Tender No. (SELCo. 03/2019)

Electrical Meters

Total	
Discount	
Total after Discount($)	

Company……. **Signature…….**

The following data shall be filled and submitted with the tender:

Tender Number:……...

Tender Name:……...

Supplier Name: …….

Contact Person: ……

Address: ……....

Telephone Number: ……..

Fax number: ……..

Mobile Number: ……...

Email: ……

Bid Submission date and time: ……

Company……. **Signature…….**

Instructions to bidders

- *General*
  - Tender documents could be obtained from SELCo website or from procurement department.
  - Palestinian companies who are registered at the Palestinian ministry of economy are the only able to participate in the tender.
  - The bidder shall have a team highly experienced with the offered system.
  - Bid document price is a nonrefundable 400 US dollar and will be paid when submission the offer by the participant.
  - The bid validity is 90 days from the final submission date.
  - Possibility to split the tender.
  - Discount at source certificate is required.
- *Pricing*
  - The offered prices should be in US dollar.
  - All prices are Excluding VAT.
  - Prices include all charges up to SELCo warehouse.
  - In case of mistakes in summation, the unit price will be considered.
  - Prices include the full technical support for 3 years as mentioned in the technical specifications.
  - The awarded supplier of at least 50% of the tender value shall bear all expenses of four engineers to visit and inspect the meters and system at manufacturer premises including travelling, accommodation and all related cost.

- *Bid submission*
  - The bidder shall submit two copies of the offer (one original and a copy).
  - Each copy shall contain each of the following in separate sealed envelope:

- Financial offer
- Bank guarantee
- Technical offer

- *Bid opening*
  - Sunday September, 01st 2019 12:00 pm is the final date for receiving the offers at SELCo headquarter / purchasing department and in sealed envelops. The offers will be opened in the same date and time.
- *Evaluation*
  - The offers which pass the basic requirements of the tender will move to the next stage of technical and financial evaluation.
  - The technical evaluation will be according to the table mentioned in the tender document.
  - The lowest price will has the highest grade in the financial offer.
  - The total evaluation will be the summation of the technical and financial offer grades.
  - The evaluation criteria will consider the following weights as follows:
    - 30% for the financial offer.
    - 70% for the technical offer as mentioned in the technical specifications.
- *Awarding*
  - The tender awarding will be within 90 days from the final submission date.
  - The tender could be awarded to more than one supplier if the offer is not fully complying with the requirements.
  - The purchaser has the right to ask for implementing a pilot project if it is needed according to offer evaluation. The time for the pilot and quantity will be decided and agreed on with the supplier after evaluation. The supplier will be initially awarded for the pilot project.

- In case of implementing a pilot project, the final letter of award is subjected to the success of the pilot project.

- *Delivery*
  - The delivery period will start from the awarding date.
  - The initially awarded supplier will deliver the goods and system required for implementing the pilot project. in case of pilot project failure, the supplier will bear all the cost of the pilot project.
  - The awarded supplier shall deliver the goods within 90 days and/or as per the submitted and approved delivery schedule. The purchaser has the right to split the delivery to different stages.

- *guarantees*
  - All required bank guarantees shall be issued from local banks.
  - The supplier shall submit a bid bond equivalent to 5% of the bid value valid for 90 days with his offer.
  - The awarded supplier and within 10 days from receiving the awarding letter shall submit a performance bond equivalent to 10% of the tender value valid for 180 days.
  - After delivery, the supplier shall submit a maintenance guarantee equivalent to 5% of the tender value valid for 3 years.
  - Advanced payment bond shall be submitted equivalent to the advanced payment value and not more than 20% of the total awarded value and valid for 6 months before receiving the payment.
- *Warranty*
  - The supplier shall submit a written undertaking to the satisfaction of the purchaser to warranty the goods and system as follows:
    - A written warranty to replace the failed meters valid for a minimum 5 years.

- A written warranty to repair the system or part of it from operation failure valid for a minimum 5 years.

- *Payments*
  - After receiving the final letter of award, the supplier could obtain an advanced payment after submitting an advanced payment bond not exceeding 20% of the awarded value.
  - The payments of the delivered items will be not later than 45 days from receiving the invoice and supporting documents and passing the technical inspection in the purchaser warehouse.
- *Fines*
  - 1% of the delayed item value per week of delay and not more than 10% of the total bid value from the date of the receiving the final letter of award.

- *For further information please do not hesitate to contact the procurement department:*

Eng. Abdelqadir Qaisieh
Purchasing Manager
Tel: 02 2283602/3
Fax: 02 2283601
Email: abed@selco.ps
Website www.selco.ps.

Schedule of Requested Materials

No	Item / Description	QTY	Unit Price ($)	Total($)
1	Smart One Phase Keypad Pre-payment Meter 5(80)A, with (GPRS 3G) modem, STS compliant.	5,000		
2	Smart three Phase Keypad Pre-payment Meter 5 (100) A, with (GPRS 3G) modem , STS compliant.	1,000		
3	Standard one phase Smart Electronic Meters 5(80)A with two-way remote communication capacity. with a build in (PLC/G3) modem.	1,000		
4	Standard three phase Smart Electronic Meters 5(80)A with two-way remote communication capacity. with a build in (PLC/G3) modem.	200		
5	Split keypad ,customer interface unit (CIU).	500		
6	Data concentrator unit (DCU).	20		
7	Vending Stations.	upon request up to 50		
8	Vending Stations software.	1		
9	Token generation tools.	upon request up to 4		
10	System management software (Main application MDM).	1		
11	Database license.	1		
12	API / webservices for integration.	1		
Total Excluding VAT ($)				

TECHNICAL SPECIFICATION OF METERS

1. System Characteristics

The basic characteristics of the systems and equipment shall be as follows:

a) LV smart prepaid single-phase meter:

Smart One Phase Key Pad Pre-payment Meter (Direct Meters). It is a smart Pre-payment meter with pluggable **(GPRS/3G)** communication modem and support adding a (**PLC/3G)** modem. the meter optionally could be used with a CIU (Customer Interface Unit). The meter could be used in switch from Pre-Payment to Post Payment. Nominal operating voltage 230V, 1-phase, 50 Hz, neutral solid earthed.

b) LV smart prepaid three-phase meter:

Three Phase Key Pad Pre-Payment Meter (Direct Meters). It is a smart Pre-payment meter with pluggable (**GPRS/3G)** communication modem and support adding a (**PLC/3G)** modem. the meter optionally could be used with a CIU (Customer Interface Unit). The meter could be used in switch from Pre-Payment to Post Payment. Nominal operating voltage 230/400V, 3-phase, 50 Hz, neutral solid earthed.

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c) LV smart single-phase meter:

It is a smart meter with a build in communication (PLC/G3) modem, also Ready to be operated using **(PLC/3G)** separate customer interface unit (CIU). Nominal operating voltage 230V, 1-phase, 50 Hz, neutral solid earthed.

d) LV smart three-phase meter (direct operated):

It is a smart meter with a build in communication (PLC/G3) modem, also Ready to be operated using **(PLC/3G)** separate customer interface unit (CIU). Nominal operating voltage 230/400V, 3-phase, 50 Hz, neutral solid earthed.

e) Vending station: Vending station with needed licenses, and software.

f) System management software: main system located at SELCO HQ manage all meters and all devices.

g) Technical Support contract (software maintenance).

h) Token generation tool.

i) Database management system license: backend database license (MSSQL, Oracle, …).

2. GENERAL (requirements, specifications)

2.1 GENERAL REQUIREMENTS

2.1.1 Completeness of Contract

2.1.1.1 All apparatus, accessories or fittings which may not have been specifically mentioned, but which are usual or necessary in the respective equipment for the completeness of the supply in an operable status, shall be deemed to be included in the Contract and shall be provided by the Supplier without any extra charge. All equipment shall be complete in all details, whether or not such details are mentioned in the Specifications. This includes fixation details and connection clamps and/or terminals.

2.1.1.2 Any reference in the quantity and price schedules, the delivery period schedule or in the various clauses and schedules of the text of either the Specification or the Bid, to any equipment shall imply that the equipment is complete with all accessories, apparatus and fittings as outlined in sub-clause 3.1.1.1 above.

2.1.1.3 The Bidder shall be responsible for ensuring that the equipment supplied is fit for the purpose intended. Available information on the characteristics of the system to which the goods will be connected and associated will be supplied on request to the Bidder who shall be responsible for obtaining and determining all applicable knowledge relevant to the supply of the goods.

2.1.2 Drawings and Documentation

- **Drawings to be submitted with the Bid**

All equipment:

- Outline Drawings.
- Installation and connection diagrams.
- System overview

Metering devices:

- Secure installation and mechanism thereof

- **Documentation to be submitted with the Bid**

Certification of compliance for metering devices
Meter G3-PLC certificate from **www.G3-PLC.com**
Data Concentrator G3-PLC certificate from**www.G3-PLC.com**

STS certificate for the metering device and the software
MTBF statistics – metering device failures
MTBF statistics – security violations
Sample calibration certificates
Reference list of installed base, including date of installation, quantity and type installed and contact details.
Training schedule for personnel

2.1.3 Time of Delivery and Completion

The guaranteed delivery times shall be stated and the guarantee therein signed by the Bidder.

2.1.4 Quality of Materials

All materials supplied under this Contract shall be new and of the highest quality and of the class most suitable for working under the conditions specified and shall withstand the variations of temperature and atmospheric conditions arising under working conditions without distortion or deterioration in the setting up of undue stresses in any parts and also without affecting the suitability of the various parts of the goods for which they were designed. No toxic material (such as Halon, PCB, and Asbestos) shall be utilized.

2.1.5 Manufacturer's Supplier's Quality Assurance Procedures

The Bidder's Manufacturer shall have established a quality assurance system based on ISO 9001 or 9002. The Supplier shall include a documentation of the system with a list of current procedures, an organogram of the quality organization and the name of the quality manager. He shall also submit a list of quality revisions performed during the last twelve months with a list of closed and unclosed findings as well-planned revisions during the coming twelve months.

The Supplier shall submit for approval a programmer of quality control and inspection procedures to assure that the product during manufacture and on completion complies with the specified requirements. The program shall relate the quality control and inspection activities to the production cycle. In support of the quality control and inspection program the Supplier shall provide details of quality control and inspection procedures available for use in the execution of the Contract. The Supplier shall retain responsibility for quality control and inspection activities made by his sub-Suppliers and shall indicate on the program, which items are to be sub-contracted.

2.1.6 Guarantees and Particulars

The Goods shall comply with the technical guarantee data stated in the Bid. The Supplier shall be responsible for any discrepancies, errors and omissions in the particulars and guarantees, whether the Purchaser has approved such particulars and guarantees or not.

2.1.7 List of installed base

The Supplier shall provide a list including quantities, date of installation and contact details of previous installations for each type of meter as reference sites.

2.1.8 MTBF – Mean Time Before Failure

The Supplier shall provide, per item, a statistical analysis of failure rates and the reasons for these failures.

2.1.9 SLT – Statistical Life Time Testing

The Supplier shall provide, per item, a Statistical Life Time (SLT) Test Report according to Siemens Norm SN29500 or equivalent.

2.1.10 Places of Manufacture and Sub-Suppliers

The manufacturer's identity and places of manufacture, testing and inspection before shipment for the various portions of the Contracted goods shall be specified in the Technical Schedules and goods shall not be departed from without the agreement of the Purchaser.
All Sub-Suppliers and Sub-suppliers of components and materials shall be subject to the approval of the Purchaser. Information shall be given on each Sub-order sufficient to identify the material or equipment, to which the sub-order relates, stating that the material is subject to inspection by the Purchaser before dispatch.
All equipment offered shall be the product of recognized and experienced manufacturers and shall be proven equipment of the same offered products to that which has been in successful continuous operation for at least two years preferably under similar climatic conditions and total installed meters shall not be less than **100,000 meters in** different utilities outside the country of manufacturer. Proven plant reliability and high availability are of prime importance and the attention of the Bidder is drawn to these particular requirements.

2.1.11 Inspection and Testing

The Supplier shall give access and necessary facilities for Four (4) Purchaser's engineers and/or his assigned representatives to attend and witness the tests of major equipment at manufacturer's factory, according to the applicable IEC Standards, or as specifically specified with enough time to carry out tests (excluding travelling days). The supplier has the right to extend the factory acceptance testing period, in case of need, to test all equipment. All costs related to the travelling (air tickets and transportations), residence, and meals, pocket money and any other expenses are deemed included.
All materials used in the Contract may be to inspection by the Purchaser and it is the Supplier's responsibility to advise the purchaser when equipment and materials are available for inspection, at least 1 month in advance.
Routine tests shall be made on each unit of all equipment.
Type tests shall be made on one unit of each type of different equipment.
The Purchaser shall be at liberty to demand any additional testing at the manufacturer's place, at site or elsewhere in order to verify that the equipment complies with the conditions of the Specifications.
A test program shall be submitted to the Purchaser for approval at least 1 month ahead of the commencement of testing.
Measuring apparatus shall be approved by the Purchaser and if required shall be calibrated at the expense of the Supplier at an approved laboratory.
Bidders are required to submit the type tests of the meters offered, carried out by a reputable independent testing agency (such as SGS, Bureau Veritas, CESI, or any other reputed agency).

Employer would inspect a representative sample of meters at the manufacturer's factory prior to shipment, using international standards for the definition of the size of the sample. In case the meters in the sample fail to pass the factory tests, the whole quantity of meters will be rejected. Shipment of the lot to final destination will be authorized only after acceptance of factory tests.

2.1.12 Packing, Transportation and Storage

Packing shall give adequate protection to the enclosed materials against mechanical damage during transport to its final destination, including rough handling during sea, rail and road transport and transition from one mode of transport to another.

Packing should be stout close-boarded wooden cases of adequate thickness, suitably braced and banded and lined internally with water-resistant material or equally solid enclosures.

Steelworks sections and similar items may be bundled provided that the ends are adequately protected and the enclosing bands or wires are robust.

Indoor electrical equipment must be enclosed in welded polythene envelopes inside packing cases and the envelopes shall be evacuated or have a desiccant inside.
All items in cases or crates shall be secured so that they are not free to move and cannot work loose in transport. If rotating parts are shipped within their bearings or mountings, they must be adequately braced and restrained to prevent relative movement. Loose items shall be placed in bags in a case, each bag having stitched onto it a label indicating the number and nature of its contents. Where a filler material is used in a case to restrict movement or provide additional protection, it must be inorganic and non-hygroscopic.
All surfaces liable to corrosion shall be thoroughly cleaned and special steps adapted to the nature of the materials and the time interval between packing and unpacking shall be taken to prevent corrosion. These steps may constitute the greasing on surfaces, the application of a protective coat, enclosure of the items in a hermetically sealed container, the addition of vapour phase inhibitor paper to the package or other approved means.
Steps shall be taken to ensure that moisture, moulds, insects or rodents cannot damage insulated materials. Items that include materials liable to be damaged by moisture shall be packed in hermetically sealed containers in which silica gel, or some other approved desiccant has been inserted.
Cases shall be marked with large lettering to show which side of the case is to be up, and if the contents are fragile, marked "FRAGILE" in large letters with the international wineglass symbol. Packages shall be marked with their place of destination in such a way that rough handling or the effect of weather cannot remove or obliterate the marking. Each item shall be marked with its gross weight and, for all lifts over two tonnes, marks on the cases shall show the correct positions for the slings.
Special steps shall be taken to guard against theft during transport. No small items such as padlocks nameplates and so forth that could be torn off or unscrewed shall be accessible.
Cases, crates, barrels and drums shall be banded in such a manner as to obstruct the theft of any of the timber used for packaging and the bands shall be so secured that they are not rendered ineffective by shrinkage of the wood.
A descriptive and fully itemized list shall be prepared of the contents of each packing case. A copy of this list shall be placed in a waterproof envelope under a metal or other suitable plate securely fastened to the outside of one end of the case, and its position indicated by stenciling on the case. Where

appropriate, drawings showing the erection markings of the items concerned shall be placed inside the case.
All stencilled markings on cases and crates, or other markings on descriptive metal tabs fixed to cable drums, bundles of structural steel works and so forth, shall be applied in two places with a material which cannot wash off and shall be additional to any erection or other marks or impressions which may be specified elsewhere.
Shipping marks are to be stencilled in oil-based paint in block letters and symbols. When unobstructed flat smooth surfaces of sufficient size are not available on the case for the shipping marks they are to be stencilled on marine-ply notice boards of adequate size and of at least 6 mm thickness securely fastened to the packing case.
All packing cases, though not steel containers, shall remain the property of the Purchaser.

