THE HASHEMITE KINGDOM OF JORDAN

IRBID DISTRICT ELECTRICITY COMPANY LTD.

METERS DATA MANAGENEMT SYSTEM AND HEAD END SYSTEM

TENDER No.46/2020

Amendment Documents

VOLUME 1 OF 2 VOLUMES

Instructions to Tenderers; Form of Tender, Tender Bond, Agreement, Advance Payment and Performance Bond; and Schedules

THE GENERAL MANAGER
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Tender Document Cost = 125 JD

IRBID DISTRICT ELECTRICITY COMPANY LTD.

METERS DATA MANAGENEMT SYSTEM AND HEAD END SYSTEM

TENDER No.46/2020

INDEX TO VOLUME 1 OF 2

APPENDICES

INSTRUCTIONS TO TENDERERS

1 GENERAL

1.1 The Works will be carried out in six districts in IDECO and are directed towards connection with the all substations.

1.2 The Project Area is spread out over all IDECO's concession area. Tenderers shall visit the sites to check all routes and locations, and to ensure that they fully understand the proposals contained in the specification before submitting their tender.

1.3 The Scope of Work covered by the Specifications includes the supply and installation of all items, whether mentioned in detail or not, to complete the installation and/or supply and put it into operation successfully according to the requirements of this specification.
The Technical Specification contains functional and qualitative requirements, which shall be a basis for detailed design being a part of the Works. Since this is a functional specification, the Tenderer may always propose a solution of higher or equal quality to the one specified in this document.
The Tenderer shall in his design consider the distance between the different locations, Environmental impact of installations and interference in communication links.

1.4 The Tendering Procedures will be those of a functional procurement, with basic requirements given in this document to be fulfilled by the Tenderer.

1.5 The Technical Specifications defines the Scope of the Works, qualitative and quantitative requirements, but leaves the detailing of the Works to the Contractor, who has to carry out all the necessary works and supplies. The Tenderer is responsible to inform himself about the actual status of the different sites.

1.6 The Contractor shall fully comply with Jordan legislation, including but not limited to the relevant labour laws.

2 TENDER DOCUMENTS

Each set of tender document consists of:

- Volume 1 - Instructions to Tenderers; Form of Tender, Tender Bond, Agreement, Advance Payment and Performance Bond; and Schedules;
- Volume 2 - Conditions of contract and Technical Specifications.

3 CONDITIONS OF CONTRACT

3.1 A complete supply and erection contract is required in accordance with the applicable Condition of Contract (International) for Electrical and Mechanical works (including erection on site) as prepared by the International Federation of Consulting Engineers (FIDIC), First Edition May 1963, reprinted May 1983 with modifications.

3.2 If the Tenderer has any doubt as to the meaning of any portion of the General Conditions or of the Agreement or of the Specification of Drawings, he shall, when submitting his Tender, set out in his covering letter the interpretation on which he relies.

3.3 The Employer reserve the right to order this tender partially among different tenderers regarding to project scope; i.e. split award.

3.4 Tenderers shall include all requirements in their tender. Tenderers who do not include all requirements will be rejected.

4 SPECIFICATION AND STANDARDS

4.1 Where compliance with an IEC or other standards is called for, the standard used (unless a standard date is given) shall be that in force at the time of tender.

4.2 References to brand names or catalogue numbers, if any, in the Specification have been made only for that equipment for which it has been determined that a degree of standardization is necessary to

maintain certain essential features. In certain instances such references have also been made for purposes of convenience to specify the requirements. In either case offers of alternative goods which have similar characteristics and provide performance and quality at least equal to those specified will be considered on their merits.

4.3 The Tenderer shall detail in the relevant Tender Schedule in order of the relevant clauses, a statement of any departures from the Specification.

4.4 If the Tenderer offers materials or equipment which conform to Recommendations or Standards other than those specified, full details of the differences between the proposed Recommendations or Standards, in so far as they affect the design or performance of the equipment, shall be submitted with the Tender.

5 TENDERERS ELIGIBILITY AND QUALIFICATIONS

The documentary evidence of the Tenderer's qualifications to perform the contract shall establish to the Employer's satisfaction:

5.1 That, in the case of a Tenderer offering to supply Plant and Equipment under the Contract which the Tenderer does not manufacture or otherwise produce, the Tenderer has been duly authorized by the manufacturer or producer of the Plant and Equipment to supply them in the Employer's country for this specific tender.

5.2 In the event that the intended contract signatory does not manufacture one or more of the main sections of plants, then the Tender submitted should give satisfactory evidence to show that all the obligations imposed by the document on the intended signatory have been fully understood and accepted, where applicable, by the manufacturer(s) to whom it would be intended to sub-contract one or more of the main sections of the plant. See also the General Conditions of Contract.

5.3 The Tenderer’s shall provide financial statements for the last 3 years.

5.4 Evidence for technical and production capability necessary to perform the Contract.

5.5 The Tenderer shall have completed facilities involving plant and equipment rated as specified, or greater, of equivalent complexity, and on a similar Turnkey basis, on at least four previous assignments in at least three different countries within the last 5 years. Documentary evidence from the end users must be provided.

5.6 The Tenderer shall provide documentation, certified by the owner, to show that the equipment to be supplied, having the specified rating of voltage and capacity and the same place of manufacture, is in successful commercial service for minimum of 10 years in three different countries.

5.7 Evidence is to be supplied with the tender to show the nature of the erecting organization and its relation to the intended signatory to the Contract.

5.8 Evidence is also to be supplied to show the competence of the erecting organization to undertake installation of the type of construction specified together with details of specialized staff which are to be provided in Schedule (U) of this Volume.

5.9 Information shall be supplied as required by the Schedule of Tenderer's Experience contained in Schedule (W) of this Volume. Failure to supply all required qualification documentation (i.e. equipment end user certificates, Tenderer's experience documentation) to the satisfaction of the employer will result in rejection of the tender.

5.10 The main subcontractor shall have supplied equipment which has been in commercial operation as stated in (4.6) above. This requirement applies to equipment from same manufacturing unit which will supply the equipment for this project; experience of other manufacturing units within the subcontractor's organization is not acceptable.

5.11 Foreign Tenderers must submit their tender through a registered local agent or through their registered office in Jordan. It is a

Jordanian Government requirement that every Tendered must have a Local Agent who shall be a person or firm of Jordanian Nationality having a valid trade license and registered with the relevant Local Authorities.
Evidence is to be supplied with the Tender to show appointment of or partnership with such a Local Agent. Tenders not accompanied by such evidence will not be considered.

5.12 The Tender that do not include the satisfactory evidence according to the Qualification Criteria, APPENDIX A, will not be considered by the Employer.

5.13 Provided certificates to show that the manufacturer do all type tests required from IEC standards in reputable laboratories.

5.14 The Tenderer and the Vendor must have a certified quality management system that conforms to ISO 9001.

5.15 No such entity or sole Tenderer shall participate in the preparation of another Tenderers Tender for the same Contract. If any entity is found to have participated in two or more Tenders, other than alternative Tenders from the same Tenderer, all such Tenders will be rejected.

5.16 Local Resources

Company No.	
Name of the Company	
Contribution/ Part (Joint Venture Partner, Subcontractor, Supplier, etc)	
Jordanian Ownership [%]	
Etablished in Jordan [year]	
Staff of Jordanian Nationality [%]	
Percentage of the total work performed by the Company [%]	
VAT Number	
Percentage of the Total Works [%]	
Description of the works to be carried out by the Company	

5.17 The Tenderer shall have an ISO Certification including 9001:2008 and 14001:2004;

6 PREPARATION AND COMPOSITION OF TENDER

6.1 The Tender documents shall be divided in two parts**: (i) Technical Proposal; (ii) Financial Proposal.**

The Tender must be made in duplicate on the accompanying Forms of Tender with all blanks therein and in all the Schedules duly filled up in ink and signed. The Tender Price must include all incidental and contingent expenses. In particular the Form of Tender must be completed and signed without alteration.

Tenderers are particularly directed that the amount entered on the Form of Tender shall be for performing the Contract strictly in accordance with the bound document and shall be the sum total of all the amounts printed into and entered by the Tenderer upon the Schedule of Prices .

Should the Tenderer consider that he can offer any advantages to the Employer by a modification to the Specification he may draw attention to such by an attached document stating the change in the amount of his Tender if such modification is accepted by the Employer, but the total entered on the Form of Tender is to be such as represents compliance with the bound document.

6.2 No alteration is to be made in the Form of Tender or in the Schedules thereto except in filling up the blanks as directed.

If any such alterations are made or if these instructions are not fully complied with the Tender may be rejected.

The Tenderer however, is at liberty to add further details that he may deem desirable and, in the event of this so doing, must print or type such details and annex the added matter to the Tender submitted by him. Such additional details shall not be binding upon the Employer unless they are subsequently incorporated in the Contract

6.3 If after the receipt of Tender a discrepancy is found between the totals in the Schedules of rates and that obtained by adding the products of the quantities and rates, the Rates indicated in the Schedule shall govern, and any errors thus found shall be corrected by the Employer. The Tender sum so corrected shall be considered

binding. If there is a difference of price in writing and in numerals the amount shown in writing shall govern.

6.4 The Employer will not be responsible for, nor pay for, any expense or loss which may by incurred by a Tenderer in the preparation of his tender.

6.5 All correspondence in connection with this Tender and contract and all matter accompany the Tender which is relevant to its examination is to be in the English language and all quantities and dimensions are to be expressed in metric units .

6.6 The Tenderer shall state the Tender Price in Jordan Dinars.

6.7 Tenderer's attention is drawn to the fact that this is a turnkey contract and as such the successful tenderer will be responsible for the overall design in accordance with the technical specification and schedules and to the approval of the Engineer and Employer. The complete cost of design, supply, installation and commissioning of all equipment and works for a satisfactory and safe working scheme is deemed to be included in the Tender Price, even if all individual items necessary have not been specifically mentioned in the tender documents.

6.8 Tenderer is expected to duly fill in the applicable Schedules A-E, I-L, N-P and T-W.

7 TENDER AND PERFORMANCE BONDS

7.1 The tender shall be accompanied by a tender bond in the form of a bank guarantee (valid for at least 120 days) or a certified cheque in favour of and payable to the Employer for a sum equal to 5 percent of the total tender price, as a guarantee of good faith. The bond should be issued through a bank in Jordan.

The Tender Bond will be returned to unsuccessful Tenderers as soon as possible after awarding the contract. However, the Employer may at his discretion retain the Tender Bond until such time that the successful Tender has establishes a Performance Bond. In the case of the successful Tenderer, the Tender Bond will, subject

to the Conditions of Contract, be returned as soon as a performance Bond has been entered into.

Should a successful Tenderer fail, or refuse to execute the contract and/ or to provide a Performance Bond to the Employer's approval within one month after receipt of the Letter of Acceptance the Tenderer will be considered to have abandoned his Tender and the amount of the Tender Bond lodged with the Tender shall thereupon be due and owing to the Employer as liquidated damages for such failure or refusal. The Employer may thereupon award the Contract to another Tenderer, who shall then be deemed to be the successful Tenderer.

7.2 The Tenderer shall enter in his tender the name or names of the Sureties, Insurance Company or Bank proposed for guaranteeing the performance of the Contract.

8 TENDER VALIDITY

The Tender is to be held open for acceptance or rejection for a period of four months from the date specified for the delivery of tenders.

9 WITHDRAWAL OF TENDERS

Tender may be withdrawn by official request received from the Tenderer prior to the time fixed for opening. If for any reason the tender should be withdrawn after the time fixed for opening and before expiry of the said period, the Employer has the full right to retain the full value of the Tender Bond.

10 ACCEPTANCE OF TENDER

The Employer does not bind himself to accept the lowest or any tender, nor to assign any reason for the rejection of any tender, nor to purchase the whole of the materials and plant specified.

11 SUBMISSION OF TENDERS

11.1 All bids must be accompanied with a Bid Bond of a value not less than 5% of the highest alternative tender price, otherwise your tender will not be considered. The bid bond shall be enclosed in the same envelope of the tender and must be deposited in allocated box placed in tenders secretary office located in supplies department **not later the 2pm, Jordan local time, due January 12, 2022,** and according to the following address:

THE GENERAL MANAGER
Irbid District Electricity Company Ltd.
P.O. Box 46 Irbid 21110
The Hashemite Kingdom of Jordan
Email: ideco@ideco.com.jo
Website: www.ideco.com.jo
Fax: + 96227245495

Each copy of the tender shall consist of Volume I of the documents issued, filled up as directed, accompanying supplementary information and Volume II, together with the drawings called for. One set shall be marked "Master Copy "and the other set "Duplicate Copy". With each copy of the tender a CD-ROM or equivalent storage medium will be provided containing electronic readable files making up the tender. The tenderer will ensure these files are read-only.

11.2 The Tenderer shall submit the Tender in two separately sealed envelopes one for Technical and the other for Financial proposal. Each copy of the tender should be enclosed in a secure envelope endorsed "Meter Data Management System and Head End System", but bearing no other mark from which the identity of the tender can be ascertained. Technical proposal shall not indicate any prices. All prices shall be shown in the financial proposal.

11.3 Both copies of the Tender documents should be delivered by the time stated in the covering letter. No tender received after that time will be considered.

11.4 Should there be any discrepancies between entries in the Master Copy and Duplicate Copy, the entries in the Master Copy shall be deemed to be correct.

11.5 Tenders received prior to the time stated for opening will be securely kept, unopened. Tenders received after that time will be rejected. The Purchaser accepts no responsibility for premature opening of tenders not properly addressed or identified.

11.6 Tender Submission Check-List

In conjunction with and as explained in the Instruction to Tenderers' clauses, the following is a check-list of documents to be enclosed with the Tender.

List of Documentation to be submitted with the Tender	**Submitted**	**Not Submitted**
Volume I		
Volume II		
Completed Form of Tender		
The Original Bid Bond		
Tender Compliance Letter		
Completed Schedules		
Technical Specifications		
Technical Drawings		
Completed Appendix A, Annex 1, Specifications Compliance Matrix		
Completed Appendix B, Site Inspection Form		

The aforementioned documents shall also be available in soft copy (CD-ROM).

12 EVALUATION OF TENDERS

12.1 Prior to the detailed evaluation of Tenders, the Employer will determine whether each Tenderer is eligible and whether each Tender is substantially responsive, to the requirements of the Tender Documents.

If a Tenderer is found not eligible or a Tender is not substantially responsive to the requirements of the Tender Documents, it will be rejected by the Employer.

The Employer will only evaluate and compare the Tenders, which have been determined to be substantially responsive to the requirements of the Tender Documents.

The Tender Price Schedule will be checked prior to the signing of the Contract in order to ascertain that the items are correctly extended at the rates quoted. Should any arithmetical error be found, it will be corrected and the Tender Price will be amended accordingly. Tenderer will be informed of any arithmetical adjustment made should the Employer wish to further consider his Tender, and he will be required to certify its acceptance.

Arithmetical errors will be considered as follows: If there is a difference between the unit price and total price that is obtained by multiplying the unit rate and quantity, the unit rate shall prevail and the total price shall be corrected. If the price for items is left out, it will be considered included in the price for other items.

The amount entered in the Form of Tender may be considered acceptable as the Contract Amount without any of the corrections and adjustments. If there is a discrepancy between words and figures, the amount in words will prevail.

If there is a discrepancy between the amount entered in the Form of Tender and the equivalent sum computed on the basis of the Schedules, the Employer may make corrections and/or adjustments. The Tenderer shall be notified accordingly, specifying each error, correction and adjustment. If the Tenderer does not accept these notified corrections and adjustments, the Tender may be rejected.

To assist in the examination, evaluation and comparison of Tenders, the Employer may ask any Tenderer for clarification of his Tender, including breakdowns of unit rates and lump sum prices. The request for clarification and the response shall be in writing. No change in the price or substance of the Tender shall be sought, offered or permitted except as required to confirm the

correction of arithmetic errors discovered by the employer during the evaluation of the Tenders. Financial and technical documentation required according to the Tender documents cannot be added during the evaluation.

The Tenderer shall be prepared to present their offered system at a meeting to be held in IRBID at a time to be communicated to the Tenderer during the Evaluation period

The Tenderer shall make it possible and arrange for the Employer to visit a reference project where the offered Meter Data Management System and Head End System is installed and up-running.

12.2 For the purpose of comparison of tenders, the exchange rates ruling in Jordan (as issued by the Central Bank of Jordan) on the tender closing date shall be used. However, should there be a change in the value of the currencies before the contract is awarded, the Employer may at his discretion carry out a final comparison using the exchange rates ruling immediately before award is made.

12.3 The Tenderer must not alter his Tender once it has been opened. The Employer may ask any Tenderer for clarifications. Each Tender will be checked in detail to assess compliance with the Tender requirements and completeness of information requested. If the Tender deviates from the Tender requirements it may be rejected.
Technical and Financial parts of the Tender shall be evaluated based on the evaluation criteria, with weightings 60% and 40% respectively.

12.4 **Technical evaluation criteria:**

General Experience in the field of Meter Data Management System and Head End System, world wide	15%
Specific experience in the last five years and documented Client's satisfaction in the region (Arabic speaking countries)	25%
Compliance with IDECO specifications & tender requirements	50%
Relevant experience of the key personnel proposed in the project team	10%

Each of the technical evaluation criteria will be evaluated and will receive a score. The total score is the weighted sum of the individual scores and the percentage in the table above.

12.5 **Financial Evaluation Criteria:**

Financial standing of the Contractor documented by auditor's report shall be reviewed.

The price value will be calculated according to formula:

$$P = \frac{C_{l.p}}{C_p} \cdot S_p$$

Where:

- $C_{l.p}$ is lowest price offered;
- C_p is price of the proposal,
- S_p is the maximum score for proposal "p".

The final score will be calculated as follows:

Total score = 40%*Financial score + 60%*Technical score

13 TIME SCHEDULE

13.1 The time for completion of total project shall be 12 (twelve) months excluding 15 days for mobilization and Employer's commissioning. The Tenderer shall complete the Time Schedule of the Tender Schedule (V) entering therein, individual items and dates, ex-works, shipment and delivery to site, erection and commissioning and completion of the Project.

13.2 Project implementation Time Schedule Plan shall be enclosed.

13.3 The warranty period shall be 18 (eighteen) months from the date of taking over works.

14 LOCAL CONDITIONS

14.1 Means of Transportation of Contractor's Personnel and Equipment

The Contractor shall be entirely responsible for all transport of his personnel and all materials in connection with the works. All such transport shall be provided by the Contractor free of charge and at no additional cost to the Employer.

14.2 Customs/ Import Fees

Tenderers must check, and make all due allowance in their tender for customs, seaport handling fees, and all other fees and expenditures required for the import of equipment into Jordan.

14.3 Construction and Checking at Site

The Contractor shall submit to the Employer, for approval and discussion, his proposals and plans as to the methods and procedures to be adopted for the construction of the Works.

Tenderers shall list in their tender details of all constructional equipment they propose to use on site.

The carrying out of all work included in the contract shall be supervised by a sufficient number of qualified representatives of the Contractor, the senior, of which is hereinafter referred to as the Superintendent. Full facilities and assistance are to be afforded by the Contractor and his Superintendent to the Employer to check the works.

The Superintendent on site, or his nominated deputy, is to be given full responsibility from the Contractor to enter into negotiations and take, if necessary, any required action regarding points arising from the construction, so that the works may proceed with as few interruptions as possible.

The Superintendent, witnessed by the Employer, shall check all electrical and mechanical connections of all plant supplied under the contract before such plant is brought into commission.

Notwithstanding witness by the Employer the Contractor shall be fully responsible for the correctness of all such connections.

14.4 Storage

The Contractor shall make arrangements to secure necessary area(s) at the sites for the storage of materials, plant and equipment solely for the execution of this contract. In addition the Contractor shall organize a covered area for the storage of materials, plant and

equipment which cannot be stored outside without deterioration. The locations of all storage areas shall be to the approval of the Employer. The storage areas shall be accessible to the Employer at all times. The Contractor shall ensure that suitable equipment is available for off-loading, transporting and handling of all equipment at site.

The handling and storage of all materials, plant and equipment at site shall be at the risk of the Contractor until a Final Certificate of Completion is issued. It is recommended that the storage compounds should be fenced and guarded.

The Contractor shall protect all materials, plant and equipment against corrosion, mechanical damage and deterioration during storage and construction on site. Such protection shall be to the approval of the Employer.

The Tenderer shall provide with his Tender details of the areas both uncovered and covered and their proposed locations.

14.5 Supplies

The Contractor shall be entirely responsible that proper services are available at the site for the administration offices, construction working, including a reliable electrical supply and distribution system, messing, food, beverages, potable water, ablution facilities and rubbish disposal. A minimum of one meal per day shall be provided for all staff and labour. The substitution of payment in lieu of meals is not permitted. The provision of these services shall be the Contractor's sole responsibility and cost, and no allowances shall be made in the tender for provision of these services by the Employer, either in whole or part.

The maintenance of these systems shall be such that undue failures do not occur, and that when unavoidable failures do occur, maintenance facilities are available to ensure their speedy return to service. Routine preventative maintenance is to be carried out frequently and regularly. All areas of the site are to be kept clean and tidy at all times. All rubbish, discarded packing material off-cuts etc. are to be removed to a single collection point for disposal off-site at regular intervals as directed by the Employer.

Ablutions shall be kept clean at all times to prevent a health hazard occurring.

14.6 Accommodation

The Contractor shall be entirely responsible for all accommodation of his personnel, and for provision of all other facilities regarding the accommodation and the entire cost therefore.

The Contractor shall include in his tender for his own office space and solely using of one furnitured room for the Employer site Supervisor, including all necessary office equipment, material and supply.

14.7 Occupational Health and safety

The Contractor shall maintain for the project works all requirements pertaining to OHSAS 18001.

14.8 Environment

The Contractor shall maintain for the project works all requirements pertaining to ISO 14001.

14.9 Electricity

The Contractor shall provide his own supply of electricity at his own cost. At the construction sites there may be supply of electricity by the Employer.

14.10 Water

The Contractor is responsible for his own water supply at his own cost. The Employer cannot guarantee the quality of the water at the different sites.

14.11 Employer visit for design meeting/workshop

The Tenderer shall include costs for the Employer's representatives to attend design meetings and workshops at the Contractor's premises.

15 SITE VISIT

15.1 Notwithstanding any information which may be contained in the Tender Documents, Tenderers must prior to submitting Proposals visit the Sites and make independent inquiries as to the Work forming the subject of this project as well as the prevailing local conditions, and obtain for themselves at their own expense, all

information and investigations on all matters that may in any way affect the design, scope of supply, prices, risks or obligations of the Tenderer. The Tenderer must consider all other matters and possible contingencies affecting the entire Scope of Work.

15.2 Any neglect, delay or failure on the part of the Tenderer to obtain reliable information upon the foregoing or any other matter affecting the design, scope of supply and completion periods of the plant and equipment complete for commercial operation shall not relieve the successful Tenderer from his responsibilities, risks or liabilities until Final Acceptance of the Work.

15.3 The Tenderers shall visit the Sites to familiarize themselves of conditions and existing plant. Permission to visit shall be obtained from the Employer by the way of making a written request. Evidence of Site visit by a duly authorized representative of the Tenderer confirmed by the operating personnel at Sites in writing shall be provided with the Tender. Tenders submitted without this evidence may not be considered.

