate and clear reports regarding the prerequisites / conditions to be ensured by PPC for the performance of the tests (e.g. connections of Communication Lines, connection of modem equipment with a communications operator, requirements regarding handling or power failures that may affect the Communications System, etc.).

Moreover, they shall include detailed descriptions of the methodology used for the performance of each test, the instruments and devices to be used, the applicable rules, and any possible relation / reference to results of theoretical calculations.

All tests shall be performed by the Contractor, who is required to provide all instruments and all metering and monitoring equipment required for the performance of the tests. The Contractor is also required to provide all highly experienced personnel required for the performance of the tests.

PPC reserves the right to request the performance of all tests described in this technical description or are recommended by the EN/IEC standards.

PPC reserves the right to modify any programs and schedules previously submitted by the Contractor within five (5) days from the date they were submitted to PPC.

3.2. Equipment tests

All offered equipment shall have type test certificates. The results of the tests shall be approved by PPC before loading the equipment for shipment.

PPC reserves the right to request the performance of all provisioned tests according to the relevant EN/IEC regulations.

Regarding the type tests for the equipment/hardware, if the Contractor has and submits type test certificates issued by established, internationally accredited test laboratories, for pieces of equipment identical to the ones to be used in the Project, PPC may relieve the Contractor from the obligation to perform the respective tests if the submitted certificates are deemed to be satisfactory.

All type tests that may be requested, as well as any required series tests, shall be performed in the presence of an authorized inspector engineer of PPC, unless PPC provides written permission for the performance of tests in its absence.