2.1.13 Tools

The Supplier shall supply in lockable boxes, for the Purchaser's use, any special tools that may be required for assembly, dismantling and adjustments to the equipment. The tools shall be unused and in new condition at the time of hand over. Suitable special spanners shall be provided for bolts and nuts, which are not properly accessible by means of an ordinary spanner.

2.1.14 Spare Parts

Particulars of spare parts, which may or not form part of the Contract at the Purchaser's discretion, shall be agreed. Bidders giving their recommendations should complete the relevant schedules and prices for spares that they believe should be purchased by the Purchaser.

2.1.15 Testing

Notwithstanding that the metering devices are manufactured to an approved International Standard all metering devices, accessories and materials shall be subjected to and withstand satisfactorily the test requirements detailed in this specification subject to any exceptions stated therein. All materials shall withstand such routine tests as are customary in the manufacture of the metering equipment and accessories included in the Contract.

2.1.16 Accessories, Connectors and Special Tools

A complete list of accessories, connectors and special tools required for the installation of the metering device and related equipment together with relevant drawings shall be submitted.

2.2 GENERAL TECHNICAL SPECIFICATION

2.2.1 General

This Chapter covers the general technical specifications of the equipment to be procured under the Contract.
The design shall incorporate every reasonable precaution and provision for the safety of the general public as well as for all those engaged in the operation and maintenance of the Contract Equipment and of associated services supplied under the Contract.
The bidders shall pay attention to ALL the general and particular specifications, especially but not limited to the tariff specifications, contactor specifications, the Communication – Meter and Customer Interface Unit, Meter and DCU, DCU and servers – specifications and testing requirements.
The bidder shall submit documentary evidence for his compliance with each of the required general and particular specifications and MUST indicate in the technical compliance sheet the page number in the bidder offer documents where status of compliance can be verified.

2.2.2 Drawings

The Bidder shall in his Bid enclose overall drawings showing; dimensions, main working principles, internal components and fixing methods to a detail level allowing the Purchaser to evaluate the functionality and completeness of the equipment.

2.2.3 Standards

Ratings, characteristics, tests and test procedures, etc. for the equipment encompassed by this specification shall comply with the relevant provisions and requirements of the Recommendations of the International Electro-Technical Commission (IEC), unless otherwise expressly stated in Particular Technical Specifications. This applies even where the specific standards are not referred to in the Particular Specifications. Where the IEC Recommendations do not fully cover all provisions and requirements for the design, construction, testing, etc. and for equipment and components that are not covered by IEC and BS Recommendations recognized national standards shall be applied. The rules of CEE (International Commission for the approval of electrical equipment) and the standards of CENELEC (Committee European de Normalization Electro technique) may also be applied.
The latest revision or edition in effect at the time of Bid Invitation shall apply. Where references are given to numbers in the old numbering system from IEC it shall be taken as to be the equivalent number in the new five-digit number series.
The Precise Standard, complete with identification number, to which the various equipment and materials are manufactured shall be specifically stated by the Bidder.
In case of conflict or disagreement between the particulars of the Standard adopted by the Bidder and the particulars of this Specification, this Specification shall prevail over the Standard. All conflicts or disagreements, mentioned above, must be clearly stated, failing which the materials and equipment offered shall be deemed to comply in every respect with this Specification both in manufacture and in performance, and compliance thereof be insisted upon without additional cost to the Purchaser.

2.2.4 Units

The SI-system (meter, Newton, second) shall be used throughout the goods covered by this Specification.

2.2.5 Definitions

Whenever the following terms or words are found in the specifications and/or other documents, they shall have the following meaning:

"Vending Station":
A payment station allowing for the payment of electricity, where consumers can interact with the supply authority to make payment and submit their token for examination and recharge.

"Token":
A token is an STS (Standard Transfer Specification) compliant 20-digit number issued upon purchase that will release the specified amount of electricity (in Kwh) on the STS Smart Prepaid Meter.

"**Keypad**":
Customer interface unit (CIU).

"**HHU**":
Hand Held Unit

"Metering device":
An electronic device able to meter electrical energy, provided with a user interface and internal algorithms and hardware providing intelligence to comply with the feature set required in the bid. Reference to degree of protection (IP) is according to the classification in IEC 60529.

"Data Concentrator Unit (DCU)"
For collecting data from meters and connecting meters with system and vice versa.

"STS"
Standard **T**ransfer **S**pecification, which defines the standard token coding
Method and format.

"Meter ID Card"
A plastic meter ID card is the card supplied (with every electricity meter) to a Customer. The card contains the customer's specific information, such as
Tariff Index and the Meter Serial Number. Customer information may however be given verbally. An authorized Operator can produce Meter ID Cards.

"Vending Unit"
Also known as the Credit Dispensing Unit (CDU) or Validator. The Vending
Unit issues tokens and provides for first line administrative and financial
Control. The Vending Unit is situated in a place convenient to the customer and is operated by the supply authority or its agent.

"DLMS (Device Language Message Specification) Protocol"

- An object model, to view the functionality of the meter, as it is seen at its interface(s)
- An identification system for all metering data

- A messaging method to communicate with the model and to turn the data to a series of bytes
- A transporting method to carry the information between the metering equipment and the data collection system

"AMM"
Advanced Meter Management software.

2.2.6 Phase Relationship

The standard phase colors are: Red (L1), Yellow (L2), Blue (L3) (RYB).

2.2.7 Environmental Conditions

Unless otherwise specifically stated in Particular Technical Specification, any equipment, component and assembly shall be designed for the following service conditions:

Description	Unit	Value
1. Altitude of site above sea level	m	-300 to + 1000
2. Ambient Temps: - Maximum Minimum	 °C °C	 70 - 20
3. Relative Humidity Maximum Minimum	 % %	 90 <10

2.2.8 Materials

2.2.8.1 Standardization of Equipment

The Supplier shall be responsible for the standardization of all mechanical and electrical equipment, materials and devices.

2.2.8.2 Sealing and securing devices

Facilities for applying safety or security seals to metering devices, enclosures related to the metering system etc. shall be provided. The facilities shall be suitable for seals made up of multi strand steel wire with a circular lead seal, allowing the seal to be crimped using security sealing pliers. The provision of wires and seals is not required.

2.2.8.3 Electrical Equipment Materials

All material delivered shall be of the highest quality and of the class most suitable for working under the conditions specified and shall withstand the variations of temperature and atmospheric conditions arising under specified conditions without distortion or deterioration or the setting up of undue stresses in any part and also without affecting the strength and suitability of the various parts for the work which they have to perform. No welding, filling or plugging of defective parts will be permitted without the sanction in writing of the Purchaser.

Materials that are susceptible to mould growth under tropical conditions shall be treated to exclude moisture and prevent growth of mould after all machining has been carried out.
All apparatus, connections and cabling shall be designed and arranged to minimize the risk of fire and any damage that might be caused in the event of fire. All plastic material used in boxes, panels and boards shall be self-extinguishable.

2.2.8.4 Bolts, Studs, Nuts, Screws, Washers, etc.

All bolts, studs, nuts, etc. shall have a standard metric threading and conform to the relevant standards as regards shape and tolerance.
Bolts, etc., smaller that 10mm diameter shall be electrolytic zinc-coated if not provided in stainless steel or other corrosion-resistant material.

Bolts, nuts, studs and screws that require frequent tightening and unbolting during inspection or maintenance procedures shall be of stainless steel, electrolytic zinc-coated or similar hard coating material.
The Supplier shall supply the net quantities plus 5% of all permanent bolts, screws and other similar items and materials required for installation of the goods at the site. Any such rivets, bolts, screws, etc., which are surplus after the installation of the equipment has been completed shall become spare parts and shall be wrapped, marked and handed over to the Purchaser.

2.2.8.5 Nameplates and signs

All equipment shall be clearly and permanently labelled in English, specifically marked according to the relevant IEC standard, to the approval of the Purchaser. The metering equipment will also be marked clearly indicating the connection diagram to the network. Where labels are provided for making clear the method of operation of equipment they shall be concise and preferably diagrammatic in form.
All meters and equipment for this project will be marked via print or label with the reference to the project code. The code must be visible once the equipment has been installed. The code (label or print) must be marked on the equipment in such a manner that it is not possible to remove without destroying the equipment seal. Details of this codification will be provided during the contract negotiations.
Before production of labels and notices the Supplier shall submit to the Purchaser full scale drawing of the proposed labels

2.2.8.6 Contactor

The relay inside the meter, used to disconnect the load, shall confirm to the following minimum standards:

- Maximum switching power: 20kVA.
- Insulation: 4kV.
- The relay's life time is not less than the meter life or 100,000 times (ON/OFF).
- Single phase contactor to be rated at 80A maximum operating current.
- Three phase contactor to be rated at 100A maximum operating current.
- Three phase contactor to be rated at AC3 category.
- The contactor shall be of a single-pole type ensuring that LIVE is switched for single phase only.
- For 3 phase meters the relay shall switch all three phases in unison, that is, it shall not be mechanically possible to switch individual phases separately.

2.2.8.7 Sealing

All equipment shall be sealed with steel wire and seals that ensure evidence of tampering should this be attempted. The seals will have a unique identifier indicating the crimping tool used. These crimping tools must be traceable and recorded. These records must be available for inspection.

2.2.8.8 Traceability

All equipment shall be traceable to their origin, where calibration of the device is required, the traceability shall extend to the meteorological standard, which shall bear a valid certificate of calibration from a recognized standards authority. The equipment shall be identified with a unique serial number that cannot be altered. It is suggested that the equipment, if electromechanical have a permanent serial number imprinted on the main body. In the case of electronic equipment, the serial number will form part of the main processor identification and must be readable via the display and any communications port available; this number may not be allowed to be altered. The Serial number may be indicated by an appropriate sticker on the face plate of the equipment.

2.2.9 keypad (CIU)

The keypad should be of robust construction and function correctly over the life time of the meter. The supplier should provide the relevant documentation for this equipment.

2.2.10 Lifetime

The equipment shall be certified for a minimum of a 10-year life cycle.
To ensure that this specification is satisfied the supplier shall submit a certified SLT-Statistical Lifetime Test.
In addition, the Purchaser will request the Supplier who will be awarded the contract to submit a certified ALT (Accelerated Lifetime Test) and IEC test reports one for each contract phase using an international recognized and accredited test facility.

2.2.11 Design and Construction

The Contract Supplies shall be designed to facilitate inspection, cleaning and repairs and for operation, in which continuity of service is the first consideration. All apparatus shall be designed to ensure reliable and safe operation under the atmospheric conditions prevailing at the Site and under such sudden variations of load and voltage as may be met with under working conditions of the system, and short circuits, including those due to faulty synchronizing, within the rating of the apparatus. The general operating conditions are given in this specification.
In no part of the equipment, including bus bars, connection, isolators, fuses, contacts and cable boxes shall the temperature rise exceed the values specified in the relevant IEC or equivalent Standards.
Corresponding parts liable to renewal shall be interchangeable. When required by the Purchaser, the Supplier shall demonstrate this quality. All apparatus shall operate without undue vibration and with the least practicable amount of noise.
All apparatus shall be designed to exclude vermin and insects from entering the equipment.

2.2.12 Meter Certification

All meters are required to have a traceable calibration certificate, this is to be provided with the metering device and made available to the user on request in soft copy. In addition, the bidder should submit an official certificate that the proposed meter is supporting the STS protocol.

3. PARTICULAR TECHNICAL SPECIFICATIONS

This Section covers the particular technical requirements of the single and three phase smart prepaid metering system and equipment to be procured under this contract. By conflict between the general specification and the particular specifications below the particular specifications prevail.

3.1 Smart Prepaid Metering System

○ Smart Prepaid metering system overview

The smart prepayment system will be used by the Purchaser in various vending stations, it is therefore required that the smart prepayment system shall be uniquely coded via a database code or identifier linked to the meters. So that meters and token from this region cannot be used in another region.

The smart prepayment environment will be made up of the following equipment and components:

- The metering device, this includes the user interface (build in keypad) for the loading of credit and other data. The metering device must be securely mounted to prevent tamper. the meter could be used with a CIU (Customer Interface Unit)
- Data servers for application and database.
- Automatic Meter Management Software (AMM/HES): The application software with the capacity to collect automatically the meter information from metering device using the communication network.
- The vending and main systems (like MDM system), specifically the hardware and software.
- Flexible and user defined reports from the software to allow reporting on all aspects of the system and the consumer consumption and spend. Trend analysis must form part of the reporting options.
- Integration interface allowing integration with 3rd party and online services.

3.1.1 STS Smart Prepaid meters

3.1.1.1 Standards

The provided solution (systems and meter) must conform to the applicable standards for this type of equipment. These standards are:

- **BS EN61036**: 1996: Alternating current static watt-hour meters for active energy (Classes 1 & 2.).
- **BS5685: 1979: Part 1**: Specification class 0.5, 1 and 2 single-phase and Polyphase, single rate and multi-rate watt-hour meters.
- **Meter G3-PLC certificate from** www.G3-PLC.com
- **Data Concentrator G3-PLC certificate from** www.G3-PLC.com
- **IEC 62056 a**t least 62056-21:2002: Electricity metering - Data exchange for meter reading, tariff and load control - Part 21: Direct local data exchange. Also IEC 62056-42, IEC 62056-46,IEC 62056-47,IEC 62056-53,IEC 62056-61,IEC 62056-62 if applicable.
- **IEC 62055-41**: Electricity Metering-Payment systems. Part 41: Standard transfer specification (STS)-Physical layer protocol for one-way numeric token carrier systems.

- **IEC 62055-31**: Electricity Metering-Payment systems. Part 31: Particulars requirements for static payment meters for active energy (classes 1 & 2.)
- **IEC 62055-51**: Electricity Metering-Payment systems. Part 51: Standard transfer specification (STS)-Physical layer protocol for one-way numeric and magnetic card token carrier systems.
- **IEC 62055-51**: sets out a framework for the integration of standards into a system specification for electricity payment metering systems.
- **IEC 62056**: Electricity metering - Data exchange for meter reading, tariff and load control.
- **IEC 62052-11:2003** : Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment
- **IEC 62053-21:2003**: Electricity metering equipment (a.c.) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)
- The meters should support DLMS/COSEM protocol.
- **IEC 61968-1**:(Interface architecture and general requirements) standard (information exchanges between electrical distribution systems).
- **ISO 9000/9001 if applicable.**
- **ISO14001:2015 if applicable.**

Where these standards have been updated by newer versions the most recent version will apply. The supplier must provide standards pertinent to the equipment. Included in these must be the security standards for the token device and the transfer mechanism. The standards must refer to the security standards applied, specifically including the token device, the transfer mechanism and for all interactions between the token and its environment.

The security of the system is highly recommended with all the requirements to achieve this issue. And each bidder shall provide the security measures/ procedures in the specification table below.

The British Standard specific to the enclosure and form factor will apply. Where the meter security and anti-tamper measures cause a deviation from these standards, the supplier shall note these deviations.

The measurement standard will be for class 1 metering devices, active energy and class 2 metering devices, reactive energy.

Meter types will be:

- Single phase meter, build in keypad on the meter, where the measurements and contactor – used to disconnect the line and neutral from the load, the meter must have a pluggable (GPRS/3G modem) as default, built in optical interface.
- Three Phase meter, build in keypad on the meter, where the measurements and contactor – used to disconnect the line and neutral from the load, the meter must have a pluggable (GPRS/3G modem) as default, built in optical interface.

3.1.1.2 Operational Requirements

3.1.1.2.1 Measurement and technical requirement

- **Single Phase Prepaid Meter**

1) 5 (80) Amp prepayment meter.
2) Rated voltage: 230 v ± 30 %
3) Operating frequency 50 HZ
4) The meter must measure active energy Accuracy IEC 62052 -11 class 1.0 at least.
5) Configured passing ampere.
6) Has a communication port to configure and read data from the meter according to IEC 61107.
7) Can work from -25 Cº to 80 Cº
8) Calculation inside meter with respect to kWh
9) Has three LEDs, one for meter status (relay status) , Another led for alarms, and the third one for output pulse (consumption).
10) Meter has the ability to store historical data for 12 months.
11) By basing current and reverse current indication.
12) Thermal shutting down protection.
13) Programmable current & power threshold.
14) The meters shall have terminal with bottom entry for cable and the arrangement shall be:
    i. L: N: N:L (live in, neutral in, neutral out, live out)
15) Provision to preset the meter to run without connect the meter with a customer on the customer management system by giving a charge to the meter and close the relay, the relay must open when this charge finished . SELCO team must have the capability to define the amount of the preset charge.
16) Provision to reset the meter, the meter must return to the Factory settings and shall be ready to reuse .
17) Single phase contactor to be rated at 80A maximum operating current
18) The contactor shall be of a single-pole type ensuring that LIVE is switched for single phase only.
19) The meter housing must be of base type
20) **the meter could be equipped to be operated using customer interface unit (CIU) with (PLC/G3, DC wire connection)**

- **Three Phase Prepaid Meter**

1) 5 (100) Amp prepayment meter.
2) Rated voltage: 230/400 v ± 30 %.
3) 3 phase 4 wire.