15.4 Persons, firms or companies proposing to tender and any of their employees or agents will be granted permission by the Employer to enter upon his premises and lands for the purpose of inspection in connection with the proposed tender, but only on condition that such persons, firms or companies will release and indemnify the Employer and his employees and agents, from and against all liabilities in respect of, and will be responsible for, personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage, costs and expenses however caused (whether by the act or neglect of the Employer or his employees or agents or not), which, but for the exercise of such permission would have not arisen.

15.5 Before submitting the Tender, the Tenderer shall read the Tender Documents carefully and satisfy himself of the tasks, risks, obligations, liabilities and responsibilities to be undertaken in the Contract. The Tenderer shall acquaint himself with the Conditions of Contract, the laws of the Hashemite Kingdom of Jordan, the site of work, and specification of the equipment specified in the Tender Documents.

15.6 Neither the Employer nor any of its employees, nor any agents of the Employer, has any authority to make representation or explanation as to the meaning of the Tender Documents, or as to any other matter or thing concerning the Contract, so as to bind the Employer or to bind or fetter the judgment or discretion of the Consultant in the exercise of his powers and duties under the Contract except in so far as the Employer may issue a Circular Letter or Addendum amending or explaining the Tender Documents.

15.7 During the Tender Period, the Tenderer shall visit the sites of relevant the Employer's meters system to appraise conditions and gather the necessary information. Tenderer shall enclose a copy of the document duly signed by the Employer's personnel as a proof for having visited the Sites. The Tenderer shall submit the declaration, APEPNDIX B, duly completed along with the Tender.

16 CONTRACT AWARD

16.1 The Employer intends (i) to award the Contract to the Tenderer who appears to have the capability and resources to carry out the Contract effectively, whose Tender has been determined to be responsive to the Tender Documents and who has offered (all taken into consideration) the most favorable Tender; or (ii) to reject any or all Tenders.

16.2 The preferred Tenderer may be invited to participate in a pre-award negotiation meeting(s) with the Employer, who will arrange for minutes of each meeting to be prepared and agreed with the Tenderer. The Employer may request the Site Manager/Project Manager to attend an interview. Thereafter, the Employer may seek the Tenderer's agreement to a Memorandum of Pre-award Negotiations recording the outcome of their joint discussions of the Tender. This Memorandum of Pre-award Negotiations will constitute the agreed basis upon which a contract could be concluded, and/or may include clarification of any alternative proposals, which the Tenderer may have submitted.

16.3 The Memorandum of Pre-award Negotiations (i) shall be binding on the Tenderer as an acceptable clarification and/or amendment of his Tender until its validity expires, (ii) shall be wholly subject to a

subsequent contract agreement, and (iii) shall not bind the Employer nor commit him to entering into any contract under any terms.

16.4 The Employer's intention to award the Contract to the successful Tenderer shall be documented by Letter of Intent. Upon receipt of the Letter of Intent, the successful Tenderer is expected to immediately issue similar letters or notices to each of the manufacturers or suppliers of material and equipment to avoid occurrence of delays.

16.5 After the approval of the contract agreement by the Employer's Board of Directors, the Employer and the Contractor shall enter into a Contract Agreement and submit a Performance Bond, and Advance Payment guarantee.

16.6 Following the entry into the Contract Agreement and receipt of the Performance Security, the Employer will promptly notify the other Tenderers that their Tenders have been unsuccessful and return the Tender Bond.

16.7 No offer, payment, consideration, or benefit of any kind, which constitutes illegal or corrupt Practices, shall be made, either directly or indirectly, as an inducement or reward in relation to:
(a) The tendering,
(b) The award of the contract, or
(c) The execution of the contract.
Any such practice will be grounds for the immediate cancellation of the Contract and for such Additional actions (civil and/or criminal) as may be appropriate.

16.8 The formal Contract Agreement to be executed by the parties shall set forth the basic understanding between the Employer and the Contractor incorporating:

(a)The Tender Documents;

(b) Duly filled in Form of Tender, Price Schedules;

(c) Spare Parts and Tools and Appliances;

(d) Departures from Specifications Schedule, if applicable.

The Contract Agreement when executed shall be deemed to include entire agreement between the parties thereto, and the Contractor shall have no right to claim any modification thereof resulting from any representation or promise made at any time by any officer, agent, or employee of the Employer or by any other person.

17 PRECEDENCE

In the event of any discrepancy or contradiction between the provisions of the conditions of contract and of the specification, the conditions of contract shall take precedence.

18 FURTHER INFORMATION

Any further information may be obtained on application in writing to:

THE GENERAL MANAGER
Irbid District Electricity Company Ltd.
P.O. Box 46 Irbid 21110
The Hashemite Kingdom of Jordan
Email: ideco@ideco.com.jo
Website: www.ideco.com.jo
Fax: + 96227245495

APPENDIX TO TENDER

	Clause, FIDIC	Qualifying Conditions
Time for Completion	1	As stated in Schedules
Amount of Bond or Guarantee	9	10%
Amount of bid bond		5%
Additional Risks to be covered by Insurance	16.1	War Risks
Delay in Completion (Contract completion):	31	
a) percentage to be deducted as damages		0.5% per week
b) maximum percentage which the deductions may not exceed		10%
Period of Maintenance	33.1	18 months
**	**	**

FORM OF TENDER

To: The General Manager,

Irbid District Electricity Company Ltd

P.O. Box (46) Irbid 21110

Hashemite Kingdom of Jordan

E-mail: ideco@ideco.com.jo

Website: www.ideco.com.jo

Dear Sir

We hereby offer to supply, complete, deliver C.I.F. Aqaba, transport to the site, erect, place in commercial operation and test all the works described in the Specification in accordance with the Specification and Schedule, with the Drawings and with the other documents comprised in the Contract and to maintain the works in the manner therein specified and to perform all the obligations which are to be performed by the Contractor for the sum of .....
.....

And we hereby undertake to start delivery of the works described in the Specification to the Site within a period of ..... weeks from the date of your Order. Delivery of the whole of the works will be complete within ..... weeks from the date of your order.

And we also undertake to start erection of the works described in the Specification on the Site within a period of ..... weeks from the date of your Order. The whole of the works will be completely erected and ready for setting to work as Site within ..... weeks from the date of your Order.

The particulars and prices in the Schedules have been duly filled in by us so as to show the calculations on which this Tender is based and in accordance with which we agree to execute additional works and to have

deductions made for works omitted. Our offer takes into consideration all additions and alterations to the Tender requirements up to and including Amendment Letter No, ... issued by the Engineer.

And we undertake, in the event of this Tender being accepted, to execute the Performance Bond referred to in Clause 9 of the General Conditions of Contract within one month of being called upon to do so.

And we further undertake, in the event of this Tender being accepted, to execute, if called upon to do so, an Agreement for the due execution of the works in the terms of the Agreement annexed here to.

And we further agree, in the event of our failure to execute such Contract within one month of its being left for execution at the address given below, that any acceptance of this Tender may be revoked by the Employer without prejudice to any other rights or remedies which he may have in respect of such failure .

DATED this day of 2022

Signed .....

Address .....

.....

FORM OF TENDER BOND

BY THIS BOND WE .....
whose registered office is at .....
..... (hereinafter called " the Tenderer")
.....
whose registered office is at .....
and .....
whose registered office is at .....
(hereinafter called " the Sureties") are held and firmly bound unto the Irbid District Electricity Company Ltd. (hereinafter called "the Employer" in the sum of ..... for the payment of which sum the Tenderer and the Sureties bind themselves their successors and assigns jointly and severally by these presents.

Sealed with our respective seals and dated this .....
day of ..... 2022.

WHEREAS

1) The Employer has invited the Tenderer and other persons to complete Tenders in similar terms for the construction of works (hereinafter called "the works") and to submit the same for consideration by the Employer.
2) The Tenderer herewith submits to the Employer a Tender (hereinafter called "the Tender") in accordance with such invitation and has agreed by the above - written Bond to provide security for the due performance by him of the undertakings and obligations in the Tender on his part contained.

NOW THE CONDITIONS of the above-written Bond is such that:

1st) If the Tender is accepted by the Employer within (120) days from the ..... day of ..... 2022 and the Tenderer shall provide a surety or sureties in accordance with his undertaking in the Tender, or
2nd) If the Tender is not accepted by the Employer within (120) days from the ..... day of ..... 2022 or if before the expiration of that period of (120) days a tender from another person

for the construction of the Works shall have been accepted by the Employer and that person shall have provided a surety or sureties in accordance with his undertaking in his Tender then this obligation shall be null and void but otherwise shall be and remain in full force and effect but no alteration in the terms of the Tender nor any forbearance or forgiveness in or in respect of any matter or thing concerning the Tender on the part of the Employer shall in any way release the Surety from any liability under the above-written Bond .

SIGNED SEALED AND DELIVERED)
by the said) .....
)
in the presence of :) .....

THE COMMON SEAL OF
was hereunto affixed in the presence of) .....

AGREEMENT

THIS AGREEMENT is made the day of
Two Thousand fifteen and BETWEEN the Irbid District Electricity Company Ltd. P.O. Box (46) Irbid, The Hashemite Kingdom of Jordan (hereinafter referred to as "the Employer") of the one part and

whose registered office is at
(hereinafter called "the Contractor", which expression shall be deemed to include his successors or permitted assigns) of the other part.

WHEREAS the Employer desires to have supplied, delivered, trans.-ported, erected, set to work, tested, handed over and maintained certain Works mentioned, enumerated and referred to in the General Conditions referred to in Clause C hereof, Specifications, Schedules, Drawings and Schedule of prices (hereinafter called the "Works") and has accepted in the terms of letters dated the Tender by the Contractor for the supply and execution of the said Works, the said Tender being dated

AND WHEREAS the Contract Price is

AND WHEREAS the aforesaid Contract Price is subject to such additions thereto or deductions there from as may be made under the provisions of the Contract.

AND WHEREAS the Employer is prepared to agree to the Contractor supplying and executing the said works.

AND WHEREAS the Contractor has provided a Bond or Guarantee for the due and proper performance of the Contract in the sum of

and the terms of which Bond or Guarantee have been approved by the Employer .
NOW IT IS HEREBY AGREED AND DECLARED as follows, that is to say :

1st) IN consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned the Contractor here by

covenants with the Employer that the Contractor shall and will duly provide, deliver to Site erect, test, set to work, hand over and maintain the said works and shall do and perform all other acts and things in the Contract mentioned or described or to be implied therefrom or may reasonably be necessary for the completion and maintenance of the said works within and at the times and in the manner and subject to the terms and conditions mentioned herein .

2nd) AND in consideration of the due provision execution construction and completion of the said works the Employer does hereby covenant with the contractor that he the Employer will pay to the contractor the said sum of

or some other sum as may become payable to the contractor under provisions here of such payments to be made at such time and in such manner as is herein provided .

3rd) IT IS HEREBY AGREED AND DECLARED that the General Conditions of Contract annexed hereto (hereinafter referred to as "the General Conditions") with the other documents referred to therein shall be incorporated in and form part of this Contract and the words and expressions in this Agreement shall have the same meanings as are respectively assigned to them in the aforesaid General Conditions.

IN WITNESS whereof the parties hereto have hereto set their respective hands and seals this day and year first above written.

SIGNED SEALED AND DELIVERED BY)
for and on behalf of the Contractor in)
the presence of :)

SIGNED SEALED AND DELIVERED FOR)
AND ON BEHALF OF THE IRBID DISTRICT)
ELECTRICITY COMPANY LTD.)
in the presence of :-)

FORM OF ADVANCE PAYMENT GUARANTEE

Whereas the Irbid District Electric Company Ltd. P.O. Box 46, Irbid, The Hashemite Kingdom of Jordan, (hereinafter called "the Employer" has entered into a contract on with ..... whose registered office is (hereinafter called "the Contractor") for the construction of contract **46/2020** for the Tender Sum of ..... and will grant the Contractor an advance payment of ten per cent of the Definite Work value of the Contract within 30 (thirty) days from the receipt of this guarantee representing a total .... we, ... whose registered office is..... ... (hereinafter called "the Surety") hereby irrevocably guaranteed to repay to the Employer an amount advanced to the Contractor in a sum not exceeding ..... or an equivalent amount in ..... calculated at the tender rate of .....on the first demand if the Contractor becomes bankrupt or against written certification by the Engineer, that the Contractor has failed to commence the works, within a reasonable period of the receipt of the order to that he has not repaid the advance payment or part thereof in accordance with the terms of the Contract or that the contract is forfeited under clause (42) of the Conditions of the Contract .

This guarantee shall come into force on receipt of the advance payment by the Contractor and shall be reduced by the amounts repaid by the Contractor as contractual redemption of the advance amount.

The guarantee shall, however, expire on ..... at the latest by which date any claims may have been received by us by registered letter.

This guarantee shall be construed and take effect according to the laws for the time being in force in Jordan.

It shall be deemed agreed that you will return this guarantee to us on expiry or on complete redemption of the advanced amount.

IN WITNESS WHEREOF the common seal of the Surety is hereunder affixed.

THE COMMON SEAL OF)
was hereunto affixed in the presence of :-)
Dated this ..... day of ..... 2022.

FORM OF PERFORMANCE BOND

REFERRED TO IN THE AGREEMENT

KNOW ALL MEN BY THESE PRESENTS that we whose Registered Office is situated at .... and ..... whose Registered office is situated at ..... are firmly bound to ..... of ..... (hereinafter referred to as "the Employer") in the penal sum of ..... of lawful money of ..... such sum to be paid to the Employer at ..... aforesaid for which payment to be well and truly made we bind ourselves and each of us and the successors of each of us jointly and severally by these presents

SEALED with our seals

DATED the..... Day of..... 2022

WHEREAS by the Contract bearing even date with the above Bond and made between the Employer of the one part and the above bounded

(herein and hereinafter called "the Contractor") of the other part the contractor has contracted and agree that the Contractor will in such manner within such periods and to such satisfaction provide construct execute complete and maintain such works as in the said Contract are mentioned and will perform the other obligations imposed on the contractor by the said contract.

And whereas before and as one of the terms upon which the said contract was made it was expressly agreed between the parties there to and *

that the contractor and *
as Surety for the contractor, should enter into the above written Bond conditions as hereunder mentioned .

Now the condition of the above written Bond is such that if the contractor shall well and truly perform and observe all the agreements conditions and stipulations which under or by virtue of the said contract or any award made under the provisions therein continued ought on his part to be performed on observed and shall from time to time and all times hereafter at his own cost and charge save harmless and keep indemnified the Employer from all actions suits losses charges damage and expenses which the Employer shall or may bear sustain or incur for or by reason of the non-observance or non-performance of breach of any of the said agreements and stipulations in the said contract continued or referred to and on the part of the contractor to be performed or observed then the above written bond shall be void or otherwise shall remain in full force or effect .

PROVIDED ALWAYS AND IT IS HEREBY DECLARED that all the rights and remedies of the employer under the above written bond are to be deemed cumulative and in addition to and not in substitution for his rights and remedies under the said contract and that the rights of the employer against *

and their successors shall not be prejudiced or affected by any alteration which May be made Agreement between the parties to the said contract in the terms thereof or the nature of the work to be executed or obligations to be performed there under or by time being granted to be contractor or by any outer indulgence or forbearance towards the contractor in connection with the said contract which but for this provision might release the said surety from liability under the said bond.

THE COMMON SEAL OF)
)
was hereunto affixed in the presence of :-)

Director

Secretary

THE COMMON SEAL OF)
)
was hereunto affixed in the presence of :-)

The names of both Contractor and Surety to be inserted here.

SCHEDULES

Schedules F, G H, M, Q, R, S **are not applicable**, hence are not part of this Tender Document.

SCHEDULE A

SCHEDULE OF REQUIREMENTS

This Schedule details the main requirements of plant to be provided and works to be carried out under this contract, but the tenderer is required to ascertain for himself whether any additional plant or works are necessary to leave the system complete and in working order on completion of the contract in accordance with the specification and tender drawings. Any such additional plant or works are deemed to be included in the prices quoted in the Schedules.

The scope of works includes the following, but not limited to:

- The design, configuration, implementation, integration, testing, commissioning and hand over of Meter Data Management System and Head End System for IDECO.
- Required completion date is twelve (12) months from the Contract Award with eighteen (18) months of warranty period.
- A quotation for maintenance contracts for five (5) years following the end of the warranty period is required, but the price for maintenance contracts will not be included in the overall project price.

SCHEDULE B

DRAWINGS

TENDER DRAWINGS

The drawings, as part of the Technical Specifications, shall form the Tender Document, Volume II.

Note: The attached drawings are not intended as final construction drawings. The successful tenderer will be responsible for producing all design drawings for the system implementation purposes and will be responsible for ensuring that all necessary safety clearances, working loads, etc. are correct. All necessary supports, structures, etc, required to complete the schemes are to be included where necessary whether or not they are shown on the above tender drawings.

SCHEDULE C

is not applicable, hence are not part of this Tender Document.

SCHEDULE D

SCHEDULE OF TESTS

1- GENERAL TEST REQUIREMENTS

Test shall include all functional, performance, stability, etc. tests in accordance with the relevant Standards and in addition any tests called for by the Engineer to ensure that the plant being supplied meets the requirements of the Specification. The costs of all test including the provision of the necessary test equipment whether at the manufacturer's works or in site shall be borne by the Contractor and shall be deemed to be included in the Contract Price.

Not less than 10 working days' notice shall be given to the Engineer when plant is ready for test.

The Contractor shall supply three copies of all test certificates.

Type tests are not required if the Contractor can submit satisfactory evidence that type tests have been carried out on similar equipment.

After satisfactory completion of the witnessed tests at the works, the plant shall be submitted for approval during dismantling prior to shipping. No item of plant shall be dispatched to Site until the Engineer has given his approval in writing.

For the quality assurance and testing please refer to Technical Specification Meter Data Management System and Head End System.

SCHEDULE E

GUARANTEES AND TECHNICAL PARTICULARS

PLANT AND EQUIPMENT

This schedule is to be completed by the contractor at the time of tendering and the particulars and guarantees entered will be binding. No departure from these particulars and guarantees will be allowed except with the written permission of the engineer.

Full details of the known site conditions (ambient temperature, altitude, etc.) are given in the technical specifications and the main requirements are summarized in the schedule A.

SCHEDULE E (Continued)

(To be completed by the contractor at the time of tendering)

Item	Particulars

SCHEDULE I

DEPARTURES FROM SPECIFICATION

Notwithstanding any description, drawings or illustrations which may have been submitted with the tender, all details other than those shown in the Schedule of Departures will be deemed to be in accordance with the Specification and the standard specifications and codes referred to therein. No departures from the Specification, except those shown in the Schedule of Departures and approved by the Purchaser, shall be made without the written approval of the Engineer.

See Instructions to Tenderer.

SCHEDULE J

MANUFACTURE, DELIVERY AND COMPLETION DATES

Item 1 (guaranteed dates) of **this schedule shall be completed by the tenderer** to show the time, calculated from the date of award of contract, in which he guarantees to dispatch to site and to complete erection of the various sections of the works. The times given shall be binding on the Contractor, except in so far as they may be varied by agreement with the Engineer.

The times quoted for the main items of plant and equipment shall apply equally to all associated and ancillary equipment, wiring, etc., necessary to completely commission the plant ready for commercial service.

Note: Target date of completion for the project shall be twelve (12) months after the award of the contract.

MANUFACTURE, DELIVERY AND COMPLETION DATES

1- Guaranteed Dates

Description	Completion of Manufacture	Guaranteed Delivery To Site	Guaranteed Completion Date

SCHEDULE K

(To be completed by the contractor at the time of tendering)

MANUFACTURERS, PLACES OF MANUFACTURE AND TESTING

The tenderer shall state the town and country where manufacture, testing and inspection are to take place.

Item	Manufacture	Place of Manufacturer	Place of Testing and Inspection

SCHEDULE L

(To be completed by the contractor at the time of tendering)

PRICES FOR PLANT AND EQUIPMENT

The bidder is asked to submit a price schedule showing all costs during the first five years and commits that they are fixed even if they are outside the assignment clauses, and he can suggest a prepayment mechanism for the first five years, In addition, a proposed pricing plan for the remainder of the period must be attached

The prices entered below for the various items, whether or not the items are fully described, shall include everything necessary to leave the equipment complete and in working order at the expiration of the maintenance period in accordance with the provisions of the contract . They shall include the cost of supervisory staff and all other charges. A price must be entered for each individual item; a total price for a number of items is not acceptable. Failure to comply with the foregoing may result in rejection of the tender, and the contract will award as a unit (partial order will not applied).

DEFINITE WORK ON A LUMP SUM BASIS

Item No.	Description	Foreign Currency		Local currency Jordan Dinar
		FOB	I&F	L T. & E
1.	Meter Data Management (MDM)			
2.	Universal Head-end System (HES)			
3.	Integration of Holley Meters to MDM and HES			
4.	Integration of Hexing Meters to MDM and HES			
5.	Integration of Landis@Gyr Meters to MDM and HES			
6.	Integration with IDECO workflow and billing			
7.	Hardware			
Total (to Schedule P)				

SCHEDULE N

QUANTITIES AND PRICES FOR TOOLS AND APPLIANCES

This section is **to be completed by the Tenderer**. The Tenderer shall furnish a list of tools and appliances in accordance with the requirements of the specification (Vol. II) with itemized prices. The cost of these shall be included in the Schedule of Prices for Definite Works.

NO OFF	Description	Foreign Currency		Jordan Dinars
		F.O.B	I & F	Delivery to IDECO Stores
Total to SUMMARY (Schedule P)				

SCHEDULE O

QUANITIES AND PRICES FOR SPARES

This Schedule is to be completed by the Tenderer. The Tenderer shall furnish a complete list of spares with breakdown of prices recommended which may or may not in whole or part be purchased by the Employer under the Contract. The cost of these shall be included in the summary of prices for provisional items.