4) Operating frequency 50 HZ.
5) Accuracy IEC 62052 -11 class 1.0 at least.
6) Configured passing ampere.
7) Has a communication port to configure and read data from the meter according to IEC 61107.
8) Can work from -25 Cº to 80 Cº.
9) Calculation inside meter with respect to KWH.
10) Capability to measure and register KWH , KVARH.
11) Dual pulse output – dual Auxiliary relays.
12) Has three LEDs, one for meter status (relay status) , Another led for alarms, and the third one for output pulse (consumption).
13) Meter has the ability to store historical data for 12 months.
14) By basing current and reverse current indication.
15) Thermal shutting down protection.
16) Programmable for under / over voltage trip.
17) Programmable current & power threshold.
18) Self-energized from the source i.e. without auxiliary batteries
19) Capability to measure and display:
    a. three phase voltages (phase – neutral), (phase – phase) .
    b. three phase currents (IL1 , IL2 , IL3).
    c. power factor.
20) The meters shall have terminal with bottom entry for cable and the arrangement shall be:
    L1L1:L2L2: L3L3: NN .
21) Measure and register KWH consumed on neutral line.
22) Provision to preset the meter to run without connect the meter with a customer on the customer management system by giving a charge to the meter and close the relay, the relay must open when this charge finished.
    SELCO team must have the capability to define the amount of the preset charge.
23) Provision to reset the meter, the meter must return to the Factory settings and shall be ready to reuse.
24) Three phase contactor to be rated at 100A maximum operating current.
25) Three phase contactor to be rated at AC3 category.
26) In case of phase failure for three phase meter, the contactor must switch to the open position.
27) For 3 phase meters the relay shall switch all three phases in unison, that is, it shall not be mechanically possible to switch individual phases separately.
28) The meter housing must be of base type.
29) the meter <u>could</u> be equipped to be operated using customer interface unit (CIU) with (PLC/G3, DC wire connection)

3.1.1.2.2Real Time Clock

The metering device must have a real time clock providing an accuracy of better than 0.5-second drift per day.

3.1.1.2.3 Data storage

The metering device must be able to store all program parameters and metering data on a non-volatile memory for at least 12 years in case of any power failure. The non-volatile memory shall be transferable to a new meter in case of malfunction of the current meter in use (meter black box).

3.1.1.2.4 Reverse Energy

The meter must provide an anti-tamper indication on the display. The meter must also be able to be programmed to add both the forward and reverse energy to a single energy register. This energy register must be available on the display.

3.1.1.2.5 Credit display in Kwh

The meter must be able to display the remaining credit in (kWh).

3.1.1.2.6 Low Credit Alarm

Once the available credit falls below a programmed level a visual and audible alarm must be triggered. The audible alarm should preferably be programmable by the utility regarding the duration once triggered and interval, until the condition is remedied.

3.1.1.2.7 Tariff

The meter shall have the capability to calculate the consumption with kWh energy values only.

The meter must support multi –tariff mechanism, such as flat rate tariff, Time of Use (TOU)… etc

3.1.1.2.8 Current Limit

The meter must allow for current limiting to be programmed by the utility. The current limit function shall be activated with a 40 - 60 seconds delay after the current limit event occurred.

3.1.1.2.9 User interface

- Push button or similar interface allowing the consumer to:
  - Scroll through the displays.
  - Setting the relay back on in order to use the remaining credit.
- Optical interface allowing interaction with the meter and a hand held unit or similar device. The optical interface will conform to IEC61107 and allow all functions of the meter to be extracted programmed and set taking into consideration the security for each local council.
- Display – for split meter equipment.

- All features listed above (3.3.1.2.2.4. to 3.3.1.2.2.8) must be available on the display in a user-friendly manner. Display sequences, parameter list and the display time should preferably be user programmable.
  - Digits: Minimum – 8, Minimum height – 4.5 mm.
  - Backlit (optional).
  - Active Rate indication.
  - Token activity: Insertion, Error insertion, Successful insertion, credit transferred
  - Error and Fault conditions.
  - The display must function| during a power outage, that is, the display must be internally powered so that it functions when there is no external power supplied to the meter.
- Audible device: The audible device must indicate various states important to the user; these include, but are not limited to the conditions listed below. The audible alarm should preferably be programmable regarding the duration once triggered and interval, until the condition is remedied.
  - Emergency credit.
  - Load limiting condition.
  - Token activity.
  -
- The contractor shall provide parametrization / customization sheet in order to define the preset values and settings for meter manufacturing.

3.1.1.2.10 Contactor

The contactor will provide the function to connect and disconnect the load. The contactor will be of a single pole type for single phase. The contactor will be triggered on the following conditions:

- Zero credit reached.
- In the case of the meter malfunctioning the contactor must switch to the open position.
- In case of over and under voltage (should preferably be programmable by the user), the contactor must switch to the open position.
- Tamper condition to be monitored when no power connected to meter, or unauthorized people open the terminal cover, case cover, modem cover. Remotely will be reconnected by HHU or from server.
- In case of phase failure for three phase meter, the contactor must switch to the open position if the meter programmed to disconnect when a phase failure exists.

3.1.1.2.11 Battery Alarm /SUPER CAP

The meter and DCU shall have an alarm showing that the battery is low or damaged.

Minimum shelf life time of battery / super cap. shall be not less than 3 years.
Minimum life time of battery/ Super Cap. shall be the same as the life time of the meter and DCU.
the CIU battery should be pluggable in order to change dysfunctional batteries easily.

3.1.1.2.12 Self Diagnostic (Testing Procedure)

The meter shall have self (diagnostic) testing procedure and the bidder shall submit explanation of this procedure.

3.1.1.3 Meter Housing

The housing should comply with BS5685. Consideration will be given should other standards apply specifically to accommodate the anti-tamper and secure installation of the metering device. The meter dimensions must not exceed those provided for a single-phase and three-phase whole current meter within the standard. The user may decide to install the metering device inside an enclosure; provision must therefore exist for the supplier to cooperate with the user to assist in the design/assembly mechanism for such a fitment.

One of the most prevalent tamper methods includes the piercing of the incoming conductor. Using an extended terminal cover, thereby ensuring that no conductor is visible, can prevent this. The terminal cover should therefore also be fitted with securing seals and an anti-tamper switch. Other alternatives include rear entry of the conductors into the metering device. The supplier must describe the method of ensuring or reducing the ability to tamper with the metering device.

3.1.1.4 Critical Performance Parameters

- The offered smart prepayment system complies with all the required specifications and functions.
- The software and database shall have no limitation on the number of named users and workstations it can accommodate.
- A standard vending operation shall be less than 15 seconds from request to completion token printing or programming.
- Thin client architecture shall require less than 32kb/sec to be functional over LAN/WAN.

3.1.1.5 Optional Features

-Maximum Demand

The meter should be able to calculate the Maximum Demand in kW, for a programmable set of interval periods ranging from 5 minutes to 60 minutes. The date and time of the Maximum Demand occurrence should also be stored. The maximum demand should be reset automatically once a month – on the first day of the month. The previous maximum demand should be stored in a cumulative Maximum Demand register.

3.1.1.6 Load Management

The meter should provide a facility for load management. The contactor should be switched under the following conditions:

- Programmed Load limit exceeded.

3.1.1.7 Token

The token is a data transfer mechanism; it transfers setup parameters and credit in kWh to the metering device. The same type of tokens must be used for all type of smart prepayment meters. See section 3.3.1.4 for more details.

3.1.1.8 Security

The environment may be hostile and special consideration must be given to the security employed. Preference will be given to suppliers that can show exceptional secure designs and implementation. This should include standards applied, tests completed, installed base versus number of security violations, especially with regards to the token. An overview of the system integrity and details of the security employed, not only within the token but also to the entire environment must be supplied.

The security of the system must be shown to be of a high standard between the various components that is the communications link between the meter and the customer interface unit. See section 3.3.1.4 for more details.

3.1.1.9 Additional Features

The functions required are detailed below; the supplier should present any additional features.

3.1.1.10 Data Transfer

The data must be transferred from meter to server and vice versa.

3.1.1.11 Data transfer from server to metering device

- Purchased Credit – This must be in energy units (KWh). The supplier is to detail the method employed.
- Program parameters – This will consist of switching tables, load management switching parameters (if available). These parameters should be transferred automatically without operator intervention.

3.1.1.12 Vending Station

The supplier shall detail the features of the vending station functionality and the ability of the vending station to interface to a third party billing system, using a SQL database. The ability to interface to third party applications is an imperative. The supplier must detail the resources available to assist in the integration. See section 4 for more details.

3.1.1.12.1 Vending Mobile

The provided solution should include vending mobile application, either using a special application or through SELCO mobile application.

3.1.1.12.2 Smart management software

This section covers needed functions to be ready at smart meter management systems to be supplied by supplier, related to smart meter. A provide reference list where your MDM is installed, show please the contract value in $, number of metering points, customer name and full contacts.
provide available certificates and recommendation letters.
provide demo copy of the software or at least remote access for testing.

3.1.1.13 Hand Held Unit

The system must support the use of robust hand held units, preferably not laptops, to program and interrogate the metering devices in the field. The handheld unit must be able to perform the same

functionality as the software provided that is used for metering device taking into consideration the security where the hand held unit is only used for SELCO.

3.2 Standard Smart Metering System

3.2.1 System overview and characteristics

- **system overview**

This specification covers the functional and technical requirements for one phase and three phase Smart meters.
The technical features of the meter shall be in conformity with international standards IEC and local regulations and with quality and performance requirements set by this document.
The meter must have the capacity to be utilized in a pre-paid or post-paid (Switchable Meter) function as part of an end to end AMI smart metering solution. All direct meter will have integrated a switch for the remote connect/disconnect function. The meter should be ready to operate using a remote Customer Interface Unit (CIU) to be installed inside customer premise.

- **system characteristics**

- **Smart Electronic Meters** with two-way remote communication capacity**.** with a build in (PLC/G3) modems.
- **CIU: customer** interface unit with a build in keypad operated using (PLC/G3) technology.
- **Data concentrator unit (DCU) :** Data Concentrator , 3ph multifunction meter to read the transformer total consumption**,** collected data from the meters and transfer it to (HES) and vice versa.
- **Automatic Meter Reading Software (AMR/HES):** The application software with the capacity to collect automatically the meter information from metering device using the communication network.
- **Meter Data Management Software (MDM):** The application software will help to metering data administration and to fight with the commercial energy losses. This software has the following main functions:
    - Loading the metering data from any reading system using different technologies.
    - Validation, Edition and Estimation (VEE) of Metering Data.
    - Providing data to the Billing system.
    - Abnormally consumption of energy detection.
    - Billing simulator.
    - Interface capacity using a standard open Protocol.
- **Communication** based on (PLC/3G) between the meters and concentrator, and based on (GPRS/G3)/Ethernet (LAN/WAN communication) between concentrator and (HES).

The new system is expected to have a useful productive life of at least 10 years, and must be designed and configured to support the future growth and expansion requirements of the organization in terms of both size and functional parameters. It is required that the new system must also be able to accommodate future technology enhancements that have the potential to increase operational effectiveness and ease implementation of new features, functions, and applications.

3.2.2 Standard AMI Infrastructure

The supplier will be responsible to following components of the AMI SYSTEM:

- Multifunctional Electronic meters (Smart Meter).
- Communication Network Component (CNC).
- Head End Software or Automatic Meter Reading Software(AMR) .
- Meter Data Management Software (MDM).
- Implementation and Integration Services (API and web services).

AMR/HES and MDM could be a solution integrated in only one application software package or can be a modular solution integrated with different application software package.

3.2.3 General specifications of the system

The required AMI System infrastructure is to be implemented that will be responsible for the metering of the energy consumption, remote data acquisition and recording and analysis of the data.

- AMI systems must interface with existing utility systems, including legacy CIS/Billing applications.
- AMI systems must peacefully coexist with multiple meter data collection technologies with diverse reading requirements.
- AMI systems produce high volumes of data for both Billing and analytic purposes.
- AMI systems require interfaces so that existing systems may participate in two-way communications with smart meters.

3.2.4 Meter Characteristics

The basic characteristics of the equipment shall be as follows:

- Nominal operating voltage 230V, 1-phase and 400V 3-phases, 50 Hz, neutral solid earthed
- Which is equipped with a build in (PLC-G3) modem.
- The meter could be base type or din rail type.

The meters will be used as part of AMI infrastructure and must support smart metering functionality like:

- Two Way (Bidirectional) Communication.
- Real Time synchronization clock from Central System.

- Remote Meter Data Collection.
- Remote Firmware update.
- Event and Alarm Notification.

Additionally, the direct meters must have:

- **Remote change of operation method (Prepayment or Post-payment)**
- **Load Limit remote programing.**
- **Remote connect/disconnect function.**

3.2.5 Applicable Standards

The international community has already defined most of the standards required for accuracy measurement, tariff, security and load control features, as well as data exchange for meter reading and pre-paid meter operations.

Section 11 (Standards and certificate) below has the list of standards to be meet by the meters.

3.2.6 Meter Certification

All meters are required to have a traceable calibration certificate, this is to be provided with the metering device and made available to the user on request in soft copy.

The Meter certification must come from an international certification laboratory.

Section 11 (Standards and certificate) below has the list of standards to be meet by the meters.

3.2.7 Functional Requirements

Capacities of the one-phase and three-phase smart meters shall comply with the following functionalities:

3.2.7.1 Operational Conditions

- The equipment to be delivered under this Contract must be warranted to function correctly without degradation of the guaranteed life time under the following network conditions:
  - The total harmonics up to 15%.
  - Surge withstand and electromagnetic interference; as per IEC specifications.
  - The Meters must sustain under-load of 10A per phase, with the phase to neutral over-voltage (420V) for 48 hours.

3..2.7.2Measurement

- The meter shall measure and register active and reactive energy in two directions forward and reverse energy measurements (4-quadrant).
  - WH: delivered, received, net, unidirectional (Default).
  - VARh: delivered, received, net delivered, net received, unidirectional.
  - VAh: vectoral and arithmetic, delivered, received and lagging.
  - Ah: per phase and neutral.
  - Vh: per phase and average.

- The meter default factory method for energy value (KWh, KVARh) is unidirectional (sum of forward + reverse energy flow).

- Instantaneous Valuesfor :
  - Voltage (Phase A/B/C).
  - Current (Phase A/B/C).
  - Total active power.
  - Active power (Phase A/B/C).
  - Total reactive Power.
  - Reactive power (Phase A/B/C).
  - Total power factor.
  - Power factor(A/B/C).
  - Frequency.
  - Export active power.
  - Export active power (phase A /B/C).
  - Export reactive power.
  - Export reactive power (phase A/B/C).
  - Phase angle of phase A/B/C.
  - Voltage phase angle.
  - The period of register should be performed in 5, 10, 15 minutes, 30 minutes, 60 minutes.
- Demand measurement
  - Maximum Demand: When a demand period ends, the demand is compared with channel's maximum demand register. If it is larger, the new maximum register and the time of maximum demand is updated to the current time.
  - Import active Maximum Demand (total & each tariff).
  - Export active Maximum Demand (total & each tariff).
  - Import reactive Maximum Demand (total & each tariff).
  - Export reactive Maximum Demand (total & each tariff).
  - Import active accumulative Maximum Demand (total & each tariff).
  - Export active accumulative Maximum Demand (total & each tariff).
  - Import reactive accumulative Maximum Demand (total & each tariff).
  - Export reactive accumulative Maximum Demand (total & each tariff).
  - The date/time of the maximum demand must be registered.
  - Meter measures, registers and displays maximum mean active power under all tariffs and in both directions. Power integration period is initially 15 minutes. This value is programmable with the following values: 5, 10, 15, 30 and 60 minutes and display of this value is easily accessible under manual display operation regime and remotely.
  - Demand reset: Automatically reset at predefined date, by remote command and push bottom.

3.2.7.3 Monthly Energy Consumption Billing Date

Meter can be programmed for monthly settlement day according to electricity company requirement. Default setting is the last day of each month.

3.2.7.4 Billing Data register

- Monthly frozen energy: last 13 months data of monthly frozen occurrence time, total active energy, total reverse active energy, export & import.
- Daily frozen energy: last 62 days data of daily frozen occurrence time, total active energy, total reverse active energy, export & import.
- Monthly frozen credit: last 13 months data of monthly frozen occurrence time, remaining credit.
- Daily frozen credit: last 62 days data of daily frozen occurrence time, remaining credit.
- Monthly frozen time is configurable in the format of XX(day): XX(hour). The default setting is 1st day 00 hour.
- Daily frozen time is configurable in the format of XX(hour): XX(minute). The default setting is 00:00.

3.2.7.5 Meters Voltage Control and Register

- Meter should record under voltage and overvoltage and also power cut.
- Events related to under voltage and overvoltage should be recorded in the meter. Threshold of under and over voltage:
  - Over voltage: 110% (default) - 105% to 200%.
  - Under voltage: 90% (default) – 60% to 95%.
- For each under voltage, min. voltage during one period should be detected and recorded.
- For each overvoltage, max. Voltage during one period should be detected and recorded.
- Parameters related to threshold and duration of under voltage and overvoltage should be adjustable locally and remotely.

3.2.7.6 Internal Memory

- The meter shall archive in its non-volatile memory the metering and non-metering data including the program parameters.
- The meter shall archive in its non-volatile memory the commercial data (charge and recharge token value, date, time, load disconnection and reconnection, etc.
- Memory size shall enable storage of profile data for at least 62 days notwithstanding other parameters defined in these specifications.

3.2.7.7 Data protection

- During operation the current measurements are stored in the working memory (RAM or EEPROM).
- Every 24 hours this data is transferred to a non-volatile memory. It is only in cases of longer interruptions that the measuring period is interrupted and the device completely shuts down.
- Data remains stored in the non-volatile memory for at least ten years.
- No buffer battery is needed to preserve the data. The data retention is assured exclusively by the qualities of the storage medium (Flash).

3.2.7.8 Security features

- The meter shall have a programmable facility to restrict access to the information recorded at different security levels, such as communication read, communication write, and so on.
- Each meter password should have inaccessible and protected codes.
- The exchange of data between the meters and the metering data management system shall be encrypted.

3.2.7.9 Firmware Update

- The meter shall allow local and remote update of firmware.
- Software for local operation, diagnostics and reporting on the operation of the meters, enabling full configuration, provisioning, diagnostics and readout of metering data and events from the meter.
- Configuration files from an older software version shall be operable in newer versions.
- The software for local operation of the meters shall enable export of metering data, events and configurations from the meters to text files (TXT, CSV, XML) with a documented structure.
- Upgrading of firmware should not stop and affect meter's metrology neither data transfer with AMR.

3.2.7.10 Events

- Meter records total occurrence times of events, total duration, start time and end time of last 100events like power off meter cover open, terminal cover open, over-voltage, under-voltage, etc.
- Meter records total occurrence times of events, occurrence time and reason of last 30 events of contactor disconnected and reconnected
- Meter records total occurrence times of events and occurring time of last 31 events of overload.

3.2.7.11 Load Profiling

- Energy& Demand Load Profile
  - At least 12 programmable channels (Three Phases Meters) and 6 programmable channels (1-phase meters).
  - Interval:5,10,15,30,60min programmable.
  - Default interval:15 minutes for 3-phases meters and 60 minutes for 1-phase meters.
  - Storage: More than 35 days every 15 minutes .
  - Data capture object as follows:
    - Import & export active demande (kW).
    - Import & export reactive demand (kvar).
    - Import & export total active energy (kWh).
    - Import & export total reactive energy (kvarh).

- Instantaneous Load Profile
  - At least 12 programmable channels (Three Phases Meters) and 6 programmable channels (1-phase meters).
  - Interval:5,10,15,30,60min programmable.
  - Default interval: 15 minutes for 3-phases meters and 60 minutes for 1-phase meters.
  - Storage: More than 35 days every 15 minutes.
  - Data capture object as follows:
    - Voltage by phase (V).
    - Current by phase (A).
    - Active power by phase (kW).
    - Reactive power by phase (kvar).
    - Power Factor (PF) total and by phase.
    - Frequency (Hz).

- Measurement type for each channel can be chosen as follows:
  - Average.

- Minimum.
- Maximum.

3.2.7.12 Time of Use

The meter can measure active/reactive energy with TOU function. Meter supports 8 tariffs and 24 time shifts.

- Meter should be able to calculate and register costumer's active and reactive energy consumption in time intervals as bellow:
  - Four tariffs for active/reactive energy and record them for normal days and holidays separately.
  - Four tariffs for Max. Demand and record of highest Max. Demand on normal days and holidays separately.
  - At least 12 seasons tariff table shall be definable.
  - Season starting at 00:00 hours of the defined day in every year.
  - Holidays and weekdays shall be definable during a season.

3.2.7.13 Real Time Clock Daylight Saving Time and Winter Time

- Daylight saving automatic task scheduled to begin on the Friday before the last Sunday of March, and end on the last Sunday of October.
- Meter is capable of converting daylight saving time and winter time. Upon permitted and authorized, through optical, RS485 communication port or AMI system.

3.2.7.14 Integrated Disconnect/ Reconnect Breaker or Relay (Direct Meter)

- The contactor's operation reasons:
  - Consumer remote disconnecting / remote connecting / Power limiting / no credit(pre-paid).
- Breaker requirements:
  - The meter shall contain an integrated 1-ph or 3-ph breaker, with configurable power limit for disconnection due to the over load.
  - The breaker status (connected/disconnected) shall be indicated and visible at all the time on the meter or its display.
  - Single phase contactor to be rated at 80A maximum operating current.
  - Three phase contactor to be rated at 100A maximum operating current.
  - Maximum Switching Current: 2xIn.
  - Maximum overload current: 120A.
  - Maximum Contracted power configuration range: -20A to + 60A.
  - Contracted power configuration resolution: 1A.
  - Insulation: 4kV.
  - Short circuit <3ms 3000A.
  - 10,000 operations under rated current condition.
  - 20,000 operations under no-load conditions.
- The manual disconnection of meter shall not be allowed at the meter, while a local disconnection (via local interface SW) or via remote communication shall be implemented.
- In the case of the meter mal functioning the contactor must switch to the open position.

- In case of phase failure for three phase meters, the contactor must switch to the open position if the meter programmed to disconnect when a phase failure exists.

3.2.7.15 Load Limit Function (Direct Meter)

The smart meters shall have a programmable load limiting function that will automatically disconnect the load when the average power consumed, exceeds the maximum allowed (contracted power limit). The time duration to measure and allow the overload before automatic disconnection shall be configurable in the meter. (The over limit disconnection time shall be set to fixed value of time and Amperes by default in the delivered meters).
When active power is larger than threshold A and for a consecutive period which exceeds delay time B, contactor disconnects. Then, after delay time C, contactor reconnects and meter starts over the process of overload detection. If there are overload events for consecutive N times, times of overload events is reset to zero and contactor reconnects after delay time D. Then, meter starts over the process of overload detection. If there is no overload event for consecutive time E, times of overload events is reset to zero.
Manual recovery should also be possible.

3.2.7.16 Internal Diagnosis

- Indications to show the satisfactory performance of the diagnostic shall be provided in the meter.
- The meter shall have the capability to regularly perform a complete self-check of its circuits, initial memory locations, integrity of data and parity, and so on, against any malfunctioning.
- The meter should have self-check and diagnostic function. So if an error appears in internal components (such as RAM, EEPROM, RTC ...etc.) meter should record and report it to the HES using remote/AMI communication port.

3.2.7.17 Communication Interface

- The meter must support the communication protocol: DLMS/COSEM.
- Local Communications:
    - The meter must provide a local optical communications port to provide reading and meter configuration as well as firmware upgrade support, taken into consideration a unique authentication for each DISCO's. The Optical port must comply with the IEC 62056-21 physical interface. preferential to be sealable.
    - The meters is preferred to support a local communications port which can interface with other communications modules such a port would include RS-232, RS-485 (with multi-drop) or USB.
- Remote/AMI Communications Modules: Meters which support an AMI Automatic Metering Infrastructure interface will provide a modular interface or communications module which is tightly integrated. The communication module must be exchangeable which provides the ability for the utility to upgrade the communications technology in the field to newer technology in the future without removing the meter from service, thus protecting the meter investment.
- The modular communications module is the default build in(PLC/G3) modem, working as upstream communication mode from the meter to the (DCU), and as downstream communication mode from the meter to the customer interface unit (CIU).
- The module to be integrated to the meters is a 2G/3G cellular modem quad band.
- All the communication interfaces are independent from each other, thus, failure of one communication interface will not affect the other.

3.2.7.18 Data interfaces

- Local data interface, and Electrical data interface with well know standard with certificate.
- Well known Data protocols like IEC 62056-21 DLMS.
- Modem: default build in with switchable to pluggable modem.
- Modem Interface module: well know with certificate officially documented.
- Modem Data protocols: well know with certificate officially documented.
- Transmission rate.

3.2.7.19 Interoperability

- Meters shall be compliant with IEC-62056 DLMS/COSEM.

3.2.7.20 Firmware download

- The firmware of the meter can be downloaded local or remotely.
- Changes to the meter firmware shall not impact the meter functionality.

3.2.8 Technical Requirements

3.2.8.1 General requirements

- The meter shall be designed and assembled with state-of-the-art microprocessor components to perform without any metrological degradation over a wide dynamic current range under harsh operating conditions.
- Each meter shall have a permanent, clear and unique serial number and shall be recorded both as printed numbers and barcode. Also recorded in permanent memory, and available for readout via the optical port. It must be impossible to change or delete the serial number.
- Meter should be protected against Electromagnetic Compatibility (EMC).

3.2.8.2 Meter design and construction

- The smart meter will be designed and assembled with state-of-the-art microprocessor components to perform without any metrological degradation over a wide dynamic current range under harsh operating conditions.
- The meter shall be A Base type or Din-rail.
- The installed Measurement Unit (Meter Unit) shall have an IP rating 54 or better according to IEC 60529.
- The cover shall be made of plastic and fitted in such a way that the internal parts of the meter are accessible only after breaking the meter cover seals.
- The plastic for the terminal block, meter cover, and base shall be flame-retardant and UV-stabilized, passing a glow wire test at 960°C.
- The terminal block may be integrated with the meter base.
- The terminal cover shall be sealed independently of the meter cover. The terminal cover shall enclose the actual terminals, the conductor fixing screws, the external conductors, and their insulation, whereby no part of the meter or cables shall be accessible from the front of the meter
- The seal of terminal cover must be installed visible and no access to the terminals shall be possible without breaking the seal(s).

- Each meter shall have a permanent, clear and unique serial number and shall be recorded both as printed numbers and barcode.
- All meters shall operate without undue vibration and with the least practicable amount of noise.
- All meters shall be designed to exclude vermin and insects from entering the equipment.
- The meters shall have conducting terminals suitable for termination of current and potential leads.
- The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of them coming loose or heating up unduly. Nickel-plated brass screws shall be provided in each current terminal for effectively clamping the external leads with thimbles. Each clamping screw shall engage at least 3 threads in the terminals. The ends of the screws shall be such as not to pierce the conductor. Pressure strips of copper that is nickel or tin-plated shall be fitted in the terminal holes.

3.2.8.2.1 Mechanical Specification

- Integrated breaker/relay (contactor). Shall meet the following requirements:
  - Single phase contactor to be rated at 80A maximum operating current.
  - Three phase contactor to be rated at 120A maximum operating current.
  - Maximum Switching Current: 2xIn.
  - Maximum overload current: 120A.
  - Maximum Contracted power configuration range: -20A to + 60A.
  - Contracted power configuration resolution: 1A.
  - Insulation: 4kV.
  - Short circuit <3ms 3000A.
  - 10,000 operations under rated current condition.
  - 50,000 operations under no-load conditions.
- The contactor will be of a dual type ensuring that both, line and neutral are disconnected.
- For 3 phase meters the relay shall switch all three phases in unison, that is, it shall not be mechanically possible to switch individual phases separately.

Note 1: In order to make sure reliable contactor operation it is only allowed to operate the contactor when the voltage of power grid is higher than the threshold of contactor operation voltage (50% by default).
Note 2: If contactor disconnection is caused by meter cover open or terminal cover open, contactor will remain disconnected, even if meter cover and terminal cover are closed (programmable option).

- Verification LED: the meter shall be equipped with a test output device that is accessible from the front in the form of a flashing LED in proportion to the meter constant to test accuracy of the meter for both Kwh and Kvarh energy consumption on site.
- Clock and Calendar: The microprocessor-based meter shall have a built-in clock and calendar having an accuracy of at least 0.5 seconds per day in accordance with IEC 62052-21 / 62054-21, without the assistance of an external time-synchronizing pulse. The clock shall be synchronized by time signals received through the local or remote communication interface and upon national standard.

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- Shall permit to define a Calendar with holidays.
- Daylight saving T (DST).

3.2.8.2.4 Meter cover seals

- At least one visible seal has to be provided in such a way that the internal parts of the meter are accessible only after breaking the seal(s).

3.2.8.2.5 Meter terminal seals

- At least one visible seal has to be provided and no access to the terminals shall be possible without breaking the seal(s) of the terminal cover(s).

3.2.8.2.6 One Phase Meter:

The meter must have one measuring element, but also measures both of phase line current and neutral line current, the objective is to compare between the phase line current and the neutral line current, if there is any difference in ampere occurs between phase and neutral, the meter shall detect and send an alarm.

3.2.8.2.7 Three Phase Meter:

The meter must have three measuring elements, in addition to optional neutral line current, the function is to detect any tamper trial as tampering of the incoming conductor of any phase.

3.2.8.3 Electrical

3.2.8.3.1 One Phase Meter:

- Meter accuracy: Class 1 for Active. and Class 2 for reactive.
- Number of Phases: 1+N, 2 wire.
- Reference Voltage range: 220 V (phase neutral). Meter input voltage range for normal operation should be from 70% to 120% of nominal voltage.
- Voltage circuit with power supply connected: ≤ 2W/5VA.
- Nominal (Maximum) Current: 5(80) A.
- Nominal Frequency (fn): 50 Hz.
- Current circuit at basic current Ib: ≤ 4VA.
- Starting current: 0.2% In (IEC 62052-11).
- Short time over current: ≥ 30 Imax for 0.01 sec. according to IEC 62053-21.
- Starting current Ib: ≤ 0.004.

3.2.8.3.2 Three Phase Meter:

- Meter accuracy for Direct Meter: Class 0.5for Active and Class 1 for reactive.
- Number of Phases: 3+N, 4 wire.
- Voltage reference for Direct type meter: 3x 230/400 (380V phase to phase).

- Meter input voltage range for normal operation should be from 70% to 120% of nominal voltage.
- Voltage circuit with power supply connected: ≤ 10VA.
- Nominal (Maximum) Current for Direct Connection meter: 10(100) A.
- Nominal Frequency (fn): 50 Hz.
- Starting current: 0.2% In (IEC 62052-11).
- Current circuit at basic current Ib: ≤ 0.5VA.
- Short time over current: according to IEC 62053-21.
- Starting current Ib: ≤ 0.004.
- Three control inputs.
- Two control output.

Note: The maximum current as defined here, is the electrical rating of the meter and is not a software implemented feature. It is separate from, and in addition to any power limiting features that may be provided in the meter which are configured locally using laptop or Hand Held, remotely using AMI system or using STS code.

3.2.8.4 Data Storage

The metering device must be able to store all program parameters and metering data on a **non-volatile memory**. The non-volatile memory shall be transferable to a new meter in case of malfunction of the current meter in use (meter black box).

3.2.8.4.1 Historical Data Transfer & Storage and Event Recording

- Meter shall save the last 13 months monthly historical metering data and it's programmable for monthly (billing) settlement date & time (freezing time). Default at factory for freezing time is 24:00 hour, end of each month.
- Meter shall save recent 61 days daily power consumption data by TOU. Default settlement time is 00:00.
- Meter shall record last 20 power-off tripping events (Direct meters). Record content as below:
    - Accumulative tripping times.
    - Tripping date/time.
    - Recovery date/time after tripping.
    - Meter tripping reason
        a. Balance amount is zero.
        b. Warning.
        c. Over load.
        d. Over current.
        e. Un-activation.
        f. Remote control.
        g. Fault by meter self-check.
        h. Neutral line failure.
        i. Over voltage.
        j. Low voltage.
        k. Reverse.
        l. Open terminal cover.

m. Open meter cover.
n. Bypass tamper.
o. Phase loss.
p. Phase reverse.
q. Over temperature.
r. Strong magnetic interference.