PLANT AND EQUIPMENT

REF NO.	Description	Foreign Currency			Jordan Dinars
		NO OFF	F.O.B	I & F	Delivery to IDECO Stores
TOTAL TO SCHEDULE P					

SCHEDULE P

SUMMARY OF PRICES

Schedule	Item	Jordan Dinars		Jordan Dinars
		FOB	I & F	LT & E
	1- DEFINITE WORK ON A LUMP SUM BASIS			
L	Plant and equipment			
N	Tools and Appliance			
	2- SUB-TOTAL (DEFINITE WORKS)(L+N)			
	3- PROVISIONAL ITEMS			
O	Spares – plant and equipment			
	4- SUB-TOTAL (PROVISIONAL ITEMS)(O)			
	5- SUB-TOTAL (DEFINITE WORKS & PROVISIONAL ITEMS) (2 + 4)			
	6- CONTINGENCY SUM, 25% SUB – TOTAL ABOVE(5)			
	7- TOTAL CONTRACT PRICE (5 + 6)			

TOTAL CONTRACT PRICE _____ (Jordan dinar)

The above price shall appear on the Form of Tender.

breakdown prices for price summary schedule

	Component	Unit of measure	Quantity	Unit Cost(USD/EURO /JOD)	Total Cost (USD/EURO/JOD)	Remarks
A	Application License Cost		-		-	(Provide application license cost detailed per license components including software support for 18
A.1	License cost detailed per license components				-	
A.2	Software support for 18 months				-	
A.3	Third party software licenses, if any, required to run the proposed solution				-	
B	Hardware Cost if any (Optional for IDECO)		-		-	Provide hardware components
					-	
					-	
					-	
C	System Configuration Cost		-		-	(Provide the number of technical and functional consultants
					-	
					-	
					-	
D	Integration Cost		-		-	(Provide the number of technical and functional consultants
					-	
					-	
					-	
E	System Testing Cost		-		-	(Provide the number of technical and functional consultants
					-	
					-	
					-	
F	Training Cost		-		-	(Provide the number of trainers involved, training delivery type,
					-	
					-	
					-	
G	Data Migration Cost (Optional for IDECO)		-		-	(Provide the number of technical and functional consultants involved and duration of their involvement)
					-	
					-	
					-	
H	Maintenance Support Cost (Optional for IDECO)		-		-	(Provide maintenance support cost detailed per maintenance support components)
					-	
					-	
					-	
I	Cloud storage cost (If Any)		-		-	
					-	
					-	
J	other cost					(Mention any cost component not covered above)
					-	
				Grand Total	-	

SCHEDULE T

RATES AND CONDITIONS FOR WORK CARRIED OUT ON TIME AND MATERIAL BASIS

These rates shall apply to any additional minor work within the scope of the contract that the engineer may require the contractor to carry out on a time and material basis. The rates shall be deemed to include all local and head office charges, including supervision.

Payment shall be made only for additional work authorized in writing by the engineer and on receipt of a detailed statement of the services supplied, endorsed by the engineer and contractor's representatives.

All claims in respect of extra to contract work shall be submitted to the engineer for approval within one month of the work being completed to the satisfaction of the engineer.

Engineer per working day JD _____

Foreman per working day JD _____

Chargehand per working day JD _____

SCHEDULE U

PROPOSED SITE ORGANIZATION

Schematic organization chart showing the Tenderer's project organisation in terms of functions, a table showing functions in the project and the names of staff assigned to these functions accompanied with the CVs, qualification of staff.

Assigned staff is expected to actually work on the project.

(Details to be entered below)

SCHEDULE V

PROGRESS CHART FORMAT

Contractor to supply in this schedule a concise project planning, graphically as Gantt-chart showing dependencies between tasks and in table format with names of the phases and start and end dates.

SCHEDULE W

TENDERER'S EXPERIENCE

Details to be entered below; please refer to Instruction to Tenderers Clause 4 for more details.

APPENDIX A
QUALIFICATION CRITERIA

With reference to the Instruction to Tenderers Clause 4, Qualification Criteria is to focus on financial stability, turnover related to the product and relevant reference projects, project team experience and compliance with the tender specifications.

The Tenderer's proposal which do not include the following evidence or where evidence is unsatisfactory to the Employer may not be considered.

The tenderer shall be the original manufacturer of the solution or to be authorized re-seller of the Vendor of such equipment or system.
The Vendor must have a successful proven track record of at least 10 years in the delivery of **meter data management system and head end system.**

The Contractor is required to have minimum of 5 years' experience on the warranty support and system maintenance of similar complexity as described in this Tender.

Turnover Criteria

The Tenderer shall have adequate financial capabilities to carry out the contract. Copies of statements on the average annual turnover of activities relating to the subject Procurement for the past 3 (three) financial years or for the period from the date of registration of the Tenderer (if the Tenderer has operated for less than 3 (three) financial years), which certify that the Tenderer's average annual turnover of activities relating to the subject Procurement is at least:

- 10 MEUR annual turnover;
- 2 MEUR annual turnover of the projects in **meter data management system and head end system.**

Liquidity Ratio

A copy of the balance sheet for the year 2020 (or a relevant document of the country wherein the Tenderer is registered) approved by the Tenderer, which confirms that the Tenderer's critical liquidity ratio (the ratio of the difference between the current assets and inventories to current liabilities) is not lower than 1.0.

Reference Projects

A list of similar Goods and Services contracts (contracts, the subject and terms and conditions whereof are similar, i.e. the supply of a system, including installation, integration and training services) successfully completed in the past 5 (five) years or over the period from the date of the Tenderer's registration (if the Tenderer has operated for less than 5 (five) years), the value of each is not lower than 1 million Euros or the equivalent in local currency, indicating the following:

- The total contract value or values of the Goods and Services similar to the subject procurement where the contract covers more supplies;
- The following dates:
  - Date of signing the contract for the delivery of Goods and Services;
  - Date of first installation at the clients site(s);
  - Date of final acceptance of Goods and Services;
- A summary of the maintenance agreements, including contract period, response times, and scope of the maintenance;
- Names, addresses and further contact details of Consignees (clients);
- A Client Satisfaction Statement duly signed by a client representative, stating that all goods and services were delivered and accepted.

The Tenderer is required to have worked out of his country and have successfully implemented at least five (5) similar contracts of similar scope and complexity in the last five (5) years.

These works must be for solutions that have:

- Been provided to like companies working within the electricity distribution industry sector;
- Included system installation, data migration, configuration services and integration;
- Contained in excess of 30,000 **meter data management system and head end system** I/O points per individual system.

Employer reserves the right to contact one or more clients to inquire about the quality of the delivered goods, works and services.

The Tenderer will upon the request of Employer organize a visit to one of the reference project.

The Tenderer is required to complete Schedule W- Tenderer's experience, providing details of the above projects. Projects may only be specified where the Tenderer has performed at least 50% of all works.

Project team relevant experience

Minimum requirements in terms of experience for the staff assigned to the project are as follows:

- Project Manger 10 years
- Senior Engineer 5 years

APPENDIX B

PRE TENDER SITE INSPECTION

We hereby confirm that we have visited and carefully examined the Sites and satisfied ourselves as to the nature of all existing roads or other means of transport or communications and as to possible interruptions thereto and as to access to and from the Site.

We have made enquiries, examined and satisfied ourselves as to the nature and location of conditions affecting our obligations under the Contract.

We have satisfied ourselves to the sources and means of obtaining adequate supplies of skilled and unskilled persons and all materials and equipment required for carrying out obligations under the Contract.

We have visited the sites and checked all routes and locations, and we understand the proposals contained in the tender specifications.

We have acquainted ourselves as to the laws and regulations, which are applicable to the work to be performed by us under the Contract, and we have verified that any permits, approvals and authorisations, if required, can be obtained.

We have obtained all necessary information of all matters whatsoever which may affect our execution of the Contract.

Name of Company: Date:

Signed:

THE HASHEMITE KINGDOM OF JORDAN

IRBID DISTRICT ELECTRICITY COMPANY LTD.

METERS DATA MANAGENEMT SYSTEM AND HEAD END SYSTEM

TENDER No.46/2020

VOLUME 2 / 2

Conditions of Contract and Technical Specifications

THE GENERAL MANAGER
Irbid District Electricity Company Ltd.
P.O. Box 46 Irbid 21110
The Hashemite Kingdom of Jordan
E-mail:ideco@ideco.com.jo
Website:www.ideco.Com.jo
Fax. + 96227245495

IRBID DISTRICT ELECTRICITY COMPANY LTD.

METERS DATA MANAGENEMT SYSTEM AND HEAD END SYSTEM

TENDER No.46/2020

INDEX TO VOLUME 2 OF 2

CONDITIONS OF CONTRACT

TECHINICAL SPECIFICATION

IRBID DISTRICT ELECTRICITY COMPANY LTD.

METER DATA MANAGENEMT SYSTEM AND HEAD END SYSTEM.

TENDER No.46/2020

CONDITIONS OF CONTRACT

INTRODUCTION

The Conditions of Contract shall be the Conditions of Contract (International) for Electrical and Mechanical Works (including erection on site) published by the international Federation of consulting Engineers (FIDIC), First Edition 1963 (reprinted May 1983) with amendments and additions as contained in the appropriate section of part II, Conditions of particular Application.

Section A of part II shall apply to contract, or those parts of contracts, for the supply, delivery to and erection of electrical and mechanical equipment on site.

Condition of contract (international) for electrical and mechanical works

As attached document.

PART II - CONDITIONS OF PARTICULAR APPLICATION

SECTION A

SUPPLY, DELIVERY TO AND ERECTION ON SITE OF

ELECTRICAL AND MECHANICAL EQUIPMENT

1.1 **DEFINITIONS**

a. Employer. The Employer is the Irbid District Electricity Company Ltd., P.O.Box 46, IRBID, THE HASHEMITE KINGDOM OF JORDAN.

b. Add "and the Employer"after the words "the consent in writing of the Engineer "in the third line.

c. Engineer. The Engineer is the IRBID DISTRICT ELECTRICITY COMPANY LTD P.O.BOX 46 IRBID - JORDAN, or other persons or persons for the time being as from time to time duly appointed in writing by the Employer to act as Engineer for the Purpose of the Contract.

d. Add the words "tender drawings "after the word "Schedules".

The following definitions shall be added:-

e. 'Contingency Sum'shall mean such sum, if any as may be provided in the Contract for expenditure for unforeseen purposes.

f. 'Provisional Sum' shall mean any sum provided in the Contract for expenditure on a particular service which is foreseen but not specified in detail.

g. F.O.B. means " free on board " i.e. the cost of equipment plus the cost of delivery on board ship or aircraft.

h. I.& F. means marine insurance and freight.

I. C.I.F. means cost, insurance and freight. F.O.B. + I & F. = C.I.F.

j. L.T.& E. means local transport and erection (includes costs of clearing from quayside or airport and local insurance) .

2.3 Engineer's Representative

Add at end of this sub - clause:-

" Provided always that failure of the Engineer's Representative to disapprove any work or Plant shall not prejudice the power of the Engineer thereafter to disapprove such work or Plant and to order the pulling down removal or breaking up thereof " .

3.2 SUB - LETTING

After the words "Written consent of the Engineer "in the third line, add "and the Employer ".

4. EXTENT OF CONTRACT

This clause to be deleted and replaced by the following: -

" The Contract comprises the design, manufacture, inspection and testing, training, packing , insurance , transport to site , unloading , storing , erection , completion , setting to work and maintenance of the Works and except in so far as the Contract otherwise provides , the provision of all labour, materials , Contractor's equipment and everything, whether of a temporary or permanent nature , required in and for such design , manufacture , inspection and testing , packing , insurance , transport to site , unloading , storing , erection , completion , setting to work and maintenance of the Works so far as the necessity for providing the same is specified in or reasonably to be inferred from the Contract . "

5.1 LANGUAGE

The language is English. The ruling language is English.

5.2 DOCUMENTS MUTUALLY EXPLANATORY

Delete the whole of the last sentence of this clause, reading "Provided always that if ....." etc.

6.7 DRAWINGS

Add extra sub - clause:-

"Where the conditions of this clause are at variance with the Specification, the Specification shall take precedence. "

7. MISTAKES IN DRAWINGS

In the first line after the words "responsible for "add "and shall pay for any alterations of the works due to ".

8. PERFORMANCE BOND

Delete this clause and substitute the following: -

"The Contractor shall undertake to enter into a Bond for the due and proper performance of the Contract and observance of all provisions, covenants, conditions, and stipulations therein contained with good and sufficient sureties as hereinafter provided in a sum equal to 10% of the Contract Price and the Bond shall be prepared and the terms of the Bond shall be such as shall be approved by the Employer. The full amount of the Bond shall be maintained until the end of the final maintenance period.

Notwithstanding anything herein above contained the Bond shall not be released until the Employer shall have given a Certificate in writing that all outstanding matters in dispute between the Employer and the Contractor have been settled.

The sureties shall be domiciled or carrying on business in the Hashemite Kingdom of Jordan and shall be subject to the approval of the Employer (Which approval shall not be unreasonably withheld). The provision of such sureties or surety and the cost of the Bond as entered into shall be at the expense in all respects of the Contractor.

In the event of the Contract being frustrated as provided in Clause 44.1 hereunder the Contractor may apply to the Engineer for a certificate certifying that as up to the time of such frustration the Contractor has duly and properly performed the Contract in accordance with all the provisions covenants , conditions and stipulations therein contained and that the Contractor's obligations whether arising under Clause 27 hereof or otherwise in respect of each and every portion of the Works as have been taken over by the employer have ceased and that the Employer has no claims of whatsoever nature against the Contractor and upon the present - ment by the Contractor to the Employer of the said certificate the Bond shall forthwith be returned to the Contractor .

12.1 PROGRAMME TO BE FURNISHED

In the second line add the word 'detailed 'before 'programme'.

13. CONTRACTOR'S REPRESENTATIVE AND WORKMEN

13.2 In the first and third lines after the words "The Engineer "add "or the Employer."

14.3 ELECTRICITY WATER AND GAS

Delete this sub - clause and substitute the following:-

"The Contractor shall be responsible for the supply of electricity water and gas for the purpose of the Works and shall, at his own expense, provide any apparatus necessary for such use. If such facilities are available on site the Contractor, after obtaining the approval of the Employer, may use such facilities and shall pay to the Employer for this use a sum to be agreed between the Employer and the Contractor. "

16. INSURANCE OF PLANT

Delete sub - clause 16.2 and 16.3 and make the following substitutions and additions:-

16.2 Any monies payable in respect of any claim under the insurance policy or policies entered into in accordance with the provisions of this clause shall either be in the same currency as the original payment made by the Employer for the Plant or any respective part thereof or in Jordanian Dinars.

16.3 The term " insured for its full value " shall be deemed to mean insurance cover to the aggregate value of the replacement cost of the Plant as at the date of shipment or at the date on which it becomes the property of the Employer as the case may be and the cost of freight together with a further amount of not less than ten percent of the aggregate of such costs

16.4 Before commencing the execution of the Works the Contractor (but without limiting his obligations and responsibilities under clause 15.1) hereof shall insure against any damage, loss or injury which may occur to any property (including that of the Employer) or to any property (including any employee of the Employer) by or arising out of the execution of the Works or in the carrying out

of the Contract. Such insurance shall be effected with an insurer and in terms approved by the Employer (which approval shall not be unreasonably withheld) and for at least the Contract Price or JD 200,000 whichever is the greater, and the Contractor shall whenever required produce to the Engineer the policy or policies of insurance and receipts for payment of the current premiums any of which may be retained by the Employer. The policy or policies of insurance shall be endorsed indemnifying the Employer in the event of any claims being made upon the Employer as Principal and arising out of the performance by the Contractor of the Contract. The policy of insurance shall be in the joint names of the Employer and the Contractor and shall include a cross liabilities clauses.

16.5 The Employer shall not be liable for or in respect of any damage or compensation payable at law in respect or in consequence of any accident or injury to any workmen or other person in the employment of the Contractor save and except in accident or injury resulting from any act or default of the Employer , his agents or servants and the Contractor shall indemnify and keep indemnified the Employer against all such damages and compensation (save and except as aforesaid) and against all claims , demands , proceedings , costs , charges and expenses whatsoever in respect thereof or in relation thereto . The Contractor shall insure against such liability with an insure approved by the Employer (which approval shall not be unreasonably withheld) and shall continue such insurance during the whole of the time that any persons are employed by him on the Works and shall, when required, produce to the Engineer the Works and shall, when required, produce to the Engineer such policy of insurance and the receipt for payment of the current premium.

16.6 By Jordanian Law all insurance risks shall be carried by Jordanian Insurance Companies, a list of which can be seen at the offices of the Irbid District Electricity Company Ltd.

16.7 If the Contractor shall fail to effect and keep in force the insurance referred to in this clause or any other insurance which he may be required to effect under the terms of the Contract then and in any such case the Employer may , without prejudice , to any other rights or remedies he may have , effect and keep in force any such insurance and pay such premiums as may be necessary for that purpose and from time to time deduct as the amount so paid from any monies due or which may become due to the Contractor or recover the same as a debt due from the Contractor .

17.2 COMPLIANCE WITH STATUTES REGULATIONS, ETC.

Delete this sub - clause and substitute the following:-

“ If the cost to the Contractor of the performance of the Contract shall be increased or reduced by reason of the making after the date of his tender in the

Hashemite Kingdom of Jordan of any law or of any order, regulation , or bye - law having the force of law the amount of such increase or reduction shall be added to or deducted from the Contract price as the case may be , provided always that payments or deductions arising from this clause shall be made only to the extent that the sum so derived shall exceed JD 3000 (Jordanian Dinars three thousand only) .

19.1 ACCESS TO AND POSSESSION OF THE SITE

Delete the words in this sub - clause after the words “reasonable time “.

19.2 Delete this sub - clause

19.5 HOURS OF WORK

Delete the words in this sub - clause after the words “for work to be so done “.

19.6 Delete marginal heading and the words “No work ..... recognised equivalent “and substitute the following: - “No work shall be carried out on site during the night or on Friday or outside recognised working hours.”

19.7 The existing sub - clause should be re - numbered as 19.8 and a new sub - clause added as follows: -

“The Contractor and any persons responsible to him shall at intervals of not more than 48 hours remove at their own cost any rubbish resulting from the execution of their work. If the Contractor fails to remove rubbish within 48 hours after being requested to do so by the Engineer, the rubbish will be removed by others and the cost of the removal charged to the Contractor.

Labour

Add the following sub - clauses:-

20.10 The Contractor shall obtain, at his own cost, work permits from the appropriate Jordanian authorities to enable any foreign personnel employed by him to work in Jordan. The Contractor shall be responsible for all formalities in connection with passports , visas , police permits and for customs duties and other import charges permits and for customs duties personnel employed by him for personal goods of foreign personnel employed by him on the Contract . However, the Employer will, if required assist the Contractor in obtaining visas and work permits.

20.11 At least two of the Contractor’s competent representatives on the site shall be capable of speaking, reading, writing and understanding English.

20.12 The Contractor shall pay wages and observe conditions not less favourable than those observe by good employers engaged in like work within the Hashemite Kingdom of Jordan.

20.13 The Contractor shall in respect of the Works and Temporary Works conform to all laws and all statutory rules , regulations and bye - laws in force from time to time in the place where work is being or is to be executed which shall include he payment of contributions due and shall give all notices and shall pay all fees that may be lawfully demanded by any public officer in respect of the Works and temporary Works ; and he shall perform all duties and pay all assessments and sums required to be paid in respect of employees and labourers employed by him on the Site .

23. UNDERGROUND WORKS

Delete this clause.

24. INSPECTION AND TESTING DURING MANUFACTURE

Add the following sub - clause:-

24.5 The contractor shall invite three IDECO Engineers for inspection and testing at manufacturer works. All travel expenses, tickets, visas, accommodation in first class hotels, and local transport etc. shall be born by the contractor.

24.6 If as a result of such inspection, examination or test of the Plant this is rejected in accordance with Clause 28 (Rejection) the Contractor, if required by the Engineer, shall repeat the tests under the same terms and conditions. The Contractor shall meet any reasonable time costs and expenses for travel, accommodation and incidental expenses incurred by the Employer and / or Engineer in conjunction with the repeat tests.

25. DELIVERY

25.2 In item (b), the reference to ‘90 per cent ‘to be amended to read ‘70 per cent ‘.

In item (c) reference in the first line to ‘ 3 months ‘ to be amended to ‘ 6 months ‘ , and in the third line reference to ‘ 95 per cent ‘ to be amended to ‘ 90 per cent ‘.

The following sub - clauses shall be added:

25.3 All operations necessary for the execution of the Works and for the construction of any Temporary Works shall so far as compliance with the requirements of the Contract permits be carried on so as not to interfere unnecessarily or improperly with the convenience of the public or the access to , use and occupation of public or private roads and footpaths or to or of properties whether in the possession of the employer or of any other person and the Contractor shall save harmless and indemnify the Employer in respect of all claims demands proceedings damages costs charges and expenses

whatsoever arising out of or in relation to any such matters in so far as the Contractor is responsible therefore .

25.4 The Contractor shall use every reasonable means to prevent any of the highways or bridges communicating with or on the routes to the Site from being damaged or injured by any traffic of the Contractor or any of his sub - contractors and in particular shall select routes choose and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arises from the moving of plant and material from and to the Site shall be limited as far as reasonably possible and so that no unnecessary damage or injury may be occasioned to such highways and bridges .

25.5 Should it be found necessary for the Contractor to move one or more loads of Constructional Plant machinery or pre - constructed units or parts of units of work over part of a highway or bridge the moving whereof is likely to damage any highway or bridge unless special protection or strengthening is carried out then the Contractor shall before moving the load on to such highway or bridge give notice to the Engineer or Engineer's Representative of the weight and other particulars of the load to be moved and his proposals for protecting or strengthening the receipt of such notice , the Engineer shall by counter - notice direct that such protection or strengthening is unnecessary then the Contractor will carry out such proposals or any modification thereof that Engineer shall require and the costs and expenses thereof shall be paid by the Contractor .

25.6 If during the carrying out of the Works or at any time there- after the Contractor shall receive any claim arising out of the execution of the Works in respect of damage or injury to highways or bridges he shall immediately report the same to the Engineer and thereafter the Contractor shall negotiate the settlement of and pay all sums due in respect of such claim and shall indemnify the Employer in respect thereof and in respect of all claims demands proceedings damages costs charges and expenses in relation thereto .

25.7 Where the nature of the Works is such as to require the use by the Contractor of waterborne transport the foregoing provisions of this clause shall be construed as though " highway " included a lock , dock , sea wall or other structure related to a waterway and " vehicle " included craft , and shall have effect accordingly . "

26. DELAYED ERECTION

In the fourth line of the first sentence after “and shall have given notice in writing “add “within 7 days “.

a. In the third line delete “the date” and substitute “a date three months after the acceptance by the Engineer “.

b.c.d.e.f. Delete these items.

27. SUSPENSION OF THE WORKS

Add the following:-

d. Or due to the Contractor’s failure to follow the Engineer’s instructions in carrying out the Works.

29.4 TEST ON COMPLETION

Delete this sub - clause substitute the following: -

The Employer, except where otherwise specified, shall provide free of charge, subject to the provision of sub - clause 5 of this clause, electricity water and normal operating personnel and services.

30. EXTENSION OF TIME FOR COMPLETION

In line 4 delete “without delay “and substitute “within days “.

In line 6 after “on receipt of such notice “add “study such claim and “.

31. DELAY IN COMPETION

In lines 4, 5 and 6 of this clause, delete the words “and the Employer shall have suffered any loss from such failure, there shall be deducted from the Contract Price, as and for liquidates and ascertained damages and not by way of penalty “and replace with the following:-

"The Employer reserves the right to deduct from the Contract Price as liquidated damages ".

32. TAKING OVER AND DEFECTS

32.1 In the third line, after the word 'defects 'add "and the Contractor has notified the Engineer that the Works have been completed ".

33.2 DEFECTS

In line 5 delete "a reasonable time "and substitute "28 days ".

33.4 In the first line of this sub - clause after the words 'a reasonable time ', add "fixed by the Engineer ".

33.6 After the word "replacements "add "repairs ".

33.7 Delete "the Works have been taken over "and substitute "all sections of the Works have been taken over and the final certificate for the Works has been issued ".

34. VARIATIONS AND OMISSIONS

34.1 In line 9 the percentage to be amended to read "25 per cent ".

34.5 The percentage in the marginal heading and the sub - clause to be amended to read "25 per cent ".

In the second line after the words "Tender Price "delete "the Contract Price shall be amended by such sum as shall be agreed upon between the Engineer and the Contractor" and substitute "the price of the variation orders exceeding 25 per cent of the Tender Price shall be calculated on the basis of prices agreed upon between the Engineer and the Contractor ".