- Meter shall record last 20 grid power-off events. Record content as below:
  - Grid power-off accumulative times.
  - Date/time of Grid power-off occurrence.
  - Recovery date/time after grid power-off.
  - When grid power--off, energy meter can send this information to main station management system automatically to achieve the automatic upload when power-off event to solve problems in time.

- Meter shall record last 50 special events. Record content as below:
  - Occurrence date of special events.
  - Occurrence time of special events.
  - Special Event reasons.
    a. Meter control circuit fault.
    b. Low clock battery voltage.
    c. Internal register fault.
    d. Internal clock fault.
    e. Overdraft.
    f. Meter software upgrade.
    g. Meter clock calibration.
    h. Open terminal cover.
    i. Open meter cover.
    j. Open communication module cover.
    k. MD restoration.
    l. Active power reverse.
    m. Serious unbalance of current (more than 6.5%).
    n. Voltage loss.
    o. Low voltage.
    p. Over voltage.
    q. Current loss.
    r. Over current.
    s. Phase loss.
    t. Current loss.
    u. Neutral Loss.
    v. Reverse phase sequence for voltage.
    w. Reverse phase sequence for current.
    x. Three phases' voltage are in unbalance condition.
    y. Three phases' current are in unbalance condition.

z. Over demand.
aa. Power factor is beyond the lower limit.
bb. Reverse split phase sequence for active power.

3.2.8.4.2 Historical Data Storage for Pre-Paid function

- Meter shall record last 15 purchasing and recharging events Record content as below:
  - Total recharging times.
  - Recharging amount.
  - Recharging TOKEN value.
  - Corresponding TID code for recharging TOKEN.
  - Recharging date/time.
- Meter shall record the using information of last 10 technical TOKENS. Recorded contents as below:
  - Total using times of technical TOKEN.
  - Technical TOKEN type.
  - Technical TOKEN value.
  - Using time and date of technical TOKEN.

3.2.8.5 Environmental Specification

- Although temperature range and relative humidity must be compliant with the IEC 62052-11 for the smart meters, the following extra requirements will apply:
  - Normal working temperature: -15℃～+60℃.
  - Extreme working temperature: -30℃～+70℃.
  - Relative humidity ≤90%.

3.2.8.6 Dimensions and layout

- Smart meter dimensions shall be such that it can be placed inside the current customer services premise according to the IEC standards.

3.2.8.7 Connection diagram and terminal markings

- Each meter shall be clearly marked with the connection diagram, which shall be placed on the meter or cover of the terminal strap of the meter.

3.2.8.8 Battery

- The meter shall be provided with lithium battery as a backup.
- Maintain clock and calendar and anti-tampering features of the meters (Events Recording).
- Lithium battery, the capacity is 1200 mAh or superior.
- When low battery is detected the meter must produce an alarm and display an indicator.

- Lifetime 5years.
- Battery is replaceable.
- A Super Capacitor shall be used along with the battery. In that case, specify the continuous time of meter working with Super Capacitor and with electricity interruption.

3.2.8.9 User Interface

3.2.8.9.1 Meter Display

The meter shall have an LCD display, comprising a minimum 8 segments and including 2 decimals. The minimum height of digits is 5mm. The display shall have 8 digits for the cumulative energy. General requirements:

The following features must be present in the display:
Auto scrolling shall be used for changing displayed data.
Use of OBIS codes for screen display.
Displayed data time duration shall be programmable.
Display sequences, parameter list and the display time should preferably programmable.
Visual indication shall be provided to show Tamper conditions.
An indicator must be displayed to indicate the commercial status of the customer account (example: Pre-paid or post-paid, active or inactive, etc.).
The display shall be capable of showy the presence or absence of individual phase voltages in the Meter Unit.
Meter shall provide unique indications if the load has been disconnected due to the following conditions:
No credit available (in case is working as pre-paid).
Power consumption exceeded the maximum power limit.
Electrical or other fault detected.
The following meter data information could be programmed to be displayed:
Default parameters:
Data and time.
Active tariff.
Phase existing or non-existing.
Breaker status.
Instantaneus value (V, I, kW, kVAr, cosϕ).
Total active energy.
Active energy for active tariff.
Maximum or Peak demand.
Total reactive energy.
Current tariff number.
Quadrant indication.
The status of relay or contactor.
Failure indication and code (if any).

3.2.8.9.2 Display parameter (Push Button) Mode during power on:

The display of the programmed parameters shall be scrolling one after the other through push button. Display must work on auto display mode.

3.2.8.9.3 Customer Interface Unit

The customer interface unit acts as a remote display and keypad for the meter. The CIU is a self-contained device that implements its own battery-backed power supply. Will display all information as meter display and it does have specific functionality that is of importance to the customer e.g. the indication of alarms for low credit or low battery conditions, communication to the meter etc.

The meters will incorporate a remote keypad and display unit for customer interface (CIU).

The CIU shall have 12 keys, includes "numeric keys" and "backspace" key and enter key to typing Token and/or return electricity to the meter on zero credit and warning credit or any other type of disconnection.

The CIU provides a serial of shortcut code to get meter information and make relevant operation thru the keypad.

The keypad will allow to Scroll through the displays

CIU should communicate via PLC or RF with the meter.

The CIU shall have a pair of 1.5V, AA sized, leak proof, alkaline cells batteries for operation when the power off.

The customer interface unit will be required to operate on battery power under two conditions:

Meter out of credit when pre-paid function is activated (load disconnected).

A general power failure

The CIU must support Push data from meter to display (“5 sec: device ID, time, active energy, “15min:special days table, DST parameters…) with key managed by server application. Unidirectional communication to customer display.

3.2.9Meter Tamper and Fraud Monitoring and Protection

3.2.9.1 Protection against Abnormal Grid Voltage and Phase Missing

The meter is designed for protection against voltage abnormity of grid and phase missing so as to reduce damage to electronic appliances

The meter must support the disconnection of the load when the supply voltage falls below pre-defined rated voltage or up over pre-defined rate voltage. The meter may optionally disconnect the load, provided that the meter shall automatically re-connect the load when the supply voltage is restored to normal condition.

Manual recovery could be also possible through the meter keypad or CIU.

The meter shall register the voltage variation like special event.

3.2.9.2 Magnetic Interference Disconnection Function (Direct Meter)

The meter shall have a programmable function for the load disconnection when meter detects magnetic interference. Furthermore, meter will power off when it keeps detecting magnetic interference for a specify time

(Ex.10 seconds) and meter will recover automatically after a specify time (ex.5 minutes) later after magnetic interference stops. Meter will record that as event.

Manual recovery should be possible through the meter keypad or CIU (Smart Pre-payment meter).

The meter shall register the voltage variation like special event.

3.2.9.3 Anti-tamper against Cover Opening Function

The meter shall have activated the anti-tamper flag for cover opening (terminal cover or upper meter cover) after delivery from factory.

The meter will instantly power off once the terminal covers or upper cover is opened under condition of power-on. This function can be programmable.

Energy meter shall recover power supply after upper cover and terminal cover are taken to original position.

The meter shall register the cover open & close event.

The meter must have the capacity to detect, register and activate an alarm in case opening and closing of the meter terminal or upper cover and the meter box (Optionally), even without power.

3.2.9.4 Anti-tamper for Reverse Power Consumption

The meter will cut off power supply circuit when it detects reverse power consumption line and N line are reverse in terminal connection. Meter will detect this event, and will automatically cut off power supply if reversing event keeps over a specified time (Ex. 60 seconds).

Meter will automatically recover power supply a time (programmable) after when grid resumes work in proper way.

Manual recovery should be possible through the meter keypad or CIU (Smart Pre-payment meter).

The meter shall register the reverse power event.

3.2.9.5 Neutral Loss Disconnection Function

When energy meter detects neutral loss, meter would disconnect power supply circuit and the event will be recorded.

Meter will automatically recover power supply a time (programmable) after when grid resumes work in proper way.

Manual recovery should be possible through the meter keypad or CIU (Smart Pre-payment meter).

The meter shall register the Neutral Loss power event.

3.2.9.6 Registration of events and alarms

The meter shall register, as a minimum, the following events:

- Power Failure
- The incoming phase and neutral interchanged.
- The load side interchanged with the input side.

- The load connected between either the incoming phase and load side neutral or between the incoming neutral and load side phase.
- Information on the status indicator to tamper with the device, including take off the terminal cover, opening the casing or activation of an external magnetic field.

Each event registered by the meters shall be described by the following attributes:
- Date and time of occurrence.
- Code of event.

3.2.9.6 Immunity against external influencing signals

3.2.9.6.1 Magnetic Field:
- Meter shall record accurate energy in case of any external influencing signals in line with IEC 62053-21. Meter shall have the following features:
    - Meter shall log the event in its memory as “MAGNET TAMPER” with date and time stamp.
    - It shall not be possible to influence the switching operation of the load switch by applying a magnet.
    - The disconnection device (for "Power Limiting" and "Out of Credit" conditions) shall be adequately protected to ensure that disconnection of the load circuit cannot be prevented by external influences e.g. magnetic field interference or mechanical intrusion/damage.
- A testing proof according to standard IEC 62053-21 must be presented.

3.2.9.6.2 Abnormal Magnetic field is defined as below;
- Continuous DC magnetic induction: 0.27 Tesla ± 5% (Value of the magneto motive force to be applied shall be generally 17500 ATs.
- AC magnetic induction: 10 m Tesla(if produced with circular metal core with square cross section 2800 AT) / 0.2 Tesla ± 5% (if produced with 14 SWG 25,000 AT air cored magnet) .

3.2.9.6.3 Electrostatic Discharge (ESD):
- Meter shall be immune up to 35 kV and shall record accurate energy as per IEC 62053-21.

3.2.9.6.4 D.C. Immunity
- The meter shall not saturate on passage of direct current, which can cause the meter either to stop recording/ record inaccurately. DC injection shall be tested both in phase and neutral. Measurement by meter shall not get influenced by injection of Chopped signal/ DC signal/ DC pulse of low frequency. Meter shall log the event into memory as ‘DC Injection’ with date & time stamp.

3.2.9.6.5 Electromagnetic Compatibility (EMC).
Meter shall be protected according to the pass testing of following standards:
- IEC EN 61000-4-2: Testing and measurement techniques - Electrostatic discharge immunity test.
- IEC EN 61000-4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test.
- IEC EN 61000-4-4: Testing and measurement techniques-Electrical fast transient/burst immunity test.

3.2.9.6.6 Internal Meter security:

The counter must guarantee, locally and remotely, three corresponding access levels with password:

- Reading the counter.
- Configuration of the counter.
- Firmware update.

Any changes to the meter parameters must be recorded in the counter event log with date and time.

The serial number, the year of manufacture and the type designation of the meter must be saved in the meter's internal memory and must be fully protected against modification. The system and the hardware part must be designed in such a way as to prohibit the modification of the internal cumulative memory (energy consumption data).

3.2.9.6.7 Communication security:

The meter must comply with the DLMS security requirements as described in the DLMS / COSEM Green Paper, Section 9.2 (OSI Model Layer 7).

In addition, the counter must use at least encryption and decryption methods, of the AES-128 or ECC-192 or equivalent type, for all data exchange operations through the counter interfaces, in particular for the exchange of data. data locally or remotely.

3.2.10Reading and configuration software:

The software (s) for reading and configuring static electricity meters for low voltage customers must meet at least the following characteristics and functionalities:

- Software in English and Arabic language;
- Can be installed on PC and on TSP / PDA.
- Supplied on CD-ROM or USB key.
- Works under the most recent versions of Windows.
- Allows the configuration and programming of static meters by the DISCOS administrator as well as the firmware update, the configuration of the modems, the setting of the counter relay and the parameterization / sequencing of the display data. Access to this programming must be protected by passwords.
- The software must allow reading of all the data saved in the digital counter, including configuration parameters, energy and power registers, alarms and events, load curves, ...
- The software must be able to record a configuration from a counter and use this same configuration to configure other counters.
- New software versions must allow the configuration and reading of counters supported by older versions. Configuration files generated by older versions of software must be supported by newer versions.

- The software must also make it possible to save all the configuration and reading data of the low voltage digital meters configured or read via the software (locally or remotely) on the PC's memory. These data can be easily consulted through adapted search criteria. The software must allow the export of these data in standard formats (Excel, PDF, ...) as well as the printing of reading and configuration reports.
- Manage different levels of access, with passwords and access rights defined by the administrator, in particular for reading, configuring and updating the firmware;
- Manage communications with:
  - Portable data entry equipment (PDA, TSP, etc.) or equivalent systems (loading and unloading).
  - Counter: by direct connection (programming and reading) and remotely.

The Supplier must deliver all the elements necessary for the installation of the software and its use (optical heads, cable connecting the PC to the RS485 port of the meter, documentation, etc.).

The installation of the reading and configuration software must be protected by an activation key to be provided by the Supplier at the request of DISCOs. The minimum number of keys will be defined at the contract level. The installation of the PC software must not be dependent on a physical device such as tokens, dongles, etc. Access to the software must be password protected and installation will be the sole responsibility of the administrator with a password.

3.2.11 HAND HELD UNIT

The system must support the use of robust hand held units, preferably not laptops, to program and interrogate the metering devices in the field. The handheld unit must be able to perform the same functionality as the software provided that is used for metering device taking into consideration the security where the hand held unit is **only used for DISCOS.**

3.2.11.1 Handheld Unit basic features.

Intuitive user friendly work using clear structure of menus and dialogs.
Ergonomic keyboard design with alpha numerical keys.
Designed for industrial applications.
Integrated laser barcode scanner for collecting data. Must supports all barcode types used in industry and market.
User defined configuration of workplace layout enables optimization of operator's route in extensive systems.
High computing power for data acquisition, data manipulation and visualization.
High quality color graphic display.
Communication and charging cradle included.

3.2.11.2 Handheld Unit Technical Characteristic

- Display: 320 x 320 pixels, color graphic LCD.
- Keypad: 38 keys.
- Power: Internal accumulators (2600 mAh @ 3.7 Vdc).

- Communications: RS-232 and USB.
- Dimensions (LxWxD): 210 x 80 x 40 mm +- 20%.
- Weight: 0.25-050 kg.
- Operation Temperature: -10 °C to +50 °C.
- Storage Temperature: -30 °C to +70 °C.
- Operating Humidity: 5 % to 95 % non-condensing.
- Drop Resistance: Multiple 1.2 m (4-foot) drops to concrete.
- Sealing: IP 54 Category 2.
- Bar Code: 1D and 2D bar code scanning.

3.2.11.3 Handheld Unit quantity

Two hand handheld unit must be delivered.

3.2.11.4 Operation life of Handheld

The Handheld operational life shall be 10 years.

3.2.12 Concentrator

- Nominal operating voltage 230/400V, 50 Hz.

The equipment shall be designed to withstand the design stresses given below without damage and disruption of service. All tests shall as a minimum be based on these design parameters.
The equipment to be delivered under this Contract must be warranted to function correctly without degradation of the guaranteed life time under the following network conditions:

- The total harmonics up to 15%.
- Surge withstand and electromagnetic interference; as per IEC specifications.
- Voltage fluctuation: -20% - +15% of nominal voltage.

- General specs
  - **G3-PLC interface**
    • Plug-and-play installation.
    • PLC communication in the CENELEC A or FCC band.
    • IEEE 802.15.4-based MAC layers enable interoperability.
    • 3-phase PLC signal injection.
  - **Ports**
    • RS-485, Safety Extra-Low Voltage. 24 V.
    • LAN (RJ45) interfaces
    2G/3G modem

- Construction

Concentrator is executed without moving parts, in accordance with standards for industrial computers (resistant to temperature, humidity, dust, vibrations, electromagnetic radiation and other) adapted to operation conditions in substations (SS). The concentrator must have PLC modem, modular GPRS modem, built in LAN.

- Number of Supported Meter

At least 500 meters.

- Storage Capacity

Capacity: minimum 256 MB.

- Hardware Monitoring

Watchdog timer, optional CPU and housing temperature monitoring.

- Protection
  - The concentrator must have protection against dust and water, **IP 54** or better.
  - The concentrator must have protection due to Speedy power outages and return frequently so that the data inside the concentrator and the communication between the DCU and the meters must not be infected.

- Anticipated Operation Life

10 years.

- Concentrator Role and Function

  - Concentrator Role

Concentrator is a device executing automatically or on request the functions of meter reading and parameterization and data transfer functions to AMM Centre and meters.

Concentrator has to execute operations defined in programs/sequences submitted to it remotely (from AMM Centre) or locally (via laptop) independently from AMM Centre and to memorize read data obtained through execution of defined programs /sequences for a pre- set specified time period. The concentrator follows priorities of programs /sequences during execution of such programs /sequences. At the request of AMM Centre or under reporting program/sequence, the concentrator needs to submit memorized data to AMM Centre or deliver the data to laptop on request.

Concentrator also needs to enable immediate communication with individual meters, remotely (from AMM Centre) or locally (via laptop).

Concentrator has communication ports for communication with meters and AMM Centre, as well as communication port for local communication.

Communication via local access has to be restricted for authorized personal only.

In addition to the connection of several networks, the concentrator may provide optimization of communication. Optimization methods include:

- Data compression.
- Communication channels engagement time reduction.
- Response time optimization**.**

It is expected that new communication technologies, as well as additional requirements in terms of expansion concentrator functions will emerge during the operation life of the concentrator and the system in general. Concentrator software needs to have upgrade option for future functionalities.

- General Description of Concentrator Functions:

Concentrator software package has to realize at least the following functions:

- Reading and memorizing functions.
- Management/parameterization functions.
- Communication functions.
- Data processing functions.
- Data and access protection functions.
- Administration functions.

Reading function in the concentrator is realized to enable all reading combinations (through corresponding reading programs/sequences) indicated above and the ones making sense.
Concentrator should have sufficient storage space, therefore data storage (archiving) function reliably should store all read data for **at least 12 months**.

- Proposal for Automated Reading According to Sequence

Programs/sequences related to this type of reading are divided into:

- Hourly.
- Daily.
- Weekly.
- Monthly.
- Real time clock reading from all meters, and synchronization.

Program/sequence reading priority should be as follows:

- Readings on request have priority over automated programs/sequences of reading.

- Management/ Parameterization Function.

Concentrator should have management/parameterization function in charge for the change of meter parameters, bi stable switch control as well as meter software change (applied only for single-phase and three-phase meters). This Function is realized through the program/sequence of management/parameterization. We differentiate:

The list of parameters:

- Real time clock synchronization.
- Daylight saving time changes.
- Tariff program change.

- Change of value presentation period on meter display.
- Change of sequence and selection of registers for presentation on meter display.
- Key roles - conditional reconnection.
- Change of integration period in case of 15-minute power.
- Voltage threshold for phase presence decision.
- Change of maximum power limit.
- Change of bistable switch position. Remote disconnection/connection of the customer.
- Controllable output management.
- Automatic or conditional repeated disconnection.
- Change of profile periods.
- Voltage thresholds related to electricity quality.
- Meter software change (only for single-phase and three-phase meters).
- Credit change for Pre-Paid meters.

Management/parameterization function will generate a corresponding report to be sent to AMM Centre after it's every action, containing assigned action success percentage and the list of meters from which there is no management/parameterization execution confirmation.

Management/parameterization function initially has execution priority over automated regular reading function. Setting of priorities is fully configurable.

- Data Processing Function.

Concentrator software, in addition to reading and data sending towards AMM Centre as primary functions, also performs partial processing of collected data. Distributed data processing would be introduced in this manner, as well as partial reduction of pressure on transmission communication path to AMM Centre, and on AMM Centre servers.
Concentrator shall execute initial data processing collected up to that moment, in the manner not affecting data reading, parameterization and delivery.

Data processing function processes alarms and statuses of meters, electricity supply quality logs, event logs, with the making of corresponding reports after finding corresponding alarms, statuses and events to be sent to AMM Centre upon emergency request of the concentrator.

This function should minimally process events and alarms related to the disruption of meter integrity (e.g. opening of termination cover), as well as attempt or disruption of data integrity in the meters themselves (e.g. meter reprogramming attempt, etc.).

- Data and Access Protection Function

Access to data and functions of the concentrator has to be protected by authentication and authorization procedure.

Concentrator should have the possibility of creating access logs, both for local or remote access through communication channels.

Concentrator has to support communication encryption with meters and with AMM Centre. Communication security.

The concentrator when communicating with meter must fully support DLMS Security as described in the DLMS/COSEM Green Book, 7th ed., section 9.2 (layer 7 of OSI model)

In addition, concentrator must encrypt data using Advanced Encryption Standard (AES) at least at one of:

- Layer 2 (IEEE 802.15.4g or IEEE P1901.2).
- Layer 3 (IP Security [IPsec]).

In this context, the concentrator must store and manage the keys in a secure way

The concentrator must raise an alarm if a meter's key is changed for more than x time per hour. (x to be defined as changeable parameter).

- Administration Function .

Administration function may be done locally or remotely. It minimally has to provide:

- Review and synchronization of reading programs/sequences with a laptop.
- Synchronization of management/parameterization programs/sequences with AMM Centre or local laptop.
- Review and change of programs/sequences execution priorities.
- Real time clock synchronization.
- Review of communication PLC route, if not implemented through PLC protocol itself in PLC modems.
- Review and change of concentrator reporting time and frequency parameters.
- Review and change of communication parameters of concentrator.
- Review and change of all other concentrator parameters.
- Change of concentrator management software.

Concentrator needs to have data stored in its memory (in the form of logs) on changes of all of its parameters and settings at least for the last 12 months.

3.3 Communication

3.3.1 Communication for Smart Prepayment Metering System

- **Overview**

The Communication Components shall guarantee the reliable and fast bidirectional data transfer between AMI components. Technical solution for data transfer shall be such to have a capacity sufficient for AMI components to perform all the set tasks within specified times. Also, shall provide a corresponding code protection of transferring data (e.g. Protection against unauthorized reading, unauthorized command generation, ill-intentioned submission of false data, etc.).

The technical features of the communication modules shall be in conformity with international standards.
The communication modules must be designed for normal operation on an aggressive environment with high humidity, dust and salinity; also must be comply with IEC Electromagnetic Compatibility immunity levels.

Data and access protection function

- Access to data and functions to the equipment in the network has to be protected by authentication and authorization procedure.
- Create access logs, both for local or remote access through communication channels.
- Support communication encryption between all components.

3.3.1.1 Modem Communication

3.3.1.1.1 Cellular Technology

A modular 3G modem is a bidirectional communication modem which is used to communicate **meter with server**. The modem must adjust automatically the cellular technology to the best available in the area: 3G. The modem should utilize IP version 4 and IP version 6 and is compatible with the Morocco mobile operator. If the antenna inside the modem does not meet the needs of signal coverage (only for limited areas), an external antenna can be mounted.

3.3.1.1.2 Cellular Modem Technical Specifications

- A modular 3G modem with a bidirectional communication will be used to communicate meter with server with **minimum 3 Mbps** downlink and full support for 3G data sim.
- The Modems shall be in conformity with international standards (FCC/IC, PTCRB, and AT&T certified – eliminates certification costs and risks) and a testing certification from independent laboratory must be presented.
- **API modes simplify software integration.**
- The modems shall be tested successfully with the Palestine Cellular network provider.
- The modem must adjust automatically the cellular technology to the best available in the area: 3G.
- The modem should utilize IP version 4 and IP version 6 and is compatible with the Palestine mobile operators.
- If the antenna inside the modem does not meet the needs of signal coverage (only for limited areas), an external antenna should be used.
- The modem must support static or dynamic addressing of modem and APNs service.
- The modems shall be interchangeable and have a configuration and troubleshooting software.
- The modems could be plug & play (optional).
- The modems should have a built-in protection against unwanted access. Access from which communication is allowed; which is entered as a parameter in the communication module.
- The communication module has to be equipped with a function to maintain the communication channel active even if the equipment has not been used for a longer time (this time represents a parameter).
- All communication parameters located in the modem at the time of reset must remain saved.
- The modems should be delivery with all necessary accessories to work properly (connectors, cables, power Supply, antenna, etc…).
- The communication module must be energized from meter terminal.

3.3.1.1.3 Configuration software and licenses

- The modem must be provided with all 3G communication licenses and associated configuration, test and diagnostic software package, including the license associated with this kit, if applicable, and must be independent of the modem and its serial number.
- The modem must integrate the IP protocol stack with the required pre-installed license, which must be independent of the electricity meter and its serial number. In fact, the modems must be interchangeable between the counters without any configuration or need to enter a license key at the modem level or at the counter.
- Where possible, access, either locally or remotely, to the modem for configuration or parameter reading shall be protected by an authentication and authorization procedure.

3.3.1.2Operation life of Communication System components

- The Communication Component Operation life shall be 10 years.

3.3.2 Communication for Standard Smart Metering System

3.3.2.1 Meter and Customer Interface Unit

The meter and the Customer Interface unit must have the following communication modules:

- *Built in (Optical Interface in meter):*

optical interface is used to interface with local probe or HHU (hand held unit) to read voltage, current, power, events log, time and date reading and manipulation, over/under voltage reading, setting and manipulation, program the mode of the communication in the meter with the CIU, program the mode of the communication in the meter with concentrator.

- *PLC MODEM (G3):*

A build in PLC modem is used to create a communication between the meter and Customer Interface Unit in a distance not less than **120 meters**(down communication). It also shall create another bidirectional communication between the meter and concentrator (upstream communication).

3.3.2.2 Concentrator Communication Modems

The concentrator shall have the following communication modems:

- ***Built in Ethernet port****:*

Ethernet port is used to create a bidirectional communication between concentrator and server through LAN.

- ***PLC MODEM (G3):***

PLC modem is a build in modem which is used to create a communication between the meter and the concentrator with a minimum distance **700 meters** without repeater. (upstream communication).

- ***GPRS/3G MODEM***

GPRS/3G modem is a bidirectional communication modem which is used to communicate DCU with server, the GPRS/3G modem must work with **3G**, work with any of the four frequency bands: **850, 900, 1800, 1900 MHz for3G**, the modem should utilize **IP version 4 and IP version 6** and is compatible with the mobile operator requirements, If the antenna inside the modem does not meet the needs of signal coverage (only for limited areas), an external antenna can be mounted.

  - ***Technical, Functional and Other Features***
    - 3GPP family must support HSPA /W-CDMA **minimum 3 Mbps downlink**.
    - GPRS-3G Quad band / class 10 / class 12.
    - Data and SMS.
    - Internet services: TCP / UDP / FTP / HTTP / SMTP / POP3 / SNMP / SSL.
    - AT command set > 300.
    - AutoRestore – timer reset.
    - Operating status LED.
    - Power supply (on 2 pins) / Digital input / output x 2 (on 2 pins).
    - SMA antenna connector (50 Ω).
    - Operating (in °C) -30° ~ +70°.
    - Penta-band Antenna.
    - Quad-band 850/900/1800/1900/2100 MHz.
    - Magnetic mount antenna.
    - Cable length = 6000mm.

  - ***Operation life of Modems***
    - The modems Operation life shall be 10 years.

  - ***Two-way communicating system solutions experience and certificate.***
    - Supplier must show his work experience with official certificate.

- ***Built in USB***

The concentrator must have a Built in USB for on-site check.

3.3.2.3 Communication Features:

- The meter must work as a repeater to adjacent meters.
- If a three phase meter exists in the network, the three phase meter must work as the repeater on each of the three phase.

- If the concentrator realizes the repetition function itself, it memorizes communication route (topology) towards every meter in its network and submits this information locally or remotely.

- Every PLC modem must have equipped with the watchdog function in charge to execute hardware reset of PLC modem if the modem was not active for a longer time (this time represents a parameter). All communication parameters located in the modem at the moment of reset remain saved.

- Communication function with meters needs to support a fully automated repetition procedure and finding of optimal communication path, except in case that this functionality is provided by the protocol itself in the PLC modem.

- Communication function has to offer information on communication quality such as signal/noise ratio, attenuation and data loss statistics.

- The meter shall have facilities for data transfer locally through optical port connected to a PC or hand held unit for local meter programming and data downloading using Infrared optical port.

- The meter must have a PLC modem to achieve required communication with AMM Centre and CIU.

- The meter shall support the DLMS/COSEM communication protocol.

- The bidder shall submit evidence of communication success rate of no less than 95% for the distance offered by the manufacturer.

3.3.2.4 Token

The token is a data transfer mechanism; it transfers setup parameters and credit in kWh to the metering device.

The same type of tokens must be used for all type of smart prepayment meters.

3.3.2.4.1 Token Security:

a) The token must be generated from the CMS (Customer Management System) with SGC of SELCO, in other case SELCO can generate tokens with default SGC if its required .
b) The token generation (a hardware token generation device) must provide tokens in parallel, not serial generation, with more than 100 token at same time.
c) The data communication between the token and the vending station.
d) The data communication between the token and the meter.
e) Meter should not accept any external token which is not registered in SELCO system.
f) Token must be compliance with STS600-4-2 and IEC62055-41 Ed3 standards to guarantee validation of token after year 2024.
g) Data encryption must be included.

3.3.2.5 Security

The environment may be hostile and special consideration must be given to the security employed. Preference will be given to suppliers that can show exceptional secure designs and implementation. This should include standards applied, tests completed, installed base versus number of security violations, especially with regards to the token. An overview of the system integrity and details of the security employed, not only within the token but also to the entire environment must be supplied. The security of the system must be shown to be of a high standard between the various components that is the communications link between the meter and the customer interface unit.

3.3.2.6 Additional Features

The functions required are detailed below; the supplier should present any additional features.

3.3.2.7 Data Transfer

The data must be transferred from DCU/meter to server and vice versa.

3.3.2.7.1 Data transfer from server to metering device

- Purchased Credit – This must be in energy units (KWh). The supplier is to detail the method employed.
- Program parameters – This will consist of switching tables, load management switching parameters (if available). These parameters should be transferred automatically without operator intervention.

3.3.2.7.2 Data transfer from Meters to DCU

- **Program parameters:** All parameter used to set-up the metering device when any parameter changed.
- **Tamper conditions:** All conditions indicating the state of tamper when any condition occurs

Reading function in the concentrator is realized to enable all reading combinations (through corresponding reading programs/sequences/ emergency readings) and the ones making sense.

3.3.2.8 Vending Station

See section 4 for reference.

The preferred method to connect to the database would be via web interface.
Creation of vending stations should be via company license not per vending station and should not be bound to PC (machine).

3.3.2.9 Hand Held Unit

The system must support the use of robust hand held units, preferably not laptops, to program and interrogate the metering devices in the field. The handheld unit must be able to perform the same

functionality as the software provided that is used for metering device taking into consideration the security where the hand held unit is only used for SELCO.

4. Vending Stations (client application)

4.1 vending station main requirements

1. The client stations work fine and perfect under Windows7 both 32/64 bit, Windows 10 both 32/64-bit Arabic and English version.
2. Security level for users at application level and data base level must allow assign single (or group of users) a set of allowed objects (functions or report sets). It must include:
    a. User permissions.
    b. SELCO team can define as many users and vending stations as they need.
    c. SELCO team can define any number of permission groups, vending category , tariff types , depts. , fixed charges.
    d. SELCO team can assign access level (read, write, execute) for any application form at any permission group.
    e. SELCO team can map any user to any permission group.
    f. Ability to limit access (allow or not allow access) for a user at specific vending station.
    g. User auditing must be included from start time of system.
    h. The operator account enables for determined quantity of KWH and by validity date.
    i. Server aapplication installation, deployment, testing must be included.
    j. All needed database license, installation, media must be included.
    k. Connect to the central database by TCP / IP or more secured protocol.
    l. The application should cover these points:
3. The proposed prepaid application must fit for bellow SELCO needs:
    a. Three STS prepaid servers; each server has his sales points / vending stations and a server application.
    b. Meters will be installed at three different servers, according SELCO needs.
4. Server, clients and database logs must be saved for future review with good utility to store/retrieve/ export logs, and must include all required fields needed by SELCO and can be changed as needed in future.
5. The possibility of programming step tariff at least 5 steps.
6. Time of Use Tariff must be included as a main function of the systems and Meter.
7. The tariff logs and history must save for future review at any time.
8. Vending station licensing through dangle or have a way to transfer license from one PC to another PC by SELCO team in case of PC failure is a must.
9. The credit transaction logs, for all vending stations, can be accessed for SELCO 3rd (PALPAY, …) must include: charging transactions, history, and API for online access and this API work in two ways, send & receive.
10. All API, web services, server application, vending client applications must be installed at SELCO premise and all software/API/services/web services/database/application must be at SELCO servers.