Add the following sub - clause: -

34.6 Day works - The Engineer may, if in his opinion it is necessary or desirable, order in writing that any additional or substituted work shall be executed on a day work basis or a time and material basis. The Contractor shall then be paid for such work under the conditions set out in the Day work Schedule or the Schedule for Work carried out on a Time and Material Basis as appropriate.

The Contractor shall furnish to the Engineer such receipts or other vouchers as may be necessary to prove the amounts paid and before ordering materials shall submit to the Engineer quotations for the same for his approval.

In respect of all work executed on a day work or time and material basis the Contractor shall during the Continuance of such work deliver each day to the Engineer's Representative a detailed list in duplicate of the names , occupation and time of all workmen employed on such work and a statement also in duplicate showing the description and quantity of all materials and Contractor's Equipment used thereof or therefore (other than Equipment which is included in the percentage addition in accordance with the Schedule hereinbefore referred to) . One copy of each list and state - ment will, if correct or when agreed, be signed by the Engineer's Representative and returned to the Contractor. At the end of each month the Contractor shall deliver to the Engineer's Representative a priced state - ment of the labour , material and Contractor's equipment (except as afore - said) used and the Contractor shall not be entitled to any payment unless such lists and statements have been fully and punctually rendered .

Provided always that if the Engineer shall consider that for any reason the sending of such list or statement by the Contractor in accordance with the foregoing provision was impracticable he shall nevertheless be entitled to authorise payment for such work either as day work (on being satisfied as to the time employed and Contractor's Equipment and materials used on such work) or at such value therefore as shall in his opinion be fair and reasonable.

37.2 INTERIM CERTIFICATES

In this sub -clause in lines 4 and 5 the words " such evidence of shipment and of payment of freight and insurance as the Engineer may reasonably require " shall be deleted and the following words shall be substituted : -

"The following documents: -

(a) Invoices - two copies.
(b) Shipping specification - two copies.
(c) Certificate of origin - two copies.
(d) Certificate (or policy) of Insurance - two copies - for the portion of the plant for which the interim certificate is claimed.
(e) Bill of lading - one negotiable, two non - negotiable copies.
(f)
(g) Test Certificates (Where applicable) three copies.
(h) Engineer's approval to dispatch - two copies.

These documents are required to support an application for an interim certificate and are in addition to any documents which may be required by the Contractor for effecting port clearance, payment or any other matter associated with delivery of the Plant.

The negotiable Bill of lading will be returned to the Contractor with the Interim Certificate.

Add at the end of this sub- clause the following:

Each application in respect of erection shall be accompanied by the following documents: -

Invoices - two copies.
Percentage of work complete report – two copies

"Each application in respect of local transport and any other type of claim not mentioned above:-

Invoice two copies.
Supporting documents - two copies.

The above documentation lists shall be considered as the minimum requirement, and the Employer shall have the right to call for such additional copies of documents, or other documents not specifically mentioned, that may be required by him during the course of the Contract. Such additional documentation shall be provided without extra charge.

INTERIM AND FINAL CERTIFICATES

Add the following sub clauses: -

37.14 All invoices for offshore and local currencies shall be submitted separately .

37.15 All invoicing shall be in accordance with the Schedules of Rates and Prices.

40.1 TERMS OF PAYMENT

Delete this clause and substitute the following:-

Payment for the C.I.F. portion of the Contract shall be as follows: -

(a) After award of the Contract, within 30 days of receipt by the Employer of an interim certificate, proof of payment of stamp Duty and Award Fees (see Clause 51) and the performance bond , the Employer shall pay to the Contractor , a sum equal to 10 per cent of the C.I.F. portion of the Definite work value of the contract as let, against a bank guarantee for the same amount from an approved bank in Jordan . The bank guarantee shall be of approved form and shall remain valid until the full amount of initial payment is deducted from invoices submitted.

(b) Upon shipment of Plant, following presentation of each interim certificate with the documents listed in Clause 37.2 above, a sum equal to 70 per cent of the sum certified therein.

(c) Upon receipt of the Plant at site, as certified by the Engineer's Representative, following the presentation of each interim certificate, a sum equal to 10% of the sum certified therein.

(d) Upon taking over, as certified in the taking Over Certificate, following the presentation of an interim certificate, a sum of 5 per cent of the Contract Price adjusted as aforesaid.

(e) The balance of the Contract Price adjusted as aforesaid following the presentation of the Final Certificate, provided that if the Contractor shall have furnished to the Employer a guarantee acceptable to the Employer for the payment on demand of such balance he shall be entitled to payment thereof with or at any time after the payment provided for by paragraph (d) hereof.

Payment of the L.T.E. portion of the Contract shall be as follows:-

(a) Upon commencement of erection work at Site , as certified by the Engineer's Representative , within 30 days of receipt by the Employer of an interim certificate , provided that mobilization of manpower and equipment shall not be considered as commencement of erection , the Employer shall pay to the Contractor a sum equal to 10 per cent of the L.T.E. value of the Contract as let, against a bank guarantee for the same amount from an approved bank in Jordan . (For overhead line work commencement of erection shall mean commencement of foundation installation).

(b) Upon erection of Plant, following the presentation of each interim certificate, with certified site measurement progress sheets, a sum equal to 80 per cent of the sum certified therein.

(c) Upon taking over, as certified in the Taking over Certificate, following the presentation of an interim certificate, a sum of 5 percent of the contract price adjusted as aforesaid.

(d) The balance of the contract price, adjusted as aforesaid, following the presentation of the final certificate, provided that if the Contractor shall have furnished to the Employer a guarantee acceptable to the employer for the payment on demand of such balance, he shall be entitled to payment there of with or at any time after the payment provided for by paragraph (c) hereof

40.2 Delete this sub - clause.

40.3 Delete this sub - clause.

40.4 The offshore element of the Contract Price shall be in the Contractor's own currency or U.S. Dollars. If , however, a substantial portion of the Contractors' expenditure under the Contract is to be in countries other than his own , he may nominate when tendering the corresponding portions of the off - shore element of the contract Price for which he requires payment in the currency of those other countries . The portions of the Contract Price so nominated may not be varied after placing of the Contract. The local element shall be in Jordanian Dinars.

Payment upon each of the Engineer's certificates shall be made to the Contractor in two parts:-

(a) The off - shore (i.e. foreign currency) elements will normally be paid in the currencies nominated by the Contractor in his Tender. The Employer, however, reserves the right to make payments in the currencies of the countries of origin of goods and services at the exchange rates applicable at the time of payment of the contract price.

(b) The local element will be paid in the currency of the Employer, in the sum stated in the Schedule of Prices and in accordance with the Contract.

Add the following sub - clauses:-

40.5 No extra payments in respect of overtime, additional materials or special conditions and hardship or otherwise shall be claimed by the Contractor unless such payment shall have been authorized in writing by the Engineer prior to the extra cost concerned being incurred .

44. FRUSTRATION

Delete sub - clauses 44.1 and 44.2 and substitute the following with the amended marginal heading 'Force Majeure ':-

"Should the Contractor be obstructed or delayed in the commencement, prosecution or completion of his work by any necessary or unavoidable act or delay of the Employer or unavoidable acts or delays on the part of the railroad or

steamship lines or any other transportation company in transporting material consigned to the Contractor , or by riot , strikes by other than Contractors or equipment manufacturers' personnel , insurrection , war directly , affecting the project , blockage , revolution , civil commotion , pestilence , acts of public authorities , fire explosion , lightning , earthquake , cyclone , tidal waves , typhoons , hurricanes , tornadoes , floods , plague , epidemics , quarantine , or through any default of other persons under contract with the Employer , or similar causes not caused by and beyond the control of the Contractor ; and if , in the opinion of the Engineer , the ultimate completion of the entire work is delayed thereby , then the Contract dates will be extended for a period equivalent to the time said work as a whole has been delayed for said reason , provided that within seven (7) days the Contractor submits to the Employer through the Engineer for approval a notice in writing stating in detail the reason for each delay caused by Force Majeure and further provided that the Contractor shall not be entitled to any compensation for and on account of the said extension granted by the Employer except as that mentioned in clause 26. In all cases of Force Majeure, the Contractor should use his best endeavours to complete the execution of the works. However, for delays by the contractor or his subcontractors which result directly or indirectly from reasons other than the Force Majeure, the contract dates will not be extended.

45. ARBITRATION

Delete this clause and substitute the following:-

(a) If any dispute, question or controversy shall arise between the Employer and the Contractor concerning this Contract the matter in dispute shall be referred to an arbitration committee composed of three (3) arbitrators. One arbitration shall be nominated by the Employer and one by the Contractor, and the third arbitrator shall be appointed by both parties. If either party fails to appoint his arbitrator within one month of the appointment of the arbitrator by the other party , or if the two parties fail to agree on the third arbitrator within two months of the date of the request to refer the dispute to arbitration , such arbitrator shall be appointed by the president of the highest court in Jordan at the request of either or both parties . All arbitration shall be according to Jordanian arbitration law in force and proceedings shall be held in Jordan.

(b) The decision of the Arbitrators shall be final and binding on both the Employer and the Contractor. Any such reference shall conform to the statutory enactment or regulation governing arbitrations as may be in force in Jordan at the time. The assessment of costs incidental to the reference and award respectively shall be at the discretion of the arbitration committee.

(c) Work under this Contract , notwithstanding the existence of any such dispute , question or controversy , shall continue uninterrupted . The arbitration

proceedings shall not be entered into until after the completion or alleged completion of the Works unless with the written agreement of both Employer and Contractor.

46.1 NOTICES

Delete this sub - clause and substitute the following:-

The Contractor shall furnish an address for service in the City of the Irbid at which any process and any notices, written communications and other documents intended for him may be served on or given to him ; and any process or any notice , written communication or other document so served on or given to the Contractor shall be binding on him

47.1 DEFAULT OF EMPLOYER

TO

47.4 Delete these sub - clauses.

48. VARIATIONS IN COSTS

No variations will be permitted. A fixed price tender is required and the validity of the fixed price shall extend until the Time for Completion.

49. CUSTOMS AND IMPORT DUTIES

49.1 CUSTOMS DUTIES, IMPORT LICENCE FEES AND EXEMPTIONS THEREFROM

(a) IDECO Company are not exempted from custom duties and sale taxes, and Materials which are to be incorporated in the works and which will become the property of the employer are not exempted from customs duties, sale taxes and import license fees, except for:

- Those materials which are manufactured in Arabian country based on Arab league protocol
- Materials have euro one certificate
- All other materials are exempted from customs duties based on free trade agreements applied by the ministry of finance and customs
- All other materials identified by the ministry of finance and customs.

(b) The Contractor shall furnish to the Ministry of Finance and Customs, a bank guarantee as security for Customs Duties which are due on every shipment to ensure that these materials will not be used for any other purpose than that for which exemption is due.

This guarantee will be returned after receiving materials at site and upon the recommendation of the Employer.

49.2 TEMPORARY ENTRY

(a) Temporary entry for equipment or vehicles required for the execution of the Works may be permitted for those items which are to be solely used for this project. Such entry will be strictly according to the laws and regulations prevailing in Jordan.

(b) Temporary Entry will not be permitted for automobiles, trucks, tools, office and residential equipment and supplies of furniture, pre - fabricated offices and houses, caravans, all types of hangers, timber, lumber and plywood, steel stanchions and laboratory instruments.

(c) A Customs Bond is required to be submitted by the Contractor in favour of the Ministry of Finance and Customs to secure the accrued fees and duties payable on the temporarily entered equipment and materials. This Bond will be returned upon the re - export from Jordan of such equipment and the recommendation of the Employer.

49.3 MATERIALS SURPLUS TO REQUIREMENTS

On completion of the works, any surplus materials (not scrap) may be disposed of in one of the following manners:-

I) Sell to the Employer at an agreed price and deliver to Employer stores.

ii) Export from Jordan.

iii) Sell locally after all Customs and Import Duties have been paid according to Jordanian laws.

50. TAXATION

The Contractor shall be responsible for all Contractor's corporate or company income tax payable in Jordan.

51. MISCELLANEOUS FEES AND REGULATIONS

(a) Stamp Duty and Award Fees are payable by the Contractor according to Jordanian Laws.

(b) Storage and Porterage fees are to be paid by the Contractor for materials kept in Yards, Warehouses or Stores belonging to Government Authorities

(c) The Company to whom a Contract for the Works is awarded will, if not already so registered, be required to register with the Ministry of Trade and Industry in Jordan in accordance with latest Companies Law, and with the Jordanian Engineering Association.

52. CARRIERS FOR MATERIALS AND PERSONNEL

The Contractor and his sub - contractors, suppliers and manufacturers shall give priority to Arab shipping companies and their subsidiaries for the shipment of goods, materials and plant for the Contract, provided such companies' ships call at the port of export.

Priority shall be given to the Royal Jordanian Airlines for items which are to be transported by airfreight and for the carriage of personnel .

53. SAFETY PRECAUTIONS

The Contractor shall in respect of all his employees on the site con - form to a standard of safety precautions not less high than that adopted by the Employer in respect of employees engaged in similar work.

54. LAW GOVERNING CONTRACT

Notwithstanding that the contract and correspondence in connection with the contract shall be in the English Language, the Contract shall be deemed to be a Jordan Contract and shall accordingly be governed by and construed according to the laws from time to time being in force in the Hashemite Kingdom Jordan.

54. POWER TO VARY THE WORK

Alternations, amendments, omissions, additions, suspensions, or variations of the work, (hereinafter referred to as "variations") under the contract as shown by the contract drawings or the specification shall be made by the contractor except as directed in writing by the purchaser, but the purchaser shall have full power, subject to the provision hereinafter contained, from time to time during the execution of the contract by notice in writing to instruct the contractor to make such variation without prejudice to the contract and the contractor shall carry out such variations, and be bound by the same conditions, as far as applicable, as though the said variations occurred in the specification. If any suggested variations would, in the opinion of the contractor, if carried out, prevent him fulfilling any of his obligations or guarantees under the contract, he shall notify the purchaser thereof in writing, and the purchaser shall decide forthwith whether or not the same shall be carried out, and if the purchaser confirms his instructions, the contractor's obligations and guarantee shall be modified to such an extent as may be justified. The difference in cost, if any, occasioned by any such variations, shall be added to or deducted from the contract price as the case may require. The amount of such difference, if any, shall be ascertained and determined in accordance with the rates specified in the schedule of prices so far as the same may be applicable, and where the rates are not contained in the said Schedule, or are not applicable they shall be settled by the purchaser and the contractor jointly. But the purchaser shall not become liable for the payment of any charge in respect of any such variations, unless the instruction for the performance of the same shall have been given in writing by him. In the event of the purchaser requiring any variation, such reasonable a proper notice shall be given to the contractor as will enable him to make his arrangements accordingly, and in cases where goods or materials are already prepared, or any designs, drawings, or patterns made or work done that requires to be altered a reasonable sum in respect thereof shall be allowed by the purchaser. Provided that no such variations shall, except with consent in writing of the contractor, be such as will involve an increase or decrease of the total price payable under the contract by more than 25 percent thereof. The power given to the purchaser to make any alteration, amendment, omission, addition or variation to, from or in any part of the works shall include power to vary from time to time the date for the completion of the works or any part thereof, also the purchaser shall have the absolute right to increase the quantities in such manner that the increment does not exceed the amount of 25% of the total price payable under the contract, however; the same prices awarded and any other relevant conditions shall remain the same for this purpose. This right is valid during the tender validity and within 120 days from the date of the order letter.

54. GUARANTEE

Subject as hereinafter set out; the Vendor undertakes to remedy any defect resulting from faulty design, materials or workmanship.

This liability is limited to defects which appear during the period (hereinafter called the Guarantee Period) of fifteen months from date of dispatch ex-works or twelve months from the date of setting to work whichever shall be the later.

In fixing this period due account has been taken of the time normally required for transport as contemplated in the contract.

In respect of such parts (whether of the Vendor's own manufacture or not) of the material as are expressly mentioned in the contract, the Guarantee Period shall be such other period (if any) as is specified in respect of each of such parts.

The Guarantee period shall start from the later of the dates mentioned in paragraph 2 above. If however dispatch ex-works is delayed for a period in excess of three months due to a cause beyond the control of the Vendor the Guarantee Period shall not extend beyond eighteen month from the date the material was ready for dispatch ex-works.

The Guarantee period is based on the continuous use of the material in service for 24 hours every day.

A fresh Guarantee Period equal to that stated in paragraph 2 hereof shall apply, under the same terms and conditions as those applicable to the original material, to parts supplied in replacement of defective parts or to parts renewed in pursuance of this clause. This provision shall not apply to the remaining parts of material, the Guarantee Period of which shall be extended only by a period equal to the period during which the material is out of action as result of a defect covered by this clause.

In order to be able to avail himself of his rights under this clause the purchaser shall notify the Vendor in writing without delay of any defects that have appeared and shall give him every opportunity of inspecting and remedying them.

On receipt of such notification the Vendor shall remedy the defect forthwith and at his own expense. Save where the nature of the defect is such that it is appropriate to effect repairs on site, the purchaser shall return to the Vendor any part in which a defect covered by this clause has appeared, for repair or replacement by the Vendor, and in such case the delivery to the purchaser of such part properly repaired or a part in replacement thereof shall be deemed to be a fulfillment by the Vendor of his obligations under this paragraph in respect of such defective part.

The Vendor shall bear all the costs and risks of the transport of defective parts or equipment and their replacements.

Where, in pursuance of paragraph 9 hereof, repairs are required to be effected on site, the conditions covering the attendance of the Vendor's representatives on site shall be such as may be specially agreed between the parties.

Defective parts replaced according to this clause shall be placed at the disposal of the Vendor.

If the Vendor refuses to fulfill his obligations under this clause or fails to proceed with due diligence after being required so to do, the purchaser may proceed to do the necessary work at the Vendor's risk and expense, provided that he does so in a reasonable manner.

The Vendor's liability does not apply to defects arising out of materials provided, or out of a design stipulated, by the purchaser.

The Vendor's liability shall apply only to defect that appears under the conditions of operation provided for by the contract and under proper use. It does not cover defects due to causes arising after the risk in the material has passed in accordance with clause 6. In particular it does not cover defects arising from the purchaser's faulty maintenance or erection, or from alterations carried out without the Vendor's consent in writing, or from repairs carried out improperly by the purchaser, nor does it cover normal deterioration.

Save as in this clause expresses, the Vendor shall be under no liability in respect of defects after the risk in the material has passed in accordance with clause 6, even if such defects are due to causes existing before the risk so passed. It is expressly agreed that the purchaser shall have no claim in respect of personal injury or of damage to property not the subject matter of the contract or of loss of profit unless it is shown from the circumstances of the case that the Vendor has been guilty of gross misconduct.

From our stores within a month from date of notification. All costs and expenses of transportation shall be borne by the vendor. Unless otherwise agreed. IDECO has the right to deal with the defective materials in a proper way.

55. GROSS MISCONDUCT

Gross misconduct “does not comprise any and every lack of proper care or skill”, but means an act or omission on the part of the Vendor implying either a failure to pay due regard to serious consequences which a conscientious contractor would normally foresee as likely to ensue, or a deliberate disregard of any consequences of such act or omission.

ITEM 1: IDECO MDM Technical Specifications for Procurement Purposes

Technical Document

Table of Contents

1. Section1: Overview

1.1. Purpose of Document

This specification document outlines the technical requirements and associated integration services for a future Meter Data Management (MDM) solution at IDECO. Together with the Integration Study, the information contained herein provides potential vendors with a description of the MDM system requirements and its interfaces to other systems as needed to support IDECO's technology roadmap.

1.2. Intended Audience

The primary audience of this document is MDM system vendors (also known as "The Bidder") intending to participate in the bidding process at IDECO. This document informs potential vendors how to structure their response as part of IDECO's procurement life cycle. The IDECO procurement team is a secondary audience of this document as the contents outlined herein inform the procurement process for a new Meter Data Management System at IDECO.

1.3. Instructions to Vendors and Evaluation Approach

IDECO's intent is to acquire a turn-key solution for a Meter Data Management System. Vendor proposals are to include all descriptions and costs needed to bring a new MDM solution to production and support utility operations at IDECO.

The requirements for the MDM solution are described in detail in Section 4 of this document. The Bidder is requested to:

1) Submit a Technical Proposal.
2) Complete and submit the Compliance Sheet "Bidder Response Sheet" attached in Appendix I.
3) Complete and submit the Clarification Matrix "Technical Proposal Clarification Sheet" attached in Appendix II.
4) Complete and submit Pricing Matrix attached in Appendix III.

The Bidder's response in the Compliance Sheet for each tabulated requirement must indicate if their proposed solution does comply with the requirement. The bidder shall include pertinent details as to how their proposed solution will address or meet the tabulated requirements. Any supporting materials provided as part of the bidder's response shall be referenced in the compliance sheet (indicating file name and details) and provided as an appendix to the bidder's response.

Below is an example format of a response expected in the Compliance Sheet.

Priority	Reqt #	Requirement	Bidder Response		
			Comply (Yes/No/May be)	Response	Proposal Reference
Mandatory	MDM-F003.1	MDM shall be able to store billing data readings from Head End System.	Yes	Our MDM is designed to store multiple different meter read types to support various billing scenarios, including but not limited to: ● Register read billing ● Demand billing ● Interval based billing ie. TOU rates ● Net meter billing	Section 4.3.2

The scoring of the vendor submission will be based on the Mandatory requirements. The optional requirement and additional services will be taken into consideration after the initial scoring is complete and an aggregate score will be determined for the response which will include a score for the mandatory requirements and the optional requirements and additional services.

The technical proposal shall include an executive summary, a solution overview, and topics outlined in the same structure as in Section 4 of this tender. Within the proposal the Bidder is to comment specifically on the aspects in the "Solution Clarification" tables in the respective sections.

Below is an example (partial table) of the billing related solution clarifications to be provided in the proposal and Appendix II.

Ref. Number	Clarification	Reference In Technical Proposal
031	Bidder is to declare its understanding of accepting this data and confirm that all commodity elements listed above will be stored in whatever granularity will be provided by the HES in the MDM.	Section 2.4.5
032	The Bidder is asked to describe its experience working with such commonly accepted files as the CMEP, XML, HHF, HUL/HDL, Itron MV-RS Input/Output file format, etc. Additionally, Bidders should discuss if they have worked with HES that provide information accessible via web services.	Section 1.4.8

The aforementioned pricing matrix found in Appendix III outlines how the bidder is to provide the cost breakdown for their submission. MDM requirements and features that are optional for which the bidder foresees costs in addition to the base cost of their solution are to be indicated in accordance to the instructions outlined in the pricing matrix.

1.4. Product Demo

After the initial evaluation, IDECO will request shortlisted Bidders to present a demo of the product they are proposing.

2. Section 2: Company Overview

Irbid District Electricity Company (IDECO) was established in 1957, and serves approximately 650,000 customers across 23,000 square kilometers. IDECO's concession includes the provinces of Irbid, Mafraq, Jerash and Ajloun area and some parts of the Balqa governorate. The concession represents an area of about 23,000 square kilometers comprising 26% of the area of the Kingdom.