11. System must support Multilanguage interface (Arabic , English) with the ability to change interface language data by SELCO team for any language added to system .
12. All reports must be exported in the following formats (HTML , Excel , PDF , XML) with the ability to select the needed fields to be displayed by report .
13. All reports must be exported in the following formats (HTML , Excel , PDF , XML) and must support English and Arabic character set.
14. Customer vending receipt MUST be flexible to be changed by SELCO team according their needs, no restriction on updating receipt.
15. System must have a report generation ability to allow easily report making for any new needed reports.
16. CMS (Customer Management System) shall generate all types of tokens except credit token to transfer it to the meter with no needs to connect meter to customer.
17. Customer management system must have ability to deduct Fees and depts by these ways:
    a. Daily.
    b. Number of Times(from charge).
    c. Monthly.
    d. Percentage from total charge.
18. Local currency: NIS.
19. Adding new meters and new customers to system must be without limitation and no additional licensing is needed or additional fees.
20. Customer Management System shall give indicators for revenue, system transactions measurements, and status of resources components.
21. The online system shall be to handle at least 30 requests per second in parallel at same time.
22. SELCO must have ability to design vending receipt.
23. A standard vending operation shall be less than 15 seconds from request till token printing or programming.
24. Client application (vending station) shall work through VPN or VPN through internet network with client speed 1M symmetric and main server bandwidth of 8M symmetric, while number of client applications between 15 – 60 at each server.

4.2. Token

Token is the data transfer mechanism; the preferred mechanism is transfer data from the vending station to the meter.

Token Security:

a) The token must be generated from the CMS (Customer Management System) with SGC of SELCO , in other case SELCO can generate tokens with default SGC if its required .
b) The token generation (a hardware token generation device) must provide tokens in parallel, not serial generation, with more than 100 token at same time.

c) The data communication between the token and the vending station.
d) The data communication between the token and the meter.
e) Meter should not accept any external token which is not registered in SELCO system.
f) Token must be compliance with STS600-4-2 and IEC62055-41 Ed3 standards to guarantee validation of token after year 2024.
g) Data encryption must be included.

5. Smart meter system tasks

Please illustrate in steps (screen shots optional) how your software performs these minimum tasks:

1. **Monitoring**
   - Viewing the log of a task, background tasks, system events.
   - Viewing metering data.
   - Troubleshooting the PLC reading process.
   - Notification of system fails, like if push from data concentrator to system fails.
   - Viewing and modifying information on metering points.
   - Metering point state.
   - Enabling device active alarms.

2. **Reading devices**

   The reading model for both Scheduled readings that are used to schedule a reading according to a desired and Direct readings tasks that are used when you need to access reading data on-demand.
   - Creating scheduled reading tasks.
   - Creating a new unit group.
   - Creating a reading task.
   - Performing direct reading.
   - Modifying a unit group.
   - Creating a new control group.
   - Modifying a control group.
   - Deleting groups.
   - Creating a new task.
   - Executing an existing task.
   - Modifying a task.
   - Deleting a task.
   - Filtering.
   - Saving views with filters.

3. **Installing devices: used for installing new meters to the system**
   - Loading new devices to the system.
   - Loading new configuration files.
   - Viewing the log of an import operation.
   - Creating a new metering point connection.
   - Viewing metering point connections of a device.
   - Removing a metering point connection.

4. **installing data concentrators: used to import the Data Concentrator to the system**

- Deploying data concentrators process.
- Parameterizing data concentrators.
- Parameters on **General.**
- Parameters on **G3.**
- Parameters on **Alarms.**
- Parameters on **Communication**.
- Parameters on **Time/Date.**
- Parameters on **Security.**
- Creating default reading profiles.
- Creating default push profiles.

5. **Managing communication security: The model used to put security rules of communication between the system and the Data Concentrator (DC), and between the DC and the meters.**
    - Viewing security statuses of data concentrators.
    - Preparing the system for communication security.
    - Enabling WAN security.
    - Activating WAN security for a data concentrator.
    - Disabling unsecured communication ports.
    - Enabling PLC security.
    - Activating PLC security for a data concentrator.
    - Changing PLC security settings for a device.
    - Viewing security details of a device.
    - Managing the default security settings.
    - Adding a new security rule.
    - Modifying an existing security rule.
    - Deleting a security rule.
    - Viewing security events.

6. **Administration: user with administrative rights can use Administration for creating and managing users**
    - Logging in.
    - Updating Ware license.
    - User management.
    - Creating user accounts.
    - Modifying user accounts and user roles.
    - Deleting user accounts.

7. **Task Manager: scheduling and automatically executing various tasks according to predefined schedules defined by the users.**
    - Creating tasks.
    - Defining and modifying parameter details.

- Time range parameters.
- Time handling.
- Effects of Daylight-Saving Time (DST).
- Creating task flows.
- Modifying task flow parameters.
- Modifying runtime settings and task properties.
- Creating a copy of a task or a task flow.
- Executing a task or task flow immediately.
- Defining a schedule for a task or task flow.
- Monitoring tasks and task flows.
- Viewing the general log.
- Removing a task from the logs (clean up).
- Viewing the usage of a task or task flow.
- Cancelling task execution.
- Deleting tasks or task flows.
- Loading data from a CIS or AMR system.
- Loading data from AMR.
- Loading data from Customer Information System (CIS).
- Viewing the log of loaded metering's and quality data.
- Viewing invalid or rejected data.

8. **Validation: validating imported metering data according to a set of validation rules. In short, it allows you to check and validate the metering data's status information and the actual values**

    - Validation rules.
    - Creating a rule for periodic or profile metering's.
    - Checking the rule usage classes.
    - Viewing customer types and their rules.
    - Creating a rule for periodic metering of a certain customer type.
    - Modifying and deleting validation steps and rules.
    - Creating a task.
    - Defining task parameters.
    - Executing a validation task.
    - Viewing task results.
    - Modifying and deleting a validation task.
    - Checking the missing billing-period endings.
    - Comparing validation data.
    - Viewing and modifying the Execution log.
    - Re-validating, modifying and accepting metering that failed validation.

9. **Profile Calculation: calculating new profile metering values from existing profile values already stored in database. A calculation is performed according to a specified calculation formula**

    - Available arithmetic operations.
    - Available logical operations.
    - Components of Profile Calculation.

- Creating a new profile calculation.
- Specifying the calculation formula and its parameters.
- Selecting a profile calculation.
- Defining parameters for the calculation formula.
- Selecting profile groups.
- Selecting single profiles.
- Removing parameters.
- Defining a calculation formula.
- Profile-calculation tasks.
- Creating a task.
- Defining task parameters.
- Defining an input group as a variable in calculation formula.
- Executing an existing profile-calculation task.
- Profile conversion operations.
- Source metering mask.
- Viewing result profiles or other profile metering's.
- Modifying the values of a profile.
- Viewing the log of a single profile.
- Comparing profiles.
- Viewing calculation log.

10. **Tariff Calculation: converting profile metering data into periodic metering data to be used as the basis for billing**

- Tariff component.
- Tariff schedule.
- Seasons and week programs.
- Special days.
- Creating a tariff.
- Deleting a tariff.
- Creating a tariff component.
- Deleting a tariff component.
- Creating a validity schedule for tariffs.
- Defining day types and switching times.
- Defining seasons and week programs.
- Defining special days.
- Making exceptions to tariff schedules.
- Generating schedule entries for tariffs.
- Deleting a tariff's schedule entries.
- Tariff-calculation tasks.
- Creating a task.
- Defining task parameters.
- Executing a tariff-calculation task.
- Deleting a task.
- Creating periodicity rules.
- Deleting a periodicity.
- Creating and deleting period endings manually.
- Generating period endings.

11. **Data Browsing: viewing and analyzing the metering data stored in the Ware database. It is the operator interface for viewing and managing metering data, metering points, consumers and contracts**

- Data viewing.
- Data manipulation.
- Updating metering point or metering information.
- Queries, groups and templates.
- Browsing for existing groups of metering points, meterings, contracts or customers.
- Creating a static or dynamic group.
- Searching for metering points, meterings, contracts or customers.
- Changing group membership.
- Viewing the details of queries or groups.
- Checking device information.
- Checking group memberships.
- Event log.
- Viewing events of a metering point.
- Event report of a group.
- Power quality information of a metering point.
- Power quality report of a group.
- Viewing metering point states of a metering point.
- Searching metering points by state.
- Creating new metering.
- Profile metering data.
- Periodic metering data.
- Merging profile or periodic metering.
- Checking for missing values.
- Monitoring metering points without valid connection contract.
- Scheduling the reports.
- Creating and modifying contracts.
- Running a report from power quality information.
- Running a report of events.
- Tariff calculation in Data Browser.
- Tariff mapping.
- Creating a tariff mapping.
- Deleting a tariff mapping.
- Creating a special tariff schedule for a metering point.
- Deleting a special tariff schedule.
- Calculating tariffs.

-Illustrate in steps (and screenshots) how your system does at lease the following minimum functionalities:

- Meter G3 firmware update.
- Load control / “load limiting”.
- Remote Transfer of token.
- Remote transfer of Time of Use tariff (TOU).
- Remote Disconnect / Connect.

- Support Pre/Post pay switchable (back and forth) remotely.
- Quality of Supply events.
- Remote change of Quality of Supply from Device Management later.
- Do the periodic losses calculations.

6. System Management Software (Server Application- main centralized system).

The server application structure needed for SELCO Company is as bellow: we have three branches; each branch has sales points (vending stations) and a server application. A Distributed server application for three branches is needed to support this need.

6.1 Database Management System (DBMS)

a) Centralized application server using RDMS that can be work with MSSQL and Oracle database systems latest version (at least MSSQL2016 and Oracle 12).
b) All system transactions (server transactions and client vending station transactions) must be saved for auditing at the database. Full auditing is needed with all its needed features.
c) Work under windows environment or Linux/Unix OS.
d) The application must have certificate related to: software security, software development, and testing.
e) The system applying the replication routines with the vending stations.
f) Complete log/archiving utility for all transactions (Arabic , English)
g) Full MSSQL server license is needed that fit the needs of the application server.
h) Licensing for server is included for 3Years with 24/7 support.
i) Database is open for access by SELCO team and not closed to access.
j) Full control panel for the following functions:
    1. Users and permissions.
    2. Backup and recovery.
    3. Setup needed.
k) Integration utility with HULUL Billing system (bidirectional) to allow data migration from billing system to prepaid system and vice versa including (Customer data, charge data, Fees data, Tariff data, meter data) , data migration between billing and prepaid system must be in formal format at least (online data transfer) and support ODBC connection .

6.2 Data Transfer from CMS (Customer Management System) to the Meter:

a) Customer information's – that must be registered in the meter.
b) Purchased credit – by KWH or NIS.
c) Parameters & argument – date & time, friendly days, friendly times, alarm situations, load management switching parameters (if available). These parameters should be transferred automatically without operator intervention.
d) Relay on, clearing alarms and control segments, clear credit .

6.3 Application and Data Base Security:

a) The application should use data base security. for data encryption.
b) The system and data base should have several layers of system users.
c) Passwords protection. for login and must be encrypted.
d) Server application installation.
e) For G3 PLC meter, we need their protocol of the DCU for the STS application, we need to know the vending key of the meters to be able to manage meter by the application.
f) Application must support Meter remote framework upgrade.
g) Application must support Monitoring of low voltage network.
h) Application must support Large-scale scalable and data storage, and Horizontal scalability possibilities.

6.4 Application Program Interface API

Application program interface (API) is a set of routines, protocols, and tools for building software applications. An API specifies how software components should interact. A good API makes it easier to develop a program by providing all the building blocks.

Application apply IEC 61968-1 (Interface architecture and general requirements) standard (information exchanges between electrical distribution systems).

All needed API must be installed at SELCO premise and not outside SELCO premise and source will be owned by SELCO and open for SELCO team later use.

- The needed API are:
  1. **Vending API:**
     a. All needed transactions by vending stations is available through this API for customer charging transactions and vending station credit change.
     b. Full integration between main system (centralized management system) and the vending station is a must.
     c. **SELCO API for a mobile gateway (local mobile telecommunication companies) for smart meter vending,** needed functions are:

        - Customer send power meter code via vending station.
        - Data send by customer will be send to SELCO system for processing.
        - SELCO API feedback by the charge code need to be sent to meter.
        - A secure connection between SELCO and meter will be used to send customer meter code to SELCO API online and vice versa.
        - A secure connection, with well know standard is a must.
        - Integration utility by API online is must.

- A management application is included.
- Full reporting system for follow up, alerts of failed transactions, communication monitor, daily transactions.

2. API Applications:

API needed as bellow:

- Integration with SELCO 3rd partner (PALPAY) MUST include:
  d. Customer charging transactions.
  e. Vending station credit change through API online.
  f. Vending station credit change logs.
  g. Vending station credit balance logs.
  h. Integration utility by API and online is must.
- Integration with SELCO 3rd partner through API for a mobile application by web service standard for customer uses, must support bellow functions:
  a. Customer meter charge.
  b. Customers charging records view.
  c. Meter details view.
  d. Update customer main data like (mobile number, address, …).
  e. Integration with Billing system to view: customer bills, payment history.
  f. Integration utility by API and online is must.
- Integration with SELCO 3rd (Al-Haitham for Technology Development (HTD) partner through API for a mobile application by web service standard for customer uses, must support bellow functions for emergency cases vending: HTD API work as bellow:
  a. Customer send power meter code via SMS to short number (defined by SELCO).
  b. All SMS send by customer will be send to SELCO system for processing.
  c. SELCO API feedback HTD by the charge code need to be entered at meter.
  d. A secure connection between SELCO and HTD will be used to send customer meter code to SELCO API online and vice versa.
  e. HTD receive charge code (20 digit) from SELCO API, through secure connection, to be send to customer.
  f. HTD send SMS to customer with 20digit charge code.
  g. Integration utility by API online is must.

6.5Application server redundancy (high availability)

As per Redundancy and Failure Management, prepaid server application shall feature redundancy capabilities: to support high-availability, all core functionality shall allow for dual redundancy at minimum. When a failure of a primary server in a redundant group is detected, the system shall invoke the appropriate failover and restart actions so that functions assigned to the failed server are preserved. The failover shall be of such a nature as to provide seamless continued operation to the users.

7. SELCO STS Software (server application & vending station) terms and condition of use

Bidder must provide full running solution for servers and vending stations, this solution must cover bellow needs:

A. SELCO has SUPRIMA Standard Transfer Specification (STS, internationally recognized, having been published as an International Standard by IEC in 2007) software for server application and for client vending stations, details as bellow:

Server application:
STS Association Certification : STS-360.
Suprima Server : 5.1.0.32 (2018-10-29).
Java : Oracle Corporation (1.8.0_121).
Java VM : Java Hot Spot(TM) 64-Bit Server VM (25.121-b13).
Database Version : Microsoft SQL Server 2008 R2 (RTM) - 10.50.1600.1 (X64) Apr 2 2010 15:48:46 Copyright (c) Microsoft Corporation Standard Edition (64-bit) on Windows NT 6.1 (Build 7601: Service Pack 1).
Database Encoding : Arabic_100_CI_AS.
Locale / Charset :en_US / UTF-8.
Base Data : 5.1.0.201 (2016-11-08 00).
Installation Data : 5.1.0.41 (2017-07-20).
Application Data : 1.0.0.39 (2016-04-12).
Available Client : 5.1.0.18.
STS certificate as bellow:

THE STS ASSOCIATION

CERTIFICATE OF CONFORMANCE

This is to certify that the
VENDING SYSTEM SUPRIMA VER 4.X
ELECTRICITY, WATER & GAS
of
LANDIS & GYR (PTY) LTD
has been assessed
and found to satisfy
the requirements of the
Standard Transfer Specification

Tested for Compliance with: IEC 62055-41, IEC 62055-51
In accordance with the STS501, STS502, STS503
Compliance Test Specifications Entities: A-STS501-1-2 FDS; B-STS501-2-2 FDS; A-STS502-1-2 FDS; B-STS502-2-2 FDS; A-STS503-1-2 FDS;B-STS503-2-2 FDS
Ref: ESK/STS/13/005

DISCLAIMER
This certificate certifies that the certified product has been tested for compliance with the version of the Standard Transfer Specification (STS) current as at the date (as detailed above) of testing and that the certified product has been found to be STS compliant to the extent tested, as required by the STS Association. This certificate does not certify or imply STS compliance of every actual or potential feature of the certified product nor that the certified product is or will be interoperable with STS compliant products other than the certified product. In this regard, the STS Association does not and will not indemnify any person against claims of any nature that may arise out of the testing, certification, use, sale or distribution of the product and the STS Association is hereby indemnified against all liability for any claim by any party arising from any defect or other characteristic of the certified product.

16 August 2013
Date

For the STS Association

Certificate No. STS-360

Client vending station:
Client version 5.1.0.32.
Vendor: Landis+Gyr (Pty) Ltd.
Website: www.landisgyr.com/za.
Java VM: Java hotspot(TM) 64-Bit Server VM (25.73-b02).

According to STS standard, Bidder can use those software (server and vending station) if applicable and under his responsibility with all needed function mentioned at SELCO meter tender.

B. If current SELCO STS software will not be used, it will be the bidder responsibility to provide SELCO with all needs to guarantee the function according to SELCO meter tender and by following bellow needs:
   1. Server application with all needs mentioned at "4. System management software (server application)".
   2. Vending station with all needs mentioned at "3. Vending Station".
   3. Needed quantities for vending station will be upon SELCO request.
   4. Current SELCO installed meters running at SELCO STS software must work at Bidder proposed STS software, and need to be moved to it during tender. We will not use 2 STS software as STS Association is backed by Eskom and compels all members to make codes available for an exchange of vending systems to take place at any given time. STS standards require that all vending systems are internet and SMS based and are able to be accessed from anywhere around the world.
C. SELCO has currently 3 STS server application distributed over three branches and 64 STS vending stations distributed over three server applications.
D. Support contract must cover three year 24/7, and must cover all needs for update/change at current STS system and 3rd party changes.
   1. Scope of support services: SELCO current STS software OR if new STS software will be used, support contract will cover the new software.
E. Bidder must provide full commitment to accomplish all needs required by SELCO 3rd party to support system integration and function of system, SELCO 3rd party are:
   1. Al-Haitham for Technology Development (HTD): webservice/API mention at "6.4" Application Program Interface API" point 2.
   2. PALPAY : mention at "4.4 Application Program Interface API" point 1.
F. Copyright and all other proprietary rights of SELCO applications must be guarantee and fulfilled by Bidder with all relevant conditions, this cover SELCO applications and SELCO 3rd party applications.
G. Limitation of liability: under no circumstances shall bidder or any of its affiliates, subsidiaries, or divisions, be liable for any damages suffered by you, including any incidental, special or consequential damages (including, without limitation, any lost profits or damages for business interruption, loss of information, programs or other data) that result from access to, use of, or inability to use proposed application or due to any breach of security associated with the transmission of information, even if bidder was advised of the possibility of such damages.
H. Compliance with law: You agree to comply with all governmental laws, statutes, ordinances, and regulations regarding your Website use.
I. Bidder must provide certificate show STS compliance certificate according to STS association for a specific needs of electricity metering system.

8. Software Support and Maintenance Agreement (Service Level Agreement)

The supplier is requested to suggest a degree of Service Level Agreement. It is envisaged that the supplier provide a variety of options, these may include, but are not limited to, the following options:

- 24/7 telephonic support.
- Onsite support on request.
- Local support.
- Onsite support for a duration of one year.

Full support contract for 3 years is needed for server application and vending stations application issues for system update and customization needed.

Definitions:

- "**Error**(s)" means programming errors in the Software in the form provided by Wind River that prevent the Software from substantially conforming to its published specifications.

- "Error Category" means the severity class for Errors as further defined and set forth at the Wind River Support Network.
- "Patch(es)" means additional programming code to be integrated with the Software to correct an Error or alleviate its effects.
- "Project User(s)" means any Customer personnel who perform any duty or service for the Project, including, but not limited to, performing any development, testing and compiling functions for the Project.

Scope:

Server application.
Vending stations (all vending station).

The support contract must include the following:

- Official Releases and Updates to Software.
- Technical Support via Telephone, via Email, and on site.
- Priority Response to system errors, alerts, warning.
- Direct Bug Fix Updates.
- Annual Reminder.
- Errors and response time must be according bellow table:

Error category/ Severity Level	**Response time**	**Description**
Level A/ **critical impact**	1 Hour	major application or mission-critical system is stopped or so severely impacted that the customer cannot reasonably

		continue work, could have the following characteristics: • System hangs or crash situations. • Data loss or data corruption. • Critical functionality not available.
Level B/ **Significant impact**	4Hours	Important product features are unavailable with no acceptable workaround. The software may be operating but is severely restricted. Problems could have the following characteristics: • Product error or failure forcing a restart or recovery. • Severely degraded performance. • Functionality unavailable but the system is able to operate in a restricted fashion.
Level C/ **Nominal Impact:**	1 working Day	Minor problem or question that does not affect the software function such as How To's, documentation, general questions, or enhancement requests. There is no impact to product usage or customer's operations. Problems could have the following characteristics: • General requests for advice on product usage. • Clarification on product documentation or release notes.

		• Product enhancement request.
Level D / **system customization**	14 working days	All needed customization that do't prevent normal SELCO functions from work as normal.

- Ongoing Support.
- Patches. Supplier will make available to SELCO those Patches which have been published and made generally available to SELCO.
- Updates. Supplier will make available to SELCO one (1) copy of any Software. Updates (or as applicable, Upgrades) in the form the Software was originally provided. to SELCO (i.e., Object Code or Source Code) and one (1) set of documentation. Updates (or as applicable, Upgrades), as available for general release to the extent such Updates (or as applicable, Upgrades) apply to Software covered by this Agreement.
- 24x7x365 Emergency Support. Support must offer 24x7x365x3 Emergency Support to SELCO.
- Support for Third Party Software. If a programming error or non-conformity in a third party product being utilized by SELCO as part of a Project, which third party product interacts with one or more Software, Supplier will use commercially reasonable efforts to coordinate with the third party support provider and will use commercially reasonable efforts to assist such support provider in addressing the error or problem for Customer. All such support and maintenance is the responsibility of Supplier.

9. Training

The supplier is required to provide onsite training for the installation, commissioning and maintenance of all equipment. The supplier must provide a training schedule together with the bid. The training must conclude with a test for the trained personnel to ensure and verify competence. The training schedule will detail the various levels and types of training; this is envisaged to include, but is not limited to, training to the following personnel:

a) Installation technicians – for the installation, commissioning, maintenance and testing of equipment.
b) Administrative personnel – for the software application and vending environment.
c) Database and application personnel – for assistance and maintenance of the back office integration.
d) Installation technicians – for the installation, commissioning, maintenance and testing of equipment.
e) Administrative personnel – for the software application and vending environment.
f) Database and application personnel – for assistance and maintenance of the back office integration.
g) The cost of the needed prepaid meters software (MDM+ Prepayment + all provided applications) to be downloaded on the computers (the software will be the property of the purchaser).

10. Documentation

Supplier shall regularly document and update all relevant and necessary hardware and software related matters, and shall submit the entirety of such documentation either on paper or in a write-enabled electronic format.

11. Standards and certificate

The provided solution (systems, meter, testing, and manufacturing) must conform to the applicable standards for this type of equipment. These standards are:

- **BS EN61036**: 1996: Alternating current static watt-hour meters for active energy (Classes 1 & 2.)
- **BS5685: 1979: Part 1**: Specification class 0.5, 1 and 2 single-phase and Polyphase, single rate and multi-rate watt-hour meters.
- **Meter G3-PLC certificate from** www.G3-PLC.com.
- **Data Concentrator G3-PLC certificate from** www.G3-PLC.com.
- **IEC 62056 a**t least 62056-21:2002: Electricity metering - Data exchange for meter reading, tariff and load control - Part 21: Direct local data exchange. Also IEC 62056-42, IEC 62056-46,IEC 62056-47,IEC 62056-53,IEC 62056-61,IEC 62056-62 if applicable.
- **IEC 62055-41**: Electricity Metering-Payment systems. Part 41: Standard transfer specification (STS)-Physical layer protocol for one-way numeric token carrier systems.
- **IEC 62055-31**: Electricity Metering-Payment systems. Part 31: Particulars requirements for static payment meters for active energy (classes 1 & 2.).

- **IEC 62055-51**: Electricity Metering-Payment systems. Part 51: Standard transfer specification (STS)-Physical layer protocol for one-way numeric and magnetic card token carrier systems.
- **IEC 62055-51**: sets out a framework for the integration of standards into a system specification for electricity payment metering systems.
- **IEC 62056**: Electricity metering - Data exchange for meter reading, tariff and load control.
- **IEC 62052-11:2003** : Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment.
- **IEC 62053-21:2003**: Electricity metering equipment (a.c.) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2).
- The meters should support DLMS/COSEM protocol.
- **IEC 61968-1**:(Interface architecture and general requirements) standard (information exchanges between electrical distribution systems).
- **ISO 9000/9001 if applicable.**
- **ISO14001:2015 if applicable.**
- IEC EN 61000-4-2: Testing and measurement techniques - Electrostatic discharge immunity test.
- IEC EN 61000-4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test.
- IEC EN 61000-4-4: Testing and measurement techniques-Electrical fast transient/burst immunity test.

The Bidder Must Fill The Following Table With All The Required Data

The supplier is asked to show his compliance for above mentioned specifications and comply with the following compliance tables, and provide the supporting documents& certificates, if the Supplier failed in providing any of the following certificates and evidences he will be considered non comply and non-eligible for entering the technical and financial evaluation stage:

- Fill the following compliance table

No.	Required data	Offered Data
1.	Vending stations license type.	
2.	Software update/ upgrade service.	
3.	Back end database (Oracle database and SQL server).	
4.	Mobile vending.	

Note:
All bidders shall fill and submit the following specification table with the required information along with the technical offer

No.	Required data	Offered Data	Page Number
1.	IEC specs and standards.		
2.	Supplying period.		
3.	Quality Certificates for metering devices ,DCU and software.		
4.	Place of manufacture.		
5.	STS compliance certificate for Metering Device.		
6.	STS compliance certificate for software.		
7.	Lifetime of meters and DCU.		
8.	Degree of protection for metering device ,CIU and DCU.		
9.	Warranty .		
10.	Software and communication Security.		
11.	Meter accuracy.		
12.	Type of memory.		

13.	Voltage range for meters and DCU.		
14.	Current range for meters.		
15.	THD for meters and DCU.		
16.	Over voltage protection.		
17.	Under voltage protection.		
18.	Anti-Tamper Provision.		
19.	Lightning Protection.		
20.	Short circuit current.		
21.	Bidirectional counting.		
22.	Tamper sensor .		
23.	Tariff policy.		
24.	Self-Diagnostic.		
25.	PLC communication type between meter and keypad.		
26.	PLC communication type between meter and DCU.		
27.	Audible alarm.		
28.	Visual alarm .		
29.	Friendly credit criteria.		
30.	minimum period for data storage without electricity for meters and DCU.		
31.	Operating conditions – temperature.		
32.	Operating conditions – humidity.		
33.	Type of screen.		
34.	Number of screen digits.		
35.	Back light of screen.		
36.	life time of contactor.		
37.	Capacity of contactor (ampere) for one and three phase.		
38.	Meter Housing.		

39.	Shelf life time of battery .		
40.	Life time of battery .		
41.	Battery with super cap.		
42.	Real time clock accuracy (second / day) .		
43.	Communication distance between meter and CIU.		
44.	Communication distance between meter and DCU.		
45.	Maximum number of meters that can communicate with one DCU.		
46.	DCU Storage Capacity.		
47.	DCU Hardware Monitoring.		
48.	DCU communication encryption type with AMM center.		
49.	Maximum number of customers to be added on the MDM		
50.	Type of integration .		
51.	Service Level Agreement.		
52.	Meter certification.		
53.	Provision for MDM and Vending system license.		
54.	Software update/ upgrade service.		
55.	database type (SQL).		
56.	Mobile vending.		
57.	Vending stations licensing mechanism .		
58.	Adding meters and customers in CMS without limitation and without licensing.		
59.	Multi language interface (Arabic , English).		
60.	Reporting function(exporting and form Arabic&English).		

61.	**Database management system.**		
61.1	Login/ encryption/ installation.		
61.2	RDMS support MSSQL2008 & Oracle database systems latest version.		
61.3	Database auditing.		
62.	**47 Server Application and vending station application:**		
62.1	Integration with SELCO 3rd partner		
62.2	Integration with SELCO Billing system .		
62.3	System support high availability.		
62.4	Logs and history (Auditing) management for future review at any time.		
62.5	Compatibility with SELCO architecture.		
62.6	Users/permission/group/mapping dynamically + ability to control access (allow or not allow access).		
62.7	Software standard and certificate included.		
62.8	Token validity and compliance with needed certificate.		
62.9	Official certificate provided.		
62.10	Recommendation letters of previous installed systems.		
63.	**API application.**		
63.1	All Features included.		
63.2	Integration is covered with 3rd application.		
63.3	Availability and location of API.		
63.4	Vending station – centralized main system integration.		
63.5	Type of integration.		
64.	**Support contracts.**		

64.1	All objects covered.		
64.2	Period and yearly fees of contract.		
64.3	Response time compliance.		
65.	**certificates**		
65.1	STS compliance certificate		
65.2	G3-PLC communication for meter and DCU approved		
65.3	Maximum communication distance with CIU		
65.4	Software and data certificate		
65.5	Testing certificate		

Technical Evaluation

The technical evaluation represents 70% of the total evaluation , technical evaluation shall consider the following points and weights:

NO.	Item	Degree
1.	Company compliance of delivering the required items.	20
2.	Delivery schedule.	10
3.	Place of manufacture.	40
4.	Quality Certificates.	50
5.	Training of SELCO team.	10
6.	Level of protection.	10
7.	Life time of meter (year).	100
8.	Warranty of meter replacement.	70
9.	Meter current (Ampere).	20
10.	Meter energy consumption.	20
11.	Meter accuracy.	20
12.	Current limiting.	20
13.	Bidirectional counting.	20
14.	Tamper sensor.	20
15.	Tariff policy.	20
16.	Audible alarm.	20
17.	Visual alarm.	10
18.	Reserve credit.	20
19.	Minimum period for data storage (year) without electricity.	30
20.	Operating conditions – temperature.	20
21.	Operating conditions – humidity.	20
22.	Type of screen.	10
23.	Viewable data in LCD.	50
24.	Back light of screen.	20
25.	Type of contactor.	40
26.	Capacity of contactor (ampere).	40
27.	Type of memory.	100

28.	Back up source	50
29.	Level of Lightning Protection.	20
30.	Starting current (ampere).	20
31.	Control of vending credit.	20
32.	Brand manufacturer profile.	100
33.	Compatibility and vision of manufacturer and their product.	100
34.	Supplier experience in prepayment systems.	100
35.	Certificate (meter, ALT ,SLT,EMC, software, testing, communication, and data).	180
36.	Meter stability and reliability.	100
37.	Server and vending station compatibility and integrity with existing SELCO systems.	200
38.	Adding meters and customers in the system without limitation and licensing.	100
39.	No Limitation of adding tariff types, depts., fixed charges.	40
40.	No Limitation of adding users, group of permissions, mapping user to group.	40
41.	API integration with 3rd parties.	40
42.	Providing all ways of deduction and refunds in the system.	100
43.	System support and technical support team CVs.	40
44.	Data transfer mechanism (two way).	40
45.	Server application features.	40
46.	Vending station features.	40
47.	Vending stations license mechanism.	40
48.	Vending methods.	60
49.	Token Security, validity, and processes.	50
50.	**Smart meter system functions** a) Monitoring. b) Reading. c) Installing devices. d) Installing data concentrators. e) Managing communication. f) Administration. g) Task Manager. h) Validation. i) Profile Calculation. j) Tariff Calculation. k) Data Browsing. l) System Illustrate in screenshots.	450

51.	**Data Concentrator (DC):** General specs. G3-PLC interface. DC Software.	300
52.	**DCU data communication (features and certificate)** Meter – DCU. Main system – DCU.	200
53.	**Meter data communication (features and certificate)** Meter-CIU. Meter-DCU**.**	200
Grades		**3500**
Grades Percentage / 70%		**70%**

- **reference list where your Meter is installed, show please the contract, number of metering points, customer name and full contacts.**
- **Recommendation letters**