IDECO is one of three electricity distribution companies in Jordan who receive their source of supply from the National Energy Power Company (NEPCO). NEPCO is the system operator for the Jordanian national interconnected grid and provides the bulk power supply to Jordan's distribution utilities.

IDECO was privatized in 2008 and is now majority-owned by Electricity Distribution Company (EDCO), which is in turn wholly owned by the Kingdom Electricity Company. IDECO is regulated by the Energy and Minerals Regulatory Commission (EMRC) in providing service to its 650,000 customers, equating to approximately 477 MW. The annual average per household consumption is 5,000kWh and the demand is expected to reach 1,000,000 customers by 2030.

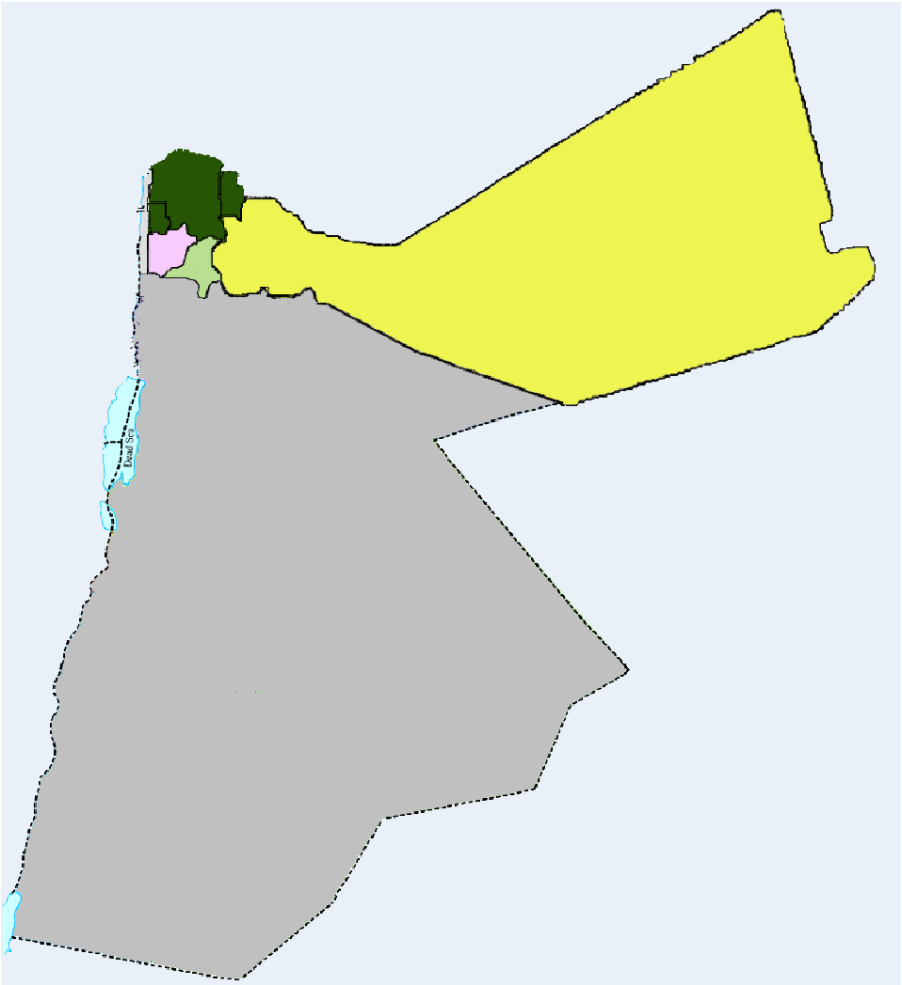


Figure 1: IDECO Franchise Areas

3. Section 3: AMI Program Scope

3.1. Glossary of Terms

Term	
MDM	Meter Data Management
AMI	Advanced Metering Infrastructure
NISTIR	National Institute of Standards and Technology Interagency Report
IEC	International Electrotechnical Commission
HES	Head-End System

3.2. AMI Program Objectives

This section is IDECO to fill

3.3. Current and Planned AMI Infrastructure

This section is IDECO to fill

3.3.1. Current AMI Infrastructure

This section is IDECO to fill

3.3.2. Planned AMI Infrastructure

This section is IDECO to fill

4. Section 4: MDM Technical Specification

4.1. General Overview

IDECO currently operates multiple electricity meter technologies from a variety of vendors and is seeking a single enterprise MDM solution to manage all meter data at the utility. It is IDECO's intent to have one centralized system to manage the multiple types of incoming meter data streams, their associated configurations and the coordination of meter firmware.

In order to simplify and significantly reduce the likelihood of errors in business processes that utilize meter data, IDECO is aiming to apply consistent business processes to a single MDM solution with well-defined interfaces. The objective of the business is to enable centralized management of the processes and interfaces for all meters current and future on IDECO's distribution network.

The MDM will provide long-term data storage of register and interval meter data, as well as meter events and alarms (such as tamper and outage notifications). The system will be integrated with IDECO's business process and will be accessible by all business and analytical systems, and readable by users of meter data throughout the utility. The MDM will have the ability to collect data streams from physical meter channels, endpoints, or modules, and virtual endpoints as needed.

It is IDECO's intention to implement commercial and industrial applications along with the residential and small commercial deployment. Therefore, this RFP for MDM solutions will address IDECO's requirements for smart metering in both residential and commercial/industrial applications.

It is IDECO's assumption that the cost to integrate the Technical Requirements will be included with the Base Price of the MDM Solution. If the proposed solution identified in the section below is not included in the base price of the system, it should be identified as such in the response. The actual costs to implement any of the functionalities identified below should be clearly identified in the Pricing Matrix attachment.

The Bidder is to propose a fully capable MDM system able to manage the ongoing collection of all cumulative and interval meter readings for electricity meter readings.

Note: The requirements are described in detail through the tables below. Please provide your answers in the attached compliance sheet Excel File.

Priority	Reqt #	Requirement
Mandatory	R4.01.01	The Bidder must provide an executive summary, of no more than two pages in length, which outlines the Bidder's background and business expertise in providing MDM solutions to electrical utilities. It shall highlight the key features that differentiate it from competitors.
Mandatory	R4.01.02	The Bidder must demonstrate previous experience successfully implementing enterprise MDM solutions at electrical utilities. The Bidder shall provide a short description of 3 reference projects, and include contact information of the client

		utilities. The references must be similar size of IDECO or larger I.E. greater than 650,000 endpoints. The descriptions shall illustrate how the solution has been applied to meet utility business needs and interface with existing utility systems.
Mandatory	R4.01.03	The Bidder must have a history of implementing MDM systems in the Middle East, North Africa, or Europe Regions. The reference projects supplied must highlight the Bidder's local experience implementing MDM solutions in the region.

4.2. Expected Growth

IDECO's current customer base of approximately 650,000 is expected to reach 1,000,000 subscribers within 10 years. It is IDECO's intent to implement an enterprise MDM solution which will meet the current needs of the business and be able to scale to meet the projected future needs.

Priority	Reqt #	Requirement
Mandatory	R4.02.01	The Bidder's MDM solution must provide a system which supports the current installed smart meters of 200,000 customers and the solution must be capable of scaling to 1,000,000 customers over a 10 year time span without the need of any major systems upgrades, modifications of recommissioning. The Bidder shall include all relevant details explaining the licensing cost structures relative to the number of customers as per the pricing matrix found in Appendix II.
Mandatory	R4.02.02	The System must be able to scale up on an annual basis to cover 50,000 - 100,000 smart meters. At the beginning of each year IDECO will inform the Vendor about the required target of the year.
Mandatory	R4.02.03	The Bidder's MDM solution must provide a system which supports 200,000 customers at initial Go Live. The Bidder shall include all relevant details explaining the licensing cost structures relative to the number of customers as per the pricing matrix found in Appendix III.

4.3. Interaction with HES (MDMS and AMI Data Collection System / Meter Data Collection)

IDECO expects that the MDM will accept and store AMI data from the HES as it pertains to billing functions (i.e., TOU Register data, interval data, register reads, etc.). Required meter read scenarios include the following:

- Total Register Reading(s) - Daily, Per Read Scheduled, Hourly provided by the HES.
- TOU Register Values (3 Buckets) - Daily, Per Read Scheduled, Hourly provided by the HES.
- Interval Data –5-minute, 15 minute, 30, minute, 60 minutes, etc.
- Residential and Commercial channels

4.3.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.03.01	MDMS must be able to estimate missing meter readings
Mandatory	R4.03.02	MDMS must be able to validate interval meter readings for a given meter.
Mandatory	R4.03.03	MDMS must be able to accept meter data from multiple meter vendors
Mandatory	R4.03.04	MDM must be able to accept data from a single-phase meter and poly phase meter.
Mandatory	R4.03.05	MDMS must record timestamps of register reads and associated interval reads.
Mandatory	R4.03.06	MDMS must log on demand read requests, whether or not they were successful, and the read data received..
Mandatory	R4.03.07	MDMS must be able to store billing data readings from the Head End System.
Mandatory	R4.03.08	MDMS must be able to provide a CIS / billing system with billing readings for requested meters.
Mandatory	R4.03.09	MDMS must be able to store meter data for at least 3 years.
Mandatory	R4.03.10	MDMS must be able to request the meter data for a given smart meter.
Mandatory	R4.03.11	MDMS must be able to save instantaneous (on demand reads) data from a smart meter.
Mandatory	R4.03.12	The MDMS must support configurable times for importing meter read data from selected meters
Mandatory	R4.03.13	MDMS must be able to record consumption data across a meter change for the same customer.
Mandatory	R4.03.14	The MDMS must maintain the current power status (Connected, Communication Off, Power Off “Last Gasp”) of each meter based on the information from the HES.

4.3.2. Clarifications

In the technical proposal, the Bidder must clarify the following:

Ref. Number	Clarification
C4.03.01	Bidder is to declare its understanding of accepting this data and confirm that all commodity elements listed above will be stored in whatever granularity will be provided by the HES in the MDM.
C4.03.02	The Bidder is asked to describe its experience working with such commonly accepted files as the CMEP, XML, HHF, HUL/HDL, Itron MV-RS Input/Output file format, etc. Additionally, Bidders should discuss if they have worked with HES that provide information accessible via web services.
C4.03.03	The Bidder is asked to provide screen shots of the GUI used regarding the functionality described above.
C4.03.04	The Bidder is asked to provide details as to the expected time to process 200,000 electric meters end points with hourly interval data.
C4.03.05	The Bidder is asked to provide details as to the expected time to process 600,000 electric meters end points with hourly interval data.
C4.03.06	The Bidder is asked to provide details as to the expected time to process 1,000,000 electric meters end points with hourly interval data.
C4.03.07	The Bidder is asked to describe the ability and functionality for the MDM for the following: ● estimate meter readings for any missing meters. ● validate interval meter readings for a given meter. ● accept meter data from multiple meter vendors ● accept data from a single-phase meter and poly phase meter. ● record when bulk meter reads occur and associate time of meter reading with the meter interval data. ● record consumption data across a meter change
C4.03.08	The Bidder is asked to provide an overview of its methodology relating to integration with the HES.
C4.03.09	The Bidder is asked to describe the capability of supporting data import/export mechanisms (i.e., batch or streaming) and describe the processing capabilities in meters per hour that their system can perform with each type.
C4.03.10	The Bidder is asked to indicate their recommended data transfer methodology (ie. push or pull)
C4.03.11	The Bidder is asked to describe how data is processed in the MDM and to provide examples of relevant size customers with similar HES configurations.
C4.03.12	The Bidder is asked to describe its current process of managing this functionality and provide details about its relevant experience, including what HES they currently support with this functionality.
C4.03.13	The MDM is to support multiple commodities and be capable of storing and processing readings from all types of data received from HES. The MDM is to provide data in different configurable formats and at whatever frequency (hourly, daily and/or monthly) is provided for in the contract to the electric utility.
C4.03.14	If the Bidder has experience in real-time processing of data, it should discuss how the timing of information processing is handled such that operational efficiencies are realized.

4.4. Validation, Editing, and Estimation (VEE)

All meter data received by the MDM will be subjected to VEE processes. At this time IDECO has not determined the required rules for VEE specifically for the utility, but the expectation is that the MDM must include the ability to validate, estimate, and edit HES data so that clean and complete data can be delivered to utility systems. In the context of HES interval data, VEE should verify the accuracy and completeness of the meter data and fill in the gaps according to set rules and predetermined logic. The standards set up by IDECO will likely map to the rule set being utilized in Ontario Canada and published by the Independent Electricity System Operators (IESO) of Ontario Canada.

4.4.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.04.01	MDMS must be able to detect errors in the meter data for a given meter
Mandatory	R4.04.02	The MDM must accept electricity consumption data at a configurable frequency from the HES, with a minimum frequency of once daily.
Mandatory	R4.04.03	MDMS must be able to support multiple different meter vendors. including but not limited to IDECO current vendors. (Hexing, Holley, and Landis & Gyr).
Mandatory	R4.04.04	MDMS must be able to accept meter data from multiple different meter vendors and one HES which aggregate the data from the meters.
Mandatory	R4.04.05	The MDMS must support storage of interval data by channel and multiple interval lengths (example 5, 15, 30, and 60 minute intervals) for all applicable data types.
Mandatory	R4.04.06	The MDMS must support storage of all collected event and alarm data from meters, network equipment, and the HES.
Mandatory	R4.04.07	The MDMS must have the capacity to store other potential meter data, for example, kW, kVARh/kVAR, kVAh/kVA, voltage, and power quality measures such as momentary interruptions and harmonics, etc.
Mandatory	R4.04.08	The MDMS must be configurable to select which data to be maintained, purged or archived.
Mandatory	R4.04.09	The MDMS must perform the same checks for all daily and billing quantities including net, demand quantities, Time-of-Use, and interval data.
Mandatory	R4.04.10	Notwithstanding the latency of data collection via the HES, once the MDMS receives meter read data, the VEE process must occur in real-time and the post-VEE data is then immediately available to user or external systems.
Mandatory	R4.04.11	The MDMS must maintain both the original received raw data in a non-manipulated state, in addition to VEE'd data.
Mandatory	R4.04.12	The MDMS must flag all estimated or manually edited data, identify data gaps (where automatic estimation cannot be performed based on configuration parameters), and generate alerts/notifications for manual data editing.
Mandatory	R4.04.13	The MDMS must provide the ability to pass to the CIS a flag identifying an estimated

		value, along with the reason for the estimate.
Mandatory	R4.04.14	The MDMS must clearly distinguish visually within the GUI between metered, estimated, and manually edited data. Please provide GUI screenshots in your response that support this requirement.
Mandatory	R4.04.15	The MDMS must have a manual GUI interface for VEE, and retain appropriate user controls and audit to investigate actual raw data collected and the manual edited data. Please provide GUI screenshots in your response that support this requirement.
Mandatory	R4.04.16	MDMS must support multiple meter configurations such as those described Appendix IV
Mandatory	R4.04.17	The MDM must be able to prioritize alerts, alarms, and reports within queues or workflows in order for the information to be distributed to the appropriate groups within the company. The MDM must also prioritize failed validations for meters that are due for billing within a configurable window and make this information available to the MDM operator or billing analyst.
Mandatory	R4.04.18	The MDM must store all versions of data and be able to flag all readings that were used for billing (i.e. sent to the CIS via request and response brokering) and make this version available for use in customer presentment products.
Mandatory	R4.04.19	The MDM must also have the ability to track the source of the read information (HES, manual edit, etc.) and a mechanism to distinguish actual reads from reads that have been estimated (VEE) when displaying data.

4.4.2. Clarifications: Validation, Editing and Estimation (VEE)

In the technical proposal, the Bidder must clarify the following:

Ref. Number	Clarification
C4.04.01	The Bidder is asked to provide an overview of its product's VEE process including when VEE takes place and how historical usage is used and what options are available for setting up rule sets. Items to be considered in the overview include: ● VEE takes place upon entry to the MDM ● VEE takes place prior to billing file being sent to CIS ● Historical usage is utilized in VEE process ● Weather information is utilized in VEE process ● Outage information is utilized in VEE ● VEE rule set is user configurable
C4.04.02	The Bidder is asked to provide an overview of how rule sets are modified and what skill set would be required to do so.
C4.04.03	The Bidder is asked to provide a description of functionality, if any, that the Bidder's solution has to perform VEE on seasonal accounts.
C4.04.04	The Bidder is asked to describe how estimated reads are visibly distinguishable from other types of readings and include a screenshot of this functionality.

C4.04.05	The Bidder is asked to describe how the system is able to distinguish between zero consumption due to a meter being removed, zero consumption due to a disconnection, and zero consumption due to an outage and must be able to factor this information in when determining estimated usage.
C4.04.06	Message Sum Check process is a critical process in the effort to provide data for billing processes which meet the needs for verification and reconciliation. The Bidder is asked to confirm that the Message Sum Check can be a daily process conducted by the MDM upon receipt of the HES Register and Interval Data. The purpose of this process is to confirm that the sum of the intervals matches the register read delta for the same time period. Provide a screenshot of this functionality.
C4.04.07	The Bidder is asked to provide details on experience with integrating standard VEE rules such as the standard California VEE rule set or the VEE rule set being utilized in Ontario published by the Independent Electricity System Operator (IESO). The Bidder should provide a list of utilities where these rule sets have been implemented and confirm that they have complied with all components of the rule sets.
C4.04.08	The Bidder must describe how its product accommodates sum checks on total kWh registers and if it has the process to complete the sum check for TOU registers. The Bidder is to describe how it completes the sum check for TOU and if it is included in the base price. The Bidder is to confirm the reconciliation of intervals to the register reads (sum check) as well as reconciling to TOU bucket register reads (sum check).
C4.04.09	The MDM is expected to manage VEE rules. The Bidder is asked to describe how different VEE rules for different commodities can be accommodated.
C4.04.10	The Bidder requested to describe the features and functions used for exception management. Specific reports to include missing reads, errors in data, errors in communication, etc...

4.4.3. Clarifications: Manual Exception Management

If, while processing meter data, the MDM produces data “exceptions”, IDECO expects that some of these will need to be corrected or estimated manually.

In the technical proposal, the Bidder must clarify the following:

Ref. Number	Clarification
C4.04.11	The Bidder is asked to describe the manner in which MDM reports on exceptions and how the user would intervene to resolve these exceptions. Topics that should be addressed are: ● Provide screen shots of the GUI and the functionality provided to manually address small volumes of corrections to interval data (i.e., 10 or less entries). ● The process to submit larger quantities of intervals estimated by an outside system/source (i.e. Excel spreadsheet, XML formatted documents) into the MDM through file-based interfaces or other methods. ● Describe the ability for the user to have this new, manually-corrected version of data submitted for VEE to verify that the exception has been cleared.
C4.04.12	The Bidder is to provide details on the average time it would take to clear a manual exception using its tools, once the user is aware of the input.
C4.04.13	The Bidder is to describe what tools are available to ensure that meters whose billing windows

	are approaching are addressed in a higher priority than those that are not.
C4.04.14	The Bidder is asked to also describe its experience with other like-size clients regarding their manual exception management functionality.

4.4.4. Clarifications: Automated Exception Management

MDM should provide a facility for the programming of IDECO's specific business rules that will allow for automated resolution of certain data related problems.

For example, as the MDM will have access to outage information from the HES, the validation of interval data can be augmented through the use of the outage messages. By using the outage messages, the MDM should have the logic to know that there would be no consumption over an outage. Therefore, any estimation of intervals should not produce consumption data during this period.

In the technical proposal, the Bidder must clarify the following:

Ref. Number	Clarification
C4.04.15	The bidder is asked to describe how the MDM can support the programming of IDECO's specific business rules that will allow for automated resolution of certain data related problems.
C4.04.16	The Bidder is asked to describe how the MDM will utilize HES data, including outage data, to ensure accurate data and that valid gaps in data are not estimated as having consumption.
C4.04.17	The Bidder is asked to describe the MDM functionality to have alarms or reports configured according to certain criteria such as percentage drops in consumption.
C4.04.18	The Bidder is asked to describe its experience with other like-sized clients regarding their automated exception management functionality.

4.4.5. Clarifications: Workflow / Queue Management

In order to efficiently manage the operation of the MDM system and to minimize the required resources, the MDM must be able to prioritize alerts, alarms, and reports within queues or workflows in order for the information to be distributed to the appropriate groups within the company.

The MDM must also prioritize failed validations for meters that are due for billing within a configurable window and make this information available to the MDM operator or billing analyst.

The Bidder is asked to:

Ref. Number	Clarification
C4.04.19	The bidder is asked to describe the escalation process built into its work queue / workflow system to identify backlogs in exception clearing.
C4.04.20	The bidder is asked to provide a listing of the exceptions / processes that can be managed by its workflow / queue functionality.
C4.04.21	The bidder is asked to provide screen shots of the GUI used regarding the functionality described above.
C4.04.22	The bidder is asked to describe its experience with other like-size clients regarding their workflow / queue functionality. For each client listed, the Bidder is to provide details on the benefits received by the client using this functionality.

4.5. Operational Data Management

4.5.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.05.01	The MDM must have the ability to send commands to the AMI network. The following is a list of required commands (state if compliancy is current or in the future): • Meter Pings • On Demand Reads • Remote Disconnects/Remote Reconnects
Mandatory	R4.05.02	MDMS must be able to provide CIS and Customer Portal Information about the status change of a meter
Mandatory	R4.05.03	MDMS must have the ability to store the firmware version of the smart meter and track its changes.
Mandatory	R4.05.04	MDMS must have the ability to flag exceptions of the configuration of the meter, relative the meter read data received from the HES
Mandatory	R4.05.05	MDMS must have the ability to store an indicator of a planned firmware upgrade and upgrade version and target upgrade date
Mandatory	R4.05.06	MDM must report compare installed firmware and planned firmware version
Mandatory	R4.05.07	MDM must maintain a history of configuration changes of the meter.
Mandatory	R4.05.08	MDM must be able to send a notification of meter program changes to a specific recipient.
Mandatory	R4.05.09	Smart meter and subscriber data must be archived when a meter is removed from the field

4.5.2. Clarifications

Ref. Number	Clarification
C4.05.01	The Bidder is asked to describe which of the following operational data can be stored in the MDM: ● Maximum/Minimum/Average Voltage ● Instantaneous Voltage – As Requested ● Lo/Hi Voltage Alarms – As Occurred ● Tamper Alarms – As Occurred ● Reverse Energy Flow – As Occurred ● Outage Notification – As Occurred ● Restoration Notification – As Occurred ● Leak detection – As Occurred ● Backflow – As Occurred ● Demand Read/Reset - As Occurred The Bidder is to provide screen shots of the GUI used showing the operational data noted above.

4.6. Remote Disconnect / Reconnects Capabilities

IDECO is expecting to deploy remote disconnects in either all smart meters or within strategic locations within its service area. It is required that the MDM will be able to interface with the HES to assist with the management of the remote disconnection process.

Due to the sensitive nature of the disconnection of power, IDECO would like to understand the level of security and protection that the MDM can provide in regards to the disconnection process. At a minimum, the MDM must provide the ability to confirm the meter number and user authorization level prior to issuing the remote disconnect to the meter.

The MDM must log all disconnect attempts. This includes successful attempts and failed attempts due to inadequate security levels or other reasons.

4.6.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.06.01	MDM must contain smart meter data such as meter number and the number of trials and period between trials intervals
Mandatory	R4.06.02	The MDM must be able to receive and store Last Gasp and Reconnect notification from the HES.
Mandatory	R4.06.03	The MDM must be able to send requests to HES to ping a smart meter or group of meters based on user request.
Mandatory	R4.06.04	The MDM must be able to send requests to HES to remotely connect or disconnect a meter.

4.6.2. Clarifications

Ref. Number	Clarification
C4.06.01	The Bidder is asked to provide an overview of how its MDM product can support the remote disconnection process (example: Service Order integration). The Bidder is asked to provide screen shots of the GUI used regarding the functionality described above.
C4.06.02	The Bidder is asked to provide an overview of pre-paid management features in the proposed solution.

4.7. Analysis and Reporting

4.7.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.07.01	The System must provide the ability to deliver and export reporting data in multiple formats such as MS Excel, CSV, HTML, PDF, etc.
Optional	R4.07.02	The system shall provide the ability to create and save ad hoc reports.
Mandatory	R4.07.03	The system must provide the ability to support reporting functions without adverse impact on the transactional processing of the MDMS such as slowing down the transactional processing.
Mandatory	R4.07.04	The System must provide the ability to create and maintain algorithms used for data analytics for the following: ● Line Losses reporting based on various levels such as at the substation level, feeder phase level, defined portions of the feeder, and by certain times of the day. ● Transformer loading analysis by a defined transformer ID. ● Measurement and verification of Demand Response events. ● Analysis of data to determine potential theft of energy. Data for analysis will include measure values from the meter or events.
Mandatory	R4.07.05	The System must provide Revenue Protection Reports (e.g. a premise which does not have an active end-use consumer is consuming any energy, or some energy above a threshold.) Identify that the reverse energy flow is allowed for those meters which are in net metering mode,however, to avoid false indicators.
Mandatory	R4.07.06	The System must provide the capability to profile smart meter data over a period of time and compare to other smart meters with similar attributes.
Mandatory	R4.07.07	The System must allow the MDM database the flexibility for various users to create and save their own reports.
Mandatory	R4.07.08	MDM shall be able to generate power quality reports. Please provide screenshots for this functionality.
Mandatory	R4.07.09	The MDM must provide the ability to produce data graphs and reports for all metered and calculated channels. All graphs and reports shall be viewed within the MDM application user interface, as well as contain the functionality to enable data export to spreadsheets, or be transportable to other electronic file format, and saved as images for use in external reports, etc. Reports will be required to be run in either online or batch mode.
Mandatory	R4.07.10	The MDM has the ability to filter reports based on attributes from the CIS, such as IDECO service territories or customer type.

Mandatory	R4.07.11	The MDMS must be able to add virtual meters which are capable of aggregating the data collected from specific smart meters and other virtual meters.
Optional	R4.07.12	The MDMS shall be able to notify the user when the configured events are triggered on a virtual meter.
Mandatory	R4.07.13	The MDM must be capable of executing custom queries / reports to accommodate any areas where standard reports are not available.
Mandatory	R4.07.14	The MDM must be able to filter reports based on the smart meter brand and model.
Mandatory	R4.07.15	The MDM must be able produce reports demonstrating the losses in energy.
Mandatory	R4.07.16	The MDM must be able to store the configuration of a smart meter that will be used to monitor feeders and use it in the data losses reports. The MDM must be able to report on energy losses aggregated at a feeder level.

4.7.2. Clarifications: MDM System Reporting

The Bidder is asked to describe what data presentation and reporting features are provided to support reporting on meter data, metrics and events. Specifically:

Ref. Number	Clarification
C4.07.01	The bidder is asked to describe the MDM reporting capabilities, with specific comments on: ● Drill down capability ● Scheduling ● Saving / Sharing / Exporting
C4.07.02	The Bidder is asked to provide a list of standard “out of the box” reports
C4.07.03	The Bidder is asked to provide an overview of available dashboards and whether dashboards can be configured for specific users or roles.
C4.07.04	The Bidder is asked to describe how they can support SLA monitoring of MDM.

4.7.3. Clarifications: Operational Data/Indicators/Events

Ref. Number	Clarification
C4.07.05	The Bidder is asked to describe the ability to display the events produced by the HES (e.g., outage notification, restoration notification, tamper information, hi/lo voltage indicators, backflow, etc.) graphically, within an interactive dashboard. In the event that the AMI network is

	encountering problems, the user should be able to click on the interactive dashboard function and be provided with additional information to explain the problems being encountered (i.e. list of meters experiencing power outage, events received to indicate tamper, meters experiencing backflow conditions). The Bidder is to provide screenshots and details about its dashboard functionality regarding this point. If a dashboard function as described above is not available, the Bidder should provide information on what other functions and features within the system could be utilized for this purpose.

4.7.4. Clarifications: Billing Schedule Maintenance

Ref. Number	Clarification
C4.07.06	The Bidder is asked to describe the product ability including screenshots to display at a summary level the current status of the billing schedule. Required information may include: ● cycles billed ● cycles pending billing and their scheduled bill date ● cycles which have completed validation within the MDM

4.7.5. Clarifications: Virtual Meters and Data Aggregation and Analysis

Ref. Number	Clarification
C4.07.07	Describe the functionality to support data aggregation for netting of bi-directional meters.
C4.07.08	Describe the functionality to support data aggregation for load analysis (comparing the load of multiple meter points and creating exceptions based on a prescribed value).
C4.07.09	Provide screen shots of the GUI regarding the functionality described above.

4.7.6. Clarifications: Custom Queries

Ref. Number	Clarification
C4.07.10	The bidder should provide a description of how the product assists the end-user to understand the database structures and relationships to facilitate the creation of optimal data queries and the prevention of machine degradation due to the use of un-optimized queries.
C4.07.11	The bidder should provide a description of the utility's level of access to use reporting and query tools to create their own reports, queries and BI tools. Bidder to confirm if there will be wide-open access to these tools or will each custom requirement be quoted on a time-and-materials basis.
C4.07.12	The bidder should provide a description of custom reports utilizing report writers (Crystal, COGNOS, Business Objects, SSRS, etc).

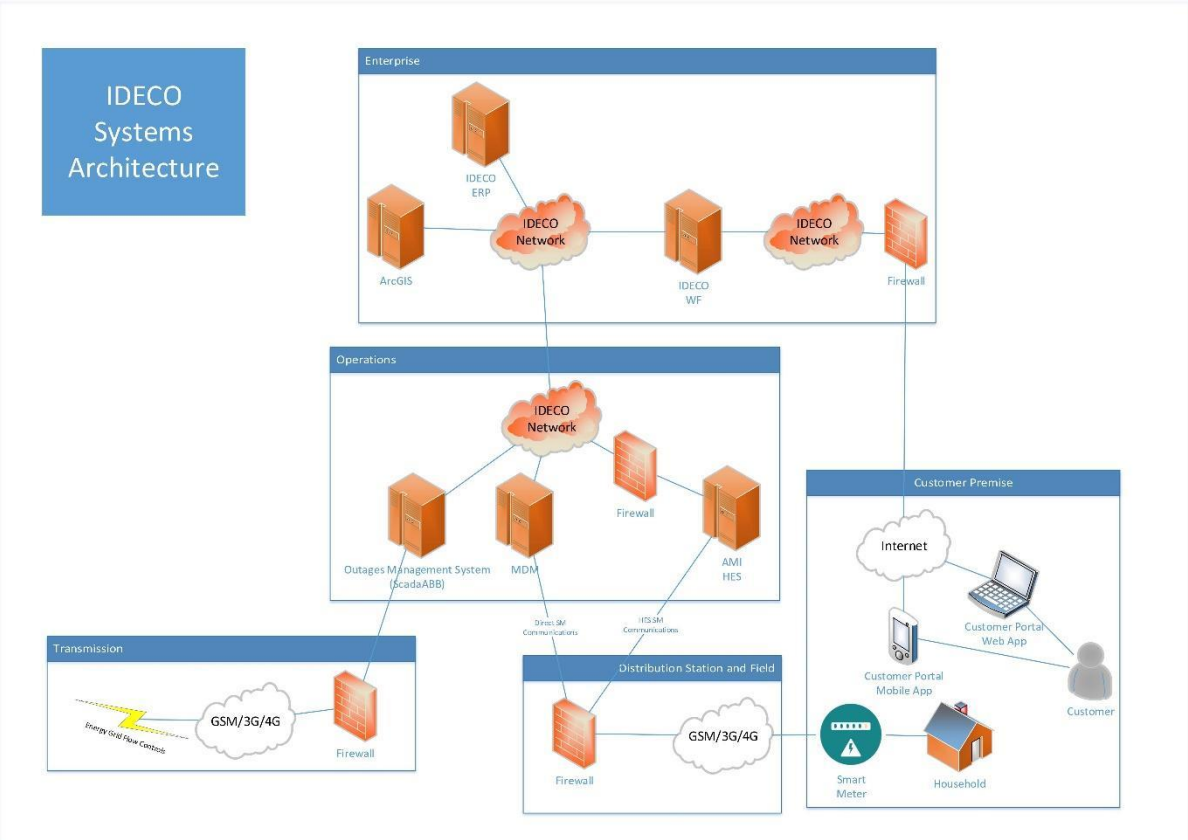
4.7.7. Clarifications: Data Analysis & Rules Management

Ref. Number	Clarification
C4.07.13	The Bidder is asked to provide details on the analytical tools and business rules engines available within its product. The information should include the skill set required to utilize these tools and if IDECO will have rights to modify existing rules or create new rules.
C4.07.14	The Bidder is also asked to provide a list of any out-of-the-box rules that are included in the base software.
C4.07.15	The Bidder is also asked to provide an overview of how this functionality is able to help maximize value from the HES in the areas of billing and operations.
C4.07.16	The Bidder must provide details on any restrictions within the product or known best practices in place to prevent degradation of performance of their MDM as a result of using this functionality.
C4.07.17	The Bidder must provide a description of what level of skill is required to create and maintain business rules.
C4.07.18	The Bidder must provide screenshots of the GUI regarding the functionality described above.

4.8. Integration

As part of the scope of work, the Bidder will prepare all the necessary API endpoints required to integrate with IDECO's systems as detailed below.

The following diagram depicts the flow of information that IDECO envisions with MDM integration.



The following are some of the systems which is currently used in at IDECO:

- IDECO ERP
- ArcGIS
- IDECO Workflow
- Outages Management System (ScadaABB)
- Customer Portal Web App
- Customer Portal Mobile App

4.8.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.08.01	MDMS must be able to provide CIS and Customer Portal Information about status change of meters
Mandatory	R4.08.02	MDM must be able to contact external systems such as GIS or CIS to request the geographic location for the smart meter.
Mandatory	R4.08.03	The MDMS must be able to be connected by other systems through secure web services
Mandatory	R4.08.04	The MDM must be able to push data to other systems through Web Services based on predefined schedules or certain events.
Mandatory	R4.08.05	The MDM must be configurable to send data incrementally or periodically.

4.8.2. Clarifications

Ref. Number	Clarification
C4.08.01	The Bidders shall provide a list of system integrations that are supported as part of their base MDM solution for commonly used utility systems and tools. Supported system integrations may include databases, data visualization tools (e.g. Power BI), Geographical Information Systems, Distribution operations tools (SCADA, outage management) etc.
C4.08.02	The Bidder shall provide a list of supported data sharing strategies and protocols which can be leveraged to interface the MDM solution with the existing utility applications and tools. This may include SOAP, JASON, REST API, web services, multispeak etc.
C4.08.03	The Bidder is asked to describe the exception management process that is used when a meter being reported by HES is not identified in the MDM. For example, is the data dropped (prevented from being imported to the MDM) with an exception report created, or stored in a staging table until a proper sync is received.
C4.08.04	The Bidder is requested to specify whether there is a cost to creating and implementing the interface that will be required for IDECO's system.
C4.08.05	The Bidder is requested to specify the security protocols used while using the APIs of the MDMS.
C4.08.06	The Bidder is requested to provide detailed information regarding its experience integrating to third party applications. The system should contain Application Program Interfaces (APIs) for third party applications and should not have a load limitation to APIs (it should be multi-threaded).
C4.08.07	The Bidder is requested to describe their approach to manage the volume of web service calls to and from the MDM system. Please indicate how the Bidder intends to manage performance levels relative to the solution's physical system constraints.

4.9. Outage Management & Power Quality

4.9.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.09.01	MDM must be able to push notification to another system based on the returned data from meters
Mandatory	R4.09.02	MDM must be able to import geographic information from external systems such as GIS or CIS.
Mandatory	R4.09.03	MDM must be able to save outage detection message logs which could be used later for tracking outage statistics including providing automated SAIDI, SAIFI, CAIDI, CAIFI reporting.
Mandatory	R4.09.04	MDM must be able to Track the performance of outage and restoration alarms

4.9.2. Clarifications

Ref. Number	Clarification
C4.09.01	The Bidder is asked to provide screenshots for the requirements mentioned earlier.
C4.09.02	The Bidder is asked to provide the out of the box features in the proposed MDM which related to Outage Management & Power Quality.

4.10. Revenue Protection

4.10.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.10.01	The MDMS must be able to store data about tampering events once occurred.
Mandatory	R4.10.02	MDM must be able to detect tampering once occurred based on certain thresholds configured by the user.
Mandatory	R4.10.03	MDM must be able to distinguish the tampering events issued by the smart meter and those generated by thresholds passing.
Mandatory	R4.10.04	The MDM must be able to use other events to verify the validity of the alarm (i.e. tamper not followed by a power outage).
Mandatory	R4.10.05	The MDM must be able to store alarms for a configurable amount of time even if they have not been resolved.

4.10.2. Clarifications

Ref. Number	Clarification
C4.10.01	The Bidder is asked to provide screenshots for the requirements mentioned earlier.
C4.10.02	The Bidder is asked to provide details on other features related to revenue protection and tempering detection available in its MDM product.

4.10.3. Clarifications: Voltage Alarm (Hi / Low) Management

To assist with asset management, the MDM may be used to analyze the Voltage alarms from the HES. IDECO expects that the MDM will have the ability to perform the following functionality:

- Assist with understanding the extent (number of homes, transformers) of hi / low voltage alarms.
- Use this data to identify potential diversions in the distribution network.
- Filter on alarms that have been caused by other events (high voltage with power restoration).
- Identify if the alarm is from a faulty meter asset.

As these alarms can create safety risks in the field, it is important that the MDM logs the action taken with each alarm through an automated or manual exception management process.

Ref. Number	Clarification
C4.10.04	The Bidder is asked to describe what functionality is available to support the analysis described above. Please provide screenshots if available.

4.11. Customer Information System

As part of this RFP, it is expected to be integration between the MDM and the CIS system.

As part of the synchronization that is required between MDM and CIS, it is expected that the proposed solution will allow for new or changed customer, account, site ID, meter configuration and service point information, and that this information will be imported from the external CIS as a batch or upon completion of service orders.

4.11.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.11.01	The MDM must allow for new or changed customer, account, site ID, meter configuration and service point information
Mandatory	R4.11.02	The MDM must be able to support TOU billing.
Mandatory	R4.11.03	The MDM must store all information and provide CIS with billing determinants appropriate to the requested period of time for each customer.
Mandatory	R4.11.04	The MDM must be able to support periodic billing.
Mandatory	R4.11.05	The MDM must be able to send to the CIS the register reading that best matches the date and time requested by the CIS for an individual customer.
Mandatory	R4.11.06	The bidder must create the API in the MDM which is responsible on the integration with CIS.

4.11.2. Clarifications

Ref. Number	Clarification
C4.11.01	The Bidder is asked to describe the functionality available in the MDM to help manage the meters assigned to each billing cycle to make sure the data is available when requested on the scheduled read date.
C4.11.02	The Bidder is asked to Provide screen shots of the GUI used regarding the functionality described above.
C4.11.03	The Bidder is asked to Describe the interface used to import billing schedules (direct database connection, web services, etc.).
C4.11.04	The Bidder is asked to describe the functionality they offer to support different TOU bill scenarios. Interval data may require aggregation into TOU buckets within the MDMS, or Smart Meters may be configured to provide the billing determinants and TOU buckets.

4.12. MDM Access and User Interface

4.12.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.12.01	The user interface of the MDM system must be web browser based
Mandatory	R4.12.02	The MDM must display the user interface in Arabic and English based on the user preferences.
Mandatory	R4.12.03	The MDM must have data export capabilities ie. download a table based report as a spreadsheet
Mandatory	R4.12.04	The MDM must have user access controls that allow for user group based permissions.
Optional	R4.12.05	The MDM shall have a notification center in the dashboard.
Mandatory	R4.12.06	The MDM must have the ability to send emails to the users based on configurable system criteria.
Optional	R4.12.07	The MDM shall have the ability to send SMS to the users based on configurable system criteria.
Mandatory	R4.12.08	The MDMS must have workflow capabilities to allow for multiple approval for remote actions (i.e Connect/Disconnect) on the meter.

4.12.2. Clarifications

Ref. Number	Clarification
C4.12.01	The Bidder should provide detailed information pertaining to the flexibility and functionality of the proposed solution in this regard, and clearly define the software components residing on the server side and any software components residing on the client side.
C4.12.02	The Bidder is asked to provide a description of the user access controls, and support for integration with various system access control models ie. Windows Active Directory.
C4.12.03	The Bidder is asked to provide details on how the MDM stores the Arabic content.

4.13. Storage & Archiving

4.13.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.13.01	The MDMS must be able to store all the retrieved data from Smart meters in the network for 3 years at minimum.
Mandatory	R4.13.02	The MDMS must be able to serve the expansion in clients number in the next 10 years. Current smart meter base is 200,000 meters and it expected to reach 1,000,000 meters in 10 years.
Mandatory	R4.13.03	The MDMS must notify IDECO's staff by email about deleting the data older than 3 years a month in advance.
Mandatory	R4.13.04	The MDMS must be able to archive its data into external storage before it is scheduled for automatic deletion.
Mandatory	R4.13.05	The MDMS must have configurations to allow for archiving old data once a month. The date of the month must be configured by IDECO staff.
Mandatory	R4.13.06	The MDMS must keep a log for the automatic archiving of old data.

4.14. MDM Environment

4.14.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.14.01	The Bidder must prepare 2 identical installations for the MDM on 2 separate physical locations to work as redundant.
Mandatory	R4.14.02	The Bidder must provide all the software, licensing, hardware, cabinets, cabling, infrastructure, etc. required for the 2 sites.
Mandatory	R4.1403	The Bidder must provide all the software and its licenses required to run the MDMS in the 2 sites.
Mandatory	R4.14.04	The Bidder must determine the required internet bandwidth for each site.
Mandatory	R4.14.05	The Bidder must take in consideration the physical space required to all the hardware required for the next 10 years.
Mandatory	R4.14.06	The Servers must be HP, DELL, or IBM.
Mandatory	R4.14.07	The Bidder must provide the workstation hardware required to operate the system by IDECO's team.

4.14.2. Clarifications

Ref. Number	Clarification
C4.14.01	The Bidder is asked to describe the failover procedure "Transfer from the primary location to the secondary".
C4.14.02	The Bidder is asked to provide information in this section regarding the optimal architectural design of the MDM and distinguish between virtual and physical. At a minimum, the following should be addressed: ● Database in use ● Operating System ● Program language/coding that the system is written in ● Server Specifications ● Third Party Licenses required to run the MDM ● Architectural Diagram ● User licenses included with base product (concurrent and permitted login accounts).
C4.14.03	The Bidder is asked to provide an architectural design of the technical platforms and identify which ones are virtual versus physical.

4.15. MDM Scalability and Availability

The MDM solution should be designed to support the minimum volume of 200,000 meters initially, and be able to scale up to a forecasted 1,000,000 meters within 10 years. The majority of meters have 15 minute interval data, and IDECO anticipates keeping 3 years of online data storage and the older data archived.

4.15.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.15.01	The MDM system must be able to scale to cover the increased demand by 50,000 to 100,000 meters annually.(cost should be shown for the first 5 years)
Mandatory	R4.15.02	The Bidder must provide a plan and quotation for the required hardware and software for the additional meters. Including licenses, servers, database, and additional supporting hardware. (for at least 5 years)
Mandatory	R4.15.03	In expanding plane, the Bidder must use the same servers vendors used for the initial environment.
Mandatory	R4.15.04	The redundant fail-over servers must support the expected growth.

4.15.2. Clarifications

Ref. Number	Clarification
C4.15.01	Bidders are asked to describe the required environment, hardware, software required to scale the system to support the above scenario.
C4.15.02	Bidders are asked to demonstrate the architecture's flexibility and scalability as the meter data volume grows.

4.16. System Security

IDECO to describe their expectation for system and data security

It is IDECO's intent to follow the security specifications described in The National Institute of Standards and Technology Interagency Report (NISTIR) 7628 "Guidelines for Smart Grid Cyber Security". In addition to standard AMI Security Requirements for confidentiality, integrity, and availability, the following use cases are considered of critical importance:

- SGSM-UC001 Bulk Meter Reading
- SGSM-UC002 Remote Connect and Disconnect
- SGSM-UC-B3 Detect Theft at the Meter

4.16.1. Requirements

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.16.01	The MDM must comply with the National Institute of Standards and Technology Interagency Report (NISTIR) 7628 "Guidelines for Smart Grid Cyber Security" You can find details in Appendix V.

4.16.2. Clarifications

Ref. Number	Clarification
C4.16.01	Bidders are asked to describe how its products and solution adhere to the NISTIR 7628 specification.
C4.16.02	Bidders are asked to describe how role based security is configured and maintained.
C4.16.03	Bidders are asked to provide documentation on recent security audits of their proposed solution.
C4.16.04	Bidders are asked to provide documentation on the best practices on security as it relates to their MDM solution.

4.17. Ongoing Resource Requirements

4.17.1. Clarifications

Ref. Number	Clarification
C4.17.01	Bidders should indicate to IDECO the level of resources that will be required for ongoing operation and maintenance of the proposed MDM solution. IDECO expects that the MDM solution will be managing its entire electric meter population by the end of 2030. IDECO would like to understand from the Bidder, at what point, given growth across all utility service segments how the required resources would be expected to change (or not), beyond 2030. The Bidder should provide reference materials such as a description of a “day in the life” of the MDM technical administrator and an application operator. The Bidder should provide a list of recommended resources (titles, number of individuals and skill set) required to operate a fully functional MDM environment.

4.18. Workflow

4.18.1. Clarifications

Ref. Number	Clarification
C4.18.01	The Bidder is asked to describe features and functions offered that support the automation of the workflow and business processes.

4.19. Training & Documentation

IDECO requires that all staff involved in the deployment and operation of the MDM System be trained. No installation of the software will be permitted until after IDECO staff are trained so that they may play a hands-on role of running the system from day one.

If IDECO determines that there are specific training and testing gaps, the Vendor will be required to complete the required additional training before the MDM system is accepted.

4.19.1. Requirements: Before and during implementation

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.19.01	The Bidder must train IDECO's teams that are involved in the implementation and installation before the installation of the system.
Optional	R4.19.02	The Bidder shall train IDECO's team outside of IDECO premises.
Mandatory	R4.19.03	The Bidder must train IDECO's team in Jordan.
Mandatory	R4.19.04	The Vendor must provide the trainees with all necessary material including workbooks, training aids, and system technical manuals prior to or during the training session.
Mandatory	R4.19.05	The Bidder must prepare the training venues with all the required equipment for the training.
Mandatory	R4.19.06	The Bidder must provide trained and experienced instructor(s), and ensure that they do not perform other duties during the training period that will interrupt instruction.
Mandatory	R4.19.07	The Bidder must train IDECO's team in terms of operations, reporting, and analysing.
Mandatory	R4.19.08	The Bidder must train IDECO's team to enable them to support the integrations going forward.
Mandatory	R4.19.09	The Bidder must provide the necessary documentation to operate the system.
Mandatory	R4.19.10	The Bidder must provide the user manuals in English and Arabic.
Mandatory	R4.19.11	The trainer must be able to deliver the training in Arabic or have a translator in the training room.
Mandatory	R4.19.12	The documentation of the training must contain at minimum: ● system overview description ● system flow charts ● file descriptions and record layouts ● description of program function and logic operating procedures, ● screen layouts ● data entry procedure ● report descriptions ● descriptions of all user options and operations ● descriptions of all error messages
Mandatory	R4.19.13	The Bidder must record the training sessions and provide them in a consumable version to be used to train staff members which may join the team later on.

Mandatory	R4.19.14	Trainee Testing - The Bidder's instructor must include evaluation of trainees to ensure that they have learned the course content and can perform all necessary functions on the system. The Vendor must notify IDECO of any employees who fail this evaluation and provide them with additional training.

4.19.2. Requirements: after implementation

Approximately six months following implementation, IDECO requires that formal review and refresher training take place at IDECO's premises. Training should address IDECO's specific topics.

The following is the requirements which the provided MDM must comply with.

Priority	Reqt #	Requirement
Mandatory	R4.19.15	After 6 months of "Production Use" of the MDM solution, the Vendor must perform a review of IDECO's use and effectiveness of the solution. Based on this review the Vendor will provide updated/refresher training for IDECO's team. This activity shall be an on-premise activity.
Mandatory	R4.19.16	It is expected that the post Go Live review and refresher training is included in the Bidder's initial proposal. Therefore no additional costs will be added at the time of the refresher training.

4.19.3. Clarifications

Ref. Number	Clarification
C4.19.01	The Bidder is asked to describe the outlines of the training conducted to similar clients.
C4.19.02	The Bidder is asked to identify the various positions recommended to be trained on the MDM and how many of IDECO staff should be allocated to those positions as prime or as backup. Specific types and levels of skill-sets necessary for all positions must be noted.
C4.19.03	The Bidder is asked to describe their methodology in participating IDECO's technical team in the implementation and installation phase.

4.20. Support

4.20.1. Clarifications

Ref. Number	Clarification
C4.20.01	The Bidder is asked to describe its intended support system for the MDM, including the following: ● Location(s) of support personnel ● Hours of support ● Organizational structure of support team(s) ● Support escalation process ● Maximum time for initial response ● Support Tools Used (phone line only, ticket access, SO ticket access view, etc.) It is anticipated that support will follow a tiered structure whereby the utility will describe a support item complete with priority (i.e., High, Med, and Low).
C4.20.02	The Bidder is asked to describe its support structure and the guaranteed time to respond to and resolve issues within different levels of priority.

5. Appendix I: Compliance Sheet (Bidder Response)

Priority	Reqt #	Requirement	Bidder Response		
			Comply (Yes/No/ Maybe)	Response	Proposal Reference
Mandatory	R4.01.01	The Bidder must provide an executive summary, of no more than two pages in length, which outlines the Bidder's background and business expertise in providing MDM solutions to electrical utilities. It shall highlight the key features that differentiate it from competitors.			
Mandatory	R4.01.02	The Bidder must demonstrate previous experience successfully implementing enterprise MDM solutions at electrical utilities. The Bidder shall provide a short description of 3 reference projects, and include contact information of the client utilities. The references must be similar size of IDECO or larger I.E. greater than 650,000 endpoints. The descriptions shall illustrate how the solution has been applied to meet utility business needs and interface with existing utility systems.			
Mandatory	R4.01.03	The Bidder must have a history of implementing MDM systems in the Middle East, North Africa, or Europe Regions. The reference projects supplied must highlight the Bidder's local experience implementing MDM solutions in the region.			

Mandatory	R4.02.01	The Bidder's MDM solution must provide a system which supports the current installed smart meters of 200,000 customers and the solution must be capable of scaling to 1,000,000 customers over a 10 year time span without the need of any major systems upgrades, modifications of recommissioning. The Bidder shall include all relevant details explaining the licensing cost structures relative to the number of customers as per the pricing matrix found in Appendix II.			
Mandatory	R4.02.02	The System must be able to scale up on an annual basis to cover 50,000 - 100,000 smart meters. At the beginning of each year IDECO will inform the Vendor about the required target of the year.			
Mandatory	R4.02.03	The Bidder's MDM solution must provide a system which supports 200,000 customers. The Bidder shall include all relevant details explaining the licensing cost structures relative to the number of customers as per the pricing matrix found in Appendix III.			
Mandatory	R4.03.01	MDMS must be able to estimate missing meter readings			
Mandatory	R4.03.02	MDMS must be able to validate interval meter readings for a given meter.			
Mandatory	R4.03.03	MDMS must be able to accept meter data from multiple meter vendors			
Mandatory	R4.03.04	MDM must be able to accept data from a single-phase meter and poly phase meter.			
Mandatory	R4.03.05	MDMS must record timestamps of register reads and associated interval reads.			

Mandatory	R4.03.06	MDMS must log on demand read requests, whether or not they were successful, and the read data received..			
Mandatory	R4.03.07	MDMS must be able to store billing data readings from the Head End System.			
Mandatory	R4.03.08	MDMS must be able to provide a CIS / billing system with billing readings for requested meters.			
Mandatory	R4.03.09	MDMS must be able to store meter data for at least 3 years.			
Mandatory	R4.03.10	MDMS must be able to request the meter data for a given smart meter.			
Mandatory	R4.03.11	MDMS must be able to save instantaneous (on demand reads) data from a smart meter.			
Mandatory	R4.03.12	The MDMS must support configurable times for importing meter read data from selected meters			
Mandatory	R4.03.13	MDMS must be able to record consumption data across a meter change for the same customer.			
Mandatory	R4.03.14	The MDMS must maintain the current power status (Connected, Communication Off, Power Off “Last Gasp”) of each meter based on the information from the HES.			
Mandatory	R4.04.01	MDMS must be able to detect and correct for errors in the meter data for a given meter			
Mandatory	R4.04.02	The MDM must accept electricity consumption data at a configurable frequency from the HES, with a minimum frequency of once daily.			
Mandatory	R4.04.03	MDMS must be able to support multiple different meter vendors. including but not limited to IDECO current vendors. (Hexing, Holley, and Landis & Gyr).			

Mandatory	R4.04.04	MDMS must be able to accept meter data from multiple different vendors and one HES.			
Mandatory	R4.04.05	The MDMS must support storage of interval data by channel and multiple interval lengths (example 5, 15, 30, and 60 minute intervals) for all applicable data types.			
Mandatory	R4.04.06	The MDMS must support storage of all collected event and alarm data from meters, network equipment, and the HES.			
Mandatory	R4.04.07	The MDMS must have the capacity to store other potential meter data, for example, kW, kVARh/kVAR, kVAh/kVA, voltage, and power quality measures such as momentary interruptions and harmonics, etc.			
Mandatory	R4.04.08	The MDMS must be configurable to select which data to be maintained, purged or archived.			
Mandatory	R4.04.09	The MDMS must perform the same checks for all daily and billing quantities including net, demand quantities, Time-of-Use, and interval data.			
Mandatory	R4.04.10	Notwithstanding the latency of data collection via the HES, once the MDMS receives meter read data, the VEE process must occur in real-time and the post-VEE data is then immediately available to user or external systems.			
Mandatory	R4.04.11	The MDMS must maintain both the original received raw data in a non-manipulated state, in addition to VEE'd data.			
Mandatory	R4.04.12	The MDMS must flag all estimated or manually edited data, identify data gaps (where automatic estimation cannot be performed based on configuration parameters), and generate			

		alerts/notifications for manual data editing.			
Mandatory	R4.04.13	The MDMS must provide the ability to pass to the CIS a flag identifying an estimated value, along with the reason for the estimate.			
Mandatory	R4.04.14	The MDMS must clearly distinguish visually within the GUI between metered, estimated, and manually edited data. Please provide GUI screenshots in your response that support this requirement.			
Mandatory	R4.04.15	The MDMS must have a manual GUI interface for VEE, and retain appropriate user controls and audit to investigate actual raw data collected and the manual edited data. Please provide GUI screenshots in your response that support this requirement.			
Mandatory	R4.04.16	MDMS must support multiple meter configurations such as those described Appendix IV (NOTE include meter spec spreadsheets in the Appendix)			
Mandatory	R4.04.17	The MDM must be able to prioritize alerts, alarms, and reports within queues or workflows in order for the information to be distributed to the appropriate groups within the company. The MDM must also prioritize failed validations for meters that are due for billing within a configurable window and make this information available to the MDM operator or billing analyst.			
Mandatory	R4.04.18	The MDM must store all versions of data and be able to flag all readings that were used for billing (i.e. sent to the CIS via request and response brokering) and make this version available for use in customer presentment products.			
Mandatory	R4.04.19	The MDM must also have the ability to track the source of the read information (HES, manual edit, etc.) and a mechanism to distinguish actual reads			

		from reads that have been estimated (VEE) when displaying data.			
Mandatory	R4.05.01	The MDM must have the ability to send commands to the AMI network. The following is a list of required commands (state if compliancy is current or in the future): Meter Pings On Demand Reads Remote Disconnects/Remote Reconnects			
Mandatory	R4.05.02	MDMS must be able to provide CIS and Customer Portal Information about the status change of a meter			
Mandatory	R4.05.03	MDMS must have the ability to store the firmware version of the smart meter and track its changes.			
Mandatory	R4.05.04	MDMS must have the ability to flag exceptions of the configuration of the meter, relative the meter read data received from the HES			
Mandatory	R4.05.05	MDMS must have the ability to store an indicator of a planned firmware upgrade and upgrade version and target upgrade date			
Mandatory	R4.05.06	MDM must report compare installed firmware and planned firmware version			
Mandatory	R4.05.07	MDM must maintain a history of configuration changes of the meter.			
Mandatory	R4.05.08	MDM must be able to send a notification of meter program changes to a specific recipient.			

Mandatory	R4.05.09	Smart meter and subscriber data must be archived when a meter is removed from the field			
Mandatory	R4.06.01	MDM must contain smart meter data such as meter number and the number of trials and period between trials intervals			
Mandatory	R4.06.02	The MDM must be able to receive and store Last Gasp and Reconnect notification from the HES.			
Mandatory	R4.06.03	The MDM must be able to send requests to HES to ping a smart meter or group of meters based on user request.			
Mandatory	R4.06.04	The MDM must be able to send requests to HES to remotely connect or disconnect a meter.			
Mandatory	R4.07.01	The System must provide the ability to deliver and export reporting data in multiple formats such as MS Excel, CSV, HTML, PDF, etc.			
Optional	R4.07.02	The system shall provide the ability to create and save ad hoc reports.			
Mandatory	R4.07.03	The system must provide the ability to support reporting functions without adverse impact on the transactional processing of the MDMS such as slowing down the transactional processing.			
Mandatory	R4.07.04	The System must provide the ability to create and maintain algorithms used for data analytics for the following: * Line Losses reporting based on various levels such as at the substation level, feeder phase level, defined portions of			

		the feeder, and by certain times of the day. * Transformer loading analysis by a defined transformer ID. * Measurement and verification of Demand Response events. * Analysis of data to determine potential theft of energy. Data for analysis will include measure values from the meter or events.			
Mandatory	R4.07.05	The System must provide Revenue Protection Reports (e.g. a premise which does not have an active end-use consumer is consuming any energy, or some energy above a threshold.) Identify that the reverse energy flow is allowed for those meters which are in net metering mode,however, to avoid false indicators.			
Mandatory	R4.07.06	The System must provide the capability to profile smart meter data over a period of time and compare to other smart meters with similar attributes.			
Mandatory	R4.07.07	The System must allow the MDM database the flexibility for various users to create and save their own reports.			
Mandatory	R4.07.08	MDM shall be able to generate power quality reports. Please provide screenshots for this functionality.			
Mandatory	R4.07.09	The MDM must provide the ability to produce data graphs and reports for all metered and calculated channels. All graphs and reports shall be viewed within the MDM application user interface, as well as contain the functionality to enable data export to			

		spreadsheets, or be transportable to other electronic file format, and saved as images for use in external reports, etc. Reports will be required to be run in either online or batch mode.			
Mandatory	R4.07.10	The MDM has the ability to filter reports based on attributes from the CIS, such as IDECO service territories or customer type.			
Mandatory	R4.07.11	The MDMS must be able to add virtual meters which are capable of aggregating the data collected from specific smart meters and other virtual meters.			
Optional	R4.07.12	The MDMS shall be able to notify the user when the configured events are triggered on a virtual meter.			
Mandatory	R4.07.13	The MDM must be capable of executing custom queries / reports to accommodate any areas where standard reports are not available.			
Mandatory	R4.07.14	The MDM must be able to filter reports based on the smart meter brand and model.			
Mandatory	R4.07.15	The MDM must be able produce reports demonstrating the losses in energy.			
Mandatory	R4.07.16	The MDM must be able to store the configuration of a smart meter that will be used to monitor feeders and use it in the data losses reports. The MDM must be able to report on energy losses aggregated at a feeder level.			
Mandatory	R4.08.01	MDMS must be able to provide CIS and Customer Portal Information about status change of meters			

Mandatory	R4.08.02	MDM must be able to contact external systems such as GIS or CIS to request the geographic location for the smart meter.			
Mandatory	R4.08.03	The MDMS must be able to be connected by other systems through secure web services			
Mandatory	R4.08.04	The MDM must be able to push data to other systems through Web Services based on predefined schedules or certain events.			
Mandatory	R4.08.05	The MDM must be configurable to send data incrementally or periodically.			
Mandatory	R4.09.01	MDM must be able to push notification to another system based on the returned data from meters			
Mandatory	R4.09.02	MDM must be able to import geographic information from external systems such as GIS or CIS.			
Mandatory	R4.09.03	MDM must be able to save outage detection message logs which could be used later for tracking outage statistics including providing automated SAIDI, SAIFI, CAIDI, CAIFI reporting.			
Mandatory	R4.09.04	MDM must be able to Track the performance of outage and restoration alarms			
Mandatory	R4.10.01	The MDMS must be able to store data about tampering events once occurred.			
Mandatory	R4.10.02	MDM must be able to detect tampering once occurred based on certain thresholds configured by the user.			

Mandatory	R4.10.03	MDM must be able to distinguish the tampering events issued by the smart meter and those generated by thresholds passing.			
Mandatory	R4.10.04	The MDM must be able to use other events to verify the validity of the alarm (i.e. tamper not followed by a power outage).			
Mandatory	R4.10.05	The MDM must be able to store alarms for a configurable amount of time even if they have not been resolved.			
Mandatory	R4.11.01	The MDM must allow for new or changed customer, account, site ID, meter configuration and service point information			
Mandatory	R4.11.02	The MDM must be able to support TOU billing.			
Mandatory	R4.11.03	The MDM must store all information and provide CIS with billing determinants appropriate to the requested period of time for each customer.			
Mandatory	R4.11.04	The MDM must be able to support periodic billing.			
Mandatory	R4.11.05	The MDM must be able to send to the CIS the register reading that best matches the date and time requested by the CIS for an individual customer.			
Mandatory	R4.11.06	The bidder must create the API in the MDM which is responsible on the integration with CIS.			
Mandatory	R4.12.01	The user interface of the MDM system must be web browser based			

Mandatory	R4.12.02	The MDM must display the user interface in Arabic and English based on the user preferences.			
Mandatory	R4.12.03	The MDM must have data export capabilities ie. download a table based report as a spreadsheet			
Mandatory	R4.12.04	The MDM must have user access controls that allow for user group based permissions.			
Optional	R4.12.05	The MDM shall have a notification center in the dashboard.			
Mandatory	R4.12.06	The MDM must have the ability to send emails to the users based on configurable system criteria.			
Optional	R4.12.07	The MDM shall have the ability to send SMS to the users based on configurable system criteria.			
Mandatory	R4.12.08	The MDM must be able to split the process into action/approval verification.			
Mandatory	R4.13.01	The MDMS must be able to store all the retrieved data from Smart meters in the network for 3 years at minimum.			
Mandatory	R4.13.02	The storage of the MDMS must be able to serve the expansion in clients number in the next 10 years without any additional hardware or software. IDECO's client base will reach 1,000,000 customers by the end of the 10 years.			
Mandatory	R4.13.03	The MDMS must notify IDECO's staff by email about deleting the data older than 3 years a month in advance.			

Mandatory	R4.13.04	The MDMS must be able to archive its data into external storage before it is scheduled for automatic deletion.			
Mandatory	R4.13.05	The MDMS must have configurations to allow for archiving old data once a month. The date of the month must be configured by IDECO staff.			
Mandatory	R4.13.06	The MDMS must keep a log for the automatic archiving of old data.			
Mandatory	R4.14.01	The Bidder must prepare 2 identical installations for the MDM on 2 separate physical locations to work as redundant.			
Mandatory	R4.14.02	The Bidder must provide all the software, licensing, hardware, cabinets, cabling, infrastructure, etc. required for the 2 sites.			
Mandatory	R4.1403	The Bidder must provide all the software and its licenses required to run the MDMS in the 2 sites.			
Mandatory	R4.14.04	The Bidder must determine the required internet bandwidth for each site.			
Mandatory	R4.14.05	The Bidder must take in consideration the physical space required to all the hardware required for the next 10 years.			
Mandatory	R4.14.06	The Servers must be HP, DELL, or IBM.			
Mandatory	R4.14.07	The Bidder must provide the workstation hardware required to operate the system by IDECO's team.			
Mandatory	R4.15.01	The MDM system must be able to scale to cover the increased demand by 50,000 to 100,000 annually.			
Mandatory	R4.15.02	The Bidder must install the required hardware and software for the			

		additional meters. Including licenses, servers, database, and additional supporting hardware.			
Mandatory	R4.15.03	When expanding, the Bidder must use the same servers hardware used for the initial environment.			
Mandatory	R4.15.04	The redundant fail-over servers must support the expected growth.			
Mandatory	R4.16.01	The MDM must comply with the National Institute of Standards and Technology Interagency Report (NISTIR) 7628 "Guidelines for Smart Grid Cyber Security" You can find details in Appendix VII.			
Mandatory	R4.19.01	The Bidder must train IDECO's teams that are involved in the implementation and installation before the installation of the system.			
Optional	R4.19.02	The Bidder shall train IDECO's team outside of IDECO premises.			
Mandatory	R4.19.03	The Bidder must train IDECO's team in Jordan.			
Mandatory	R4.19.04	The Vendor must provide the trainees with all necessary material including workbooks, training aids, and system technical manuals prior to or during the training session.			
Mandatory	R4.19.05	The Bidder must prepare the training venues with all the required equipment for the training.			
Mandatory	R4.19.06	The Bidder must provide trained and experienced instructor(s), and ensure that they do not perform other duties			

		during the training period that will interrupt instruction.			
Mandatory	R4.19.07	The Bidder must train IDECO's team in terms of operations, reporting, and analysing.			
Mandatory	R4.19.08	The Bidder must train IDECO's team to enable them to support the integrations going forward.			
Mandatory	R4.19.09	The Bidder must provide the necessary documentation to operate the system.			
Mandatory	R4.19.10	The Bidder must provide the user manuals in English and Arabic.			
Mandatory	R4.19.11	The trainer must be able to deliver the training in Arabic or have a translator in the training room.			
Mandatory	R4.19.12	The documentation of the training must contain at minimum: * system overview description * system flow charts * file descriptions and record layouts * description of program function and logic operating procedures, * screen layouts * data entry procedure * report descriptions * descriptions of all user options and operations * descriptions of all error messages			
Mandatory	R4.19.13	The Bidder must record the training sessions and provide them in a			

		consumable version to be used to train staff members which may join the team later on.			
Mandatory	R4.19.14	Trainee Testing - The Bidder's instructor must include evaluation of trainees to ensure that they have learned the course content and can perform all necessary functions on the system. The Vendor must notify IDECO of any employees who fail this evaluation and provide them with additional training.			
Mandatory	R4.19.15	After 6 months of "Production Use" of the MDM solution, the Vendor must perform a review of IDECO's use and effectiveness of the solution. Based on this review the Vendor will provide updated/refresher training for IDECO's team. This activity shall be an on-premise activity.			
Mandatory	R4.19.16	It is expected that the post Go Live review and refresher training is included in the Bidder's initial proposal. Therefore no additional costs will be added at the time of the refresher training.			

6. Appendix II: Clarification Matrix

Ref. Number	Clarification	Reference In Technical Proposal
C4.03.01	Bidder is to declare its understanding of accepting this data and confirm that all commodity elements listed above will be stored in whatever granularity will be provided by the HES in the MDM.	
C4.03.02	The Bidder is asked to describe its experience working with such commonly accepted files as the CMEP, XML, HHF, HUL/HDL, Itron MV-RS Input/Output file format, etc. Additionally, Bidders should discuss if they have worked with HES that provide information accessible via web services.	
C4.03.03	The Bidder is asked to provide screen shots of the GUI used regarding the functionality described above.	
C4.03.04	The Bidder is asked to provide details as to the expected time to process 200,000 electric meters end points with hourly interval data.	
C4.03.05	The Bidder is asked to provide details as to the expected time to process 600,000 electric meters end points with hourly interval data.	
C4.03.06	The Bidder is asked to provide details as to the expected time to process 1,000,000 electric meters end points with hourly interval data.	
C4.03.07	The Bidder is asked to describe the ability and functionality for the MDM for the following: estimate meter readings for any missing meters. validate interval meter readings for a given meter. accept meter data from multiple meter vendors accept data from a single-phase meter and poly phase meter. record when bulk meter reads occur and associate time of meter reading with the meter interval data. record consumption data across a meter change	
C4.03.08	The Bidder is asked to provide an overview of its methodology relating to integration with the HES.	
C4.03.09	The Bidder is asked to describe the capability of supporting data import/export mechanisms (i.e., batch or streaming) and describe the processing capabilities in meters per hour that their system can perform with each type.	
C4.03.10	The Bidder is asked to indicate their recommended data transfer methodology (ie. push or pull)	

C4.03.11	The Bidder is asked to describe how data is processed in the MDM and to provide examples of relevant size customers with similar HES configurations.	
C4.03.12	The Bidder is asked to describe its current process of managing this functionality and provide details about its relevant experience, including what HES they currently support with this functionality.	
C4.03.13	The MDM is to support multiple commodities and be capable of storing and processing readings from all types of data received from HES. The MDM is to provide data in different configurable formats and at whatever frequency (hourly, daily and/or monthly) is provided for in the contract to the electric utility.	
C4.03.14	If the Bidder has experience in real-time processing of data, it should discuss how the timing of information processing is handled such that operational efficiencies are realized.	
C4.04.01	The Bidder is asked to provide an overview of its product's VEE process including when VEE takes place and how historical usage is used and what options are available for setting up rule sets. Items to be considered in the overview include: VEE takes place upon entry to the MDM VEE takes place prior to billing file being sent to CIS Historical usage is utilized in VEE process Weather information is utilized in VEE process Outage information is utilized in VEE VEE rule set is user configurable	
C4.04.02	The Bidder is asked to provide an overview of how rule sets are modified and what skill set would be required to do so.	
C4.04.03	The Bidder is asked to provide a description of functionality, if any, that the Bidder's solution has to perform VEE on seasonal accounts.	
C4.04.04	The Bidder is asked to describe how estimated reads are visibly distinguishable from other types of readings and include a screenshot of this functionality.	
C4.04.05	The Bidder is asked to describe how the system is able to distinguish between zero consumption due to a meter being removed, zero consumption due to a disconnection, and zero consumption due to an outage and must be able to factor this information in when determining estimated usage.	
C4.04.06	Message Sum Check process is a critical process in the effort to provide data for billing processes which meet the needs for verification and reconciliation. The Bidder is asked to confirm that the Message Sum Check can be a daily process conducted by the MDM upon receipt of the HES Register and Interval Data. The purpose of	

	this process is to confirm that the sum of the intervals matches the register read delta for the same time period. Provide a screenshot of this functionality.	
C4.04.07	The Bidder is asked to provide details on experience with integrating standard VEE rules such as the standard California VEE rule set or the VEE rule set being utilized in Ontario published by the Independent Electricity System Operator (IESO). The Bidder should provide a list of utilities where these rule sets have been implemented and confirm that they have complied with all components of the rule sets.	
C4.04.08	The Bidder must describe how its product accommodates sum checks on total kWh registers and if it has the process to complete the sum check for TOU registers. The Bidder is to describe how it completes the sum check for TOU and if it is included in the base price. The Bidder is to confirm the reconciliation of intervals to the register reads (sum check) as well as reconciling to TOU bucket register reads (sum check).	
C4.04.09	The MDM is expected to manage VEE rules. The Bidder is asked to describe how different VEE rules for different commodities can be accommodated.	
C4.04.10	The Bidder requested to describe the features and functions used for exception management. Specific reports to include missing reads, errors in data, errors in communication, etc...	
C4.04.11	The Bidder is asked to describe the manner in which MDM reports on exceptions and how the user would intervene to resolve these exceptions. Topics that should be addressed are: Provide screen shots of the GUI and the functionality provided to manually address small volumes of corrections to interval data (i.e., 10 or less entries). The process to submit larger quantities of intervals estimated by an outside system/source (i.e. Excel spreadsheet, XML formatted documents) into the MDM through file-based interfaces or other methods. Describe the ability for the user to have this new, manually-corrected version of data submitted for VEE to verify that the exception has been cleared.	
C4.04.12	The Bidder is to provide details on the average time it would take to clear a manual exception using its tools, once the user is aware of the input.	
C4.04.13	The Bidder is to describe what tools are available to ensure that meters whose billing windows are approaching are addressed in a higher priority than those that are not.	

C4.04.14	The Bidder is asked to also describe its experience with other like-size clients regarding their manual exception management functionality.	
C4.04.15	The bidder is asked to describe how the MDM can support the programming of IDECO's specific business rules that will allow for automated resolution of certain data related problems.	
C4.04.16	The Bidder is asked to describe how the MDM will utilize HES data, including outage data, to ensure accurate data and that valid gaps in data are not estimated as having consumption.	
C4.04.17	The Bidder is asked to describe the MDM functionality to have alarms or reports configured according to certain criteria such as percentage drops in consumption.	
C4.04.18	The Bidder is asked to describe its experience with other like-sized clients regarding their automated exception management functionality.	
C4.04.19	The bidder is asked to describe the escalation process built into its work queue / workflow system to identify backlogs in exception clearing.	
C4.04.20	The bidder is asked to provide a listing of the exceptions / processes that can be managed by its workflow / queue functionality.	
C4.04.21	The bidder is asked to provide screen shots of the GUI used regarding the functionality described above.	
C4.04.22	The bidder is asked to describe its experience with other like-size clients regarding their workflow / queue functionality. For each client listed, the Bidder is to provide details on the benefits received by the client using this functionality.	

C4.05.01	The Bidder is asked to describe which of the following operational data can be stored in the MDM: Maximum/Minimum/Average Voltage Instantaneous Voltage – As Requested Lo/Hi Voltage Alarms – As Occurred Tamper Alarms – As Occurred Reverse Energy Flow – As Occurred Outage Notification – As Occurred Restoration Notification – As Occurred Leak detection – As Occurred Backflow – As Occurred Demand Read/Reset - As Occurred The Bidder is to provide screen shots of the GUI used showing the operational data noted above.	
C4.06.01	The Bidder is asked to provide an overview of how its MDM product can support the remote disconnection process (example: Service Order integration). The Bidder is asked to provide screen shots of the GUI used regarding the functionality described above.	
C4.06.02	The Bidder is asked to provide an overview of pre-paid management features in the proposed solution.	
C4.07.01	The bidder is asked to describe the MDM reporting capabilities, with specific comments on: Drill down capability Scheduling Saving / Sharing / Exporting	
C4.07.02	The Bidder is asked to provide a list of standard “out of the box” reports	
C4.07.03	The Bidder is asked to provide an overview of available dashboards and whether dashboards can be configured for specific users or roles.	
C4.07.04	The Bidder is asked to describe how they can support SLA	

	monitoring of MDM.	
C4.07.05	The Bidder is asked to describe the ability to display the events produced by the HES (e.g., outage notification, restoration notification, tamper information, hi/lo voltage indicators, backflow, etc.) graphically, within an interactive dashboard. In the event that the AMI network is encountering problems, the user should be able to click on the interactive dashboard function and be provided with additional information to explain the problems being encountered (i.e. list of meters experiencing power outage, events received to indicate tamper, meters experiencing backflow conditions). The Bidder is to provide screenshots and details about its dashboard functionality regarding this point. If a dashboard function as described above is not available, the Bidder should provide information on what other functions and features within the system could be utilized for this purpose.	
C4.07.06	The Bidder is asked to describe the product ability including screenshots to display at a summary level the current status of the billing schedule. Required information may include: cycles billed cycles pending billing and their scheduled bill date cycles which have completed validation within the MDM	
C4.07.07	Describe the functionality to support data aggregation for netting of bi-directional meters.	
C4.07.08	Describe the functionality to support data aggregation for load analysis (comparing the load of multiple meter points and creating exceptions based on a prescribed value).	
C4.07.09	Provide screen shots of the GUI regarding the functionality described above.	
C4.07.10	The bidder should provide a description of how the product assists the end-user to understand the database structures and relationships to facilitate the creation of optimal data queries and the prevention of machine degradation due to the use of un-optimized queries.	
C4.07.11	The bidder should provide a description of the utility's level of access to use reporting and query tools to create their own reports, queries and BI tools. Bidder to confirm if there will be wide-open access to these tools or will each custom requirement be quoted on	

	a time-and-materials basis.	
C4.07.12	The bidder should provide a description of custom reports utilizing report writers (Crystal, COGNOS, Business Objects, SSRS, etc).	
C4.07.13	The Bidder is asked to provide details on the analytical tools and business rules engines available within its product. The information should include the skill set required to utilize these tools and if IDECO will have rights to modify existing rules or create new rules.	
C4.07.14	The Bidder is also asked to provide a list of any out-of-the-box rules that are included in the base software.	
C4.07.15	The Bidder is also asked to provide an overview of how this functionality is able to help maximize value from the HES in the areas of billing and operations.	
C4.07.16	The Bidder must provide details on any restrictions within the product or known best practices in place to prevent degradation of performance of their MDM as a result of using this functionality.	
C4.07.17	The Bidder must provide a description of what level of skill is required to create and maintain business rules.	
C4.07.18	The Bidder must provide screenshots of the GUI regarding the functionality described above.	
C4.08.01	The Bidders shall provide a list of system integrations that are supported as part of their base MDM solution for commonly used utility systems and tools. Supported system integrations may include databases, data visualization tools (e.g. Power BI), Geographical Information Systems, Distribution operations tools (SCADA, outage management) etc.	
C4.08.02	The Bidder shall provide a list of supported data sharing strategies and protocols which can be leveraged to interface the MDM solution with the existing utility applications and tools. This may include SOAP, JASON, REST API, web services, multispeak etc.	
C4.08.03	The Bidder is asked to describe the exception management process that is used when a meter being reported by HES is not identified in the MDM. For example, is the data dropped (prevented from being imported to the MDM) with an exception report created, or stored in a staging table until a proper sync is received.	
C4.08.04	The Bidder is requested to specify whether there is a cost to creating and implementing the interface that will be required for IDECO's system.	
C4.08.05	The Bidder is requested to specify the security protocols used while using	

	the APIs of the MDMS.	
C4.08.06	The Bidder is requested to provide detailed information regarding its experience integrating to third party applications. The system should contain Application Program Interfaces (APIs) for third party applications and should not have a load limitation to APIs (it should be multi-threaded).	
C4.08.07	The Bidder is requested to describe their approach to manage the volume of web service calls to and from the MDM system. Please indicate how the Bidder intends to manage performance levels relative to the solution's physical system constraints.	
C4.09.01	The Bidder is asked to provide screenshots for the requirements mentioned earlier.	
C4.09.02	The Bidder is asked to provide the out of the box features in the proposed MDM which related to Outage Management & Power Quality.	
C4.10.01	The Bidder is asked to provide screenshots for the requirements mentioned earlier.	
C4.10.02	The Bidder is asked to provide details on other features related to revenue protection and tempering detection available in its MDM product.	
C4.10.04	The Bidder is asked to describe what functionality is available to support the analysis described above. Please provide screenshots if available.	
C4.11.01	The Bidder is asked to describe the functionality available in the MDM to help manage the meters assigned to each billing cycle to make sure the data is available when requested on the scheduled read date.	
C4.11.02	The Bidder is asked to Provide screen shots of the GUI used regarding the functionality described above.	
C4.11.03	The Bidder is asked to Describe the interface used to import billing schedules (direct database connection, web services, etc.).	
C4.11.04	The Bidder is asked to describe the functionality they offer to support different TOU bill scenarios. Interval data may require aggregation into TOU buckets within the MDMS, or Smart Meters may be configured to provide the billing determinants and TOU buckets.	
C4.12.01	The Bidder should provide detailed information pertaining to the flexibility and functionality of the proposed solution in this regard, and clearly define the software components residing on the server side and any software components residing on the client side.	
C4.12.02	The Bidder is asked to provide a description of the user access controls, and support for integration with various system access control models ie. Windows Active Directory.	

C4.12.03	The Bidder is asked to provide more details on how the MDM stores the Arabic content.	
C4.14.01	The Bidder is asked to describe the failover procedure “Transfer from the primary location to the secondary”.	
C4.14.02	The Bidder is asked to provide information in this section regarding the optimal architectural design of the MDM and distinguish between virtual and physical. At a minimum, the following should be addressed: Database in use Operating System Program language/coding that the system is written in Server Specifications Third Party Licenses required to run the MDM Architectural Diagram User licenses included with base product (concurrent and permitted login accounts).	
C4.14.03	The Bidder is asked to provide an architectural design of the technical platforms and identify which ones are virtual versus physical.	
C4.15.01	Bidders are asked to describe the required environment, hardware, software required to scale the system to support the above scenario.	
C4.15.02	Bidders are asked to demonstrate the architecture’s flexibility and scalability as the meter data volume grows.	
C4.16.01	Bidders are asked to describe how its products and solution adhere to the NISTIR 7628 specification.	
C4.16.02	Bidders are asked to describe how role based security is configured and maintained.	
C4.16.03	Bidders are asked to provide documentation on recent security audits of their proposed solution.	
C4.16.04	Bidders are asked to provide documentation on the best practices on security as it relates to their MDM solution.	

C4.17.01	Bidders should indicate to IDECO the level of resources that will be required for ongoing operation and maintenance of the proposed MDM solution. IDECO expects that the MDM solution will be managing its entire electric meter population by the end of 2030. IDECO would like to understand from the Bidder, at what point, given growth across all utility service segments how the required resources would be expected to change (or not), beyond 2030. The Bidder should provide reference materials such as a description of a “day in the life” of the MDM technical administrator and an application operator. The Bidder should provide a list of recommended resources (titles, number of individuals and skill set) required to operate a fully functional MDM environment.	
C4.18.01	The Bidder is asked to describe features and functions offered that support the automation of the workflow and business processes.	
C4.19.01	The Bidder is asked to describe the outlines of the training conducted to similar clients.	
C4.19.02	The Bidder is asked to identify the various positions recommended to be trained on the MDM and how many of IDECO staff should be allocated to those positions as prime or as backup. Specific types and levels of skill-sets necessary for all positions must be noted.	
C4.19.03	The Bidder is asked to describe their methodology in participating IDECO’s technical team in the implementation and installation phase.	
C4.20.01	The Bidder is asked to describe its intended support system for the MDM, including the following: Location(s) of support personnel Hours of support Organizational structure of support team(s) Support escalation process Maximum time for initial response Support Tools Used (phone line only, ticket access, SO ticket access view, etc.) It is anticipated that support will follow a tiered structure whereby the utility will describe a support item complete with priority (i.e., High, Med, and Low).	
C4.20.02	The Bidder is asked to describe its support structure and the guaranteed time to respond to and resolve issues within different levels of priority.	

7. Appendix III: Pricing Matrix

Instructions: Vendors submitting a response to the IDECO MDM tendering process are to utilise the Pricing Matrix below to provide itemised cost structure of their solution in line with the IDECO technical specification.

IDECO will keep all information confidential, and access to it will be restricted to those requiring it for the purpose of evaluating this proposal.

Prices shall be all inclusive and reflect all costs necessary to provide the solution described in the proposal in its entirety. The costs/rates are to be quoted in Jordanian Dinar (JOD), and shall exclude taxes.

The tables 1 to 6 below are considered as a part of the cost structure to bring the system to production "Go-Live". Later sections (section 7) are to include recurring fees which will be incurred by IDECO during the initial 5 years of operation.

Proposal pricing will be evaluated based on a weighted average.

7.1. System License Pricing

Vendors are to list licensing cost for their solution. Licensing costs shall clearly indicate how it is determined:

a) Type of Cost ie. Based on module, server hardware, number of meters, number of system users etc.
b) Nature of Cost ie. one-time software licensing / recurring license fees etc.

Item	Cost/Rate (JOD)
Total	

7.2. Third-Party License Pricing

Vendors are to list all third-party licensing costs required for the proposed solution, including but not limited to operating systems, database management software, firewalls, and monitoring and security software. Licensing costs shall clearly indicate how it is determined:

a) Type of Cost ie. Based on module, server hardware, number of meters, number of system users etc.
b) Nature of Cost ie. one-time software licensing / recurring license fees etc.

Item	Cost/Rate (JOD)
Total	

7.3. Hardware & Environment Pricing

Vendors are to list all hardware and environment costs needed to adequately support the proposed solution and meet the indicated Service Level Agreement and response times, as indicated in Requirements Section XXX.

Item	Cost/Rate (JOD)
Total	

7.4. Implementation & Integration Services Pricing

Vendors are to list all implementation and integration services costs to be incurred by IDECO during the course of implementing the Vendor's proposed solution, which may include but not limited to:

- Project Management
- Requirements and Solution Design
- Solution Development and Configuration
- Testing
- Go-Live Activities
- Post Go-Live Support

Item	Cost/Rate (JOD)
Total	

7.5. Training Pricing

Vendors are to price the list of items included in the training (i.e. Venues, materials, professional services, etc…)

Item	Cost/Rate (JOD)
Total	

7.6. Pricing for Optional Functionality and/or Services

Vendors are to list pricing for any optional modules, functionality, or services not included in the pricing above. Custom functionality development to meet IDEOCO's requirements as outlined in the requirements section not met by the base vendor's standard product which will incur additional costs are to be included here. Clearly indicate in the proposal what is included for these costs.

Item	Cost/Rate (JOD)
Total	

7.7. Ongoing Recurring Fees

Vendors are to list recurring fees which IDECO will incur during the first five years of operation following the solution being placed into production. Costs shall clearly indicate how it is determined:

a. Type of Cost ie. Based on module, server hardware, number of meters, number of system users etc.
b. Nature of Cost ie. software licensing, maintenance and support, professional services etc.

Item	Cost/Rate (JOD)				
	1	2	3	4	5
Total					

7.8. Expansion

As noted the expectation of the meters is 50,000 - 100,000 meters per year. Please describe the cost structure for the solution that supports this growth. Include all cost types described here.

8. Appendix IV: Current Smart Meters Specifications

8.1. Hexing configuration

No.		Item Can Be Write	Writing Data
1	EVENT	Power Quality	Number of over voltage in phase L1
			Number of over voltage in phase L2
			Number of over voltage in phase L3
			Number of Under Voltages in phase L1
			Number of Under Voltages in phase L2
			Number of Under Voltages in phase L3
			Number of short power failures in any phase
			Number of long power failures in any phase
			Threshold for over voltage
			Time threshold for over voltage
			Threshold for phase failure
			Time threshold for phase failure
			Time threshold for long power failure
			Time threshold for current reversal

			Threshold for current unbalance
			Time threshold for current unbalance
			Threshold for bypass
			Time threshold for bypass
			Threshold for under voltage
			Time threshold for under voltage
			Threshold for voltage unbalance
			Time threshold for voltage unbalance
			Time threshold for missing current
			Threshold for low power factor
			Time threshold for manual disconnection
2	**parameter**	**Billing Parameter**	Billing date(format dd.hh)
3		**Display**	Time and Format
			Display item for normal mode
			Display item for Alternate mode1
			Display item for Alternate mode2
4		**Meter Identification**	Serial number
			Hardware version
			Version of bootloader code

			Check code of bootloader code	
			Firmware version to update	
			Firmware version	
			Software identifier of measurement chip	
			Integer digits of energy,Decimal digits of energy	
			LCD display enable/disable	
5		**CTPT**	**OBIS**	**Data List**
			0.4.3	Numerator of PT ratio
			0.4.6	Denominator of PT ratio
			0.4.2	Numerator of CT ratio
			0.4.5	Version of bootloader code
6		**Demand Parameter**		Demand Interval
				Demand Table
7		**GPRS**		TCP port
				GPRS APN
				CS IP
				CS SMS number
				Server center SMS number

				PDP user name
				PDP password
				PPP link authentication
				Text message for SMS
				CS SMS number for backup
				Third CS SMS number
				GPRS signal strength
				Period of heartbeat
				Timeout for disconnection after communication
				Communication mode for GPRS module
8	**PROFILE**	**Load Profile**	**OBIS**	**Data List**
			1.0.0	Time
			1.8.0	Total import active energy
			2.8.0	Total export active energy
			3.8.0	Total import reactive energy
			4.8.0	Total export reactive energy
			1.14.0	Total import active demand
			2.14.0	Total export active demand

			3.14.0	total import reactive demand
			4.14.0	Total export reactive demand
			32.7.0	Voltage of phase A
			52.7.0	Voltage of phase B
			72.7.0	Voltage of phase C
			31.7.0	Current of phase A
			51.7.0	Current of phase B
			71.7.0	Current of phase C
			14.7.0	Frequency
			15.7.0	Total active power of all phases
			21.7.0	Active power of phase A
			41.7.0	Active power of phase B
			61.7.0	Active power of phase C
			3.7.0	Total reactive power of all phases
			23.7.0	Reactive power of phase A
			43.7.0	Reactive power of phase B
			63.7.0	Reactive power of phase C
			13.7.0	Total power factor

			33.7.0	Ppower factor of phase A
			53.7.0	Power factor of phase B
			73.7.0	Power factor of phase C
9	**SECURITY**	**disconnect control**	Active parameter	
			Normal mode	
			Emergency mode	
10		**firmware update**	Software identifire for upgrading	
			Image file	
			Configuration file	
			Activation Time	
11		**function switch 1**	Disable terminal cover detect	
			Disable meter cover detect	
			Disable battery cover detect	
			8 digite display	
			Disable disconnect when power down	
			lls enable	
			Enable terminal cover detect	
			Enable meter cover detect	
			Enable bettery cover detect	

			Enable disconnect when power down	
			7 digite display	
			lls disable	
12		**Alarm led configuration**	Meter cover open	
			Terminal cover remove	
			Bpass start	
			Strong DC field detect	
			Phase failure	
13	**TIME**	**Date Time**	Clock time shift limit	Current reverse
			According pc time	Switch between phase
			According input time	Change the sequence of voltage and current Signals
14		**Tariff**	Active Tariff	Day Table: tariff 1 (T1) & tariff2(T2)
			Passive Tariff	Day Table:tariff 1 (T1) & tariff2(T2)
				Passive TOU Activation Date

8.2. Hexing Reading

No.		Item Can Be Read	Reading Data	
1	Event	**Event Logs** **(Once a Day)**	Event Logs	Standard Event log
				Fraud in the event log
				Relay the event log
				Grid the event log
			Event Detail Record	Power down(long power failure)
				Under voltage L1
				Under voltage L2
				Under voltage L3
				Over voltage L1
				Over voltage L2
				Over voltage L3
				Parameter Program
				Terminal cover open
				Strong Dc field detected
				main cover removed
				Power down(short power failure)
			Number of over voltage in phase L1	

2		**Power Quality** **(Once a Day)**	Number of over voltage in phase L2
			Number of over voltage in phase L3
			Number of Under Voltages in phase L1
			Number of Under Voltages in phase L2
			Number of Under Voltages in phase L3
			Number of short power failures in any phase
			Number of long power failures in any phase
			Threshold for over voltage
			Time threshold for over voltage
			Threshold for phase failure
			Time threshold for phase failure
			Time threshold for long power failure
			Time threshold for current reversal
			Threshold for current unbalance
			Time threshold for current unbalance
			Threshold for bypass
			Time threshold for bypass
			Threshold for under voltage
			Time threshold for under voltage

			Threshold for voltage unbalance
			Time threshold for voltage unbalance
			Time threshold for missing current
			Threshold for low power factor
			Time threshold for manual disconnection
3	parameter	**Billing Parameter** **(Once a Month without validation)**	Billing date(format dd.hh)
4			Time and Format
		Display	Display item for normal mode
		(Once a Month with validation)	Display item for Alternate mode1
			Display item for Alternate mode2
5			Serial number
			Hardware version
			Version of bootloader code
		Meter Identification	Check code of bootloader code
		(Once a Month with validation)	Firmware version to update
			Firmware version
			Software identifier of measurement chip

			Integer digits of energy,Decimal digits of energy	
			LCD display enable/disable	
6			**OBIS**	**Data List**
		CTPT	0.4.3	Numerator of PT ratio
		(Once a Month with validation)	0.4.6	Denominator of PT ratio
			0.4.2	Numerator of CT ratio
			0.4.5	Version of bootloader code
7	**profile**	load profile	**OBIS**	**Data List**
			1.0.0	Time
			1.8.0	Total import active energy
			2.8.0	Total export active energy
			3.8.0	Total import reactive energy
		(Once a Month without validation)	4.8.0	Total export reactive energy
			1.14.0	Total import active demand
			2.14.0	Total export active demand
			3.14.0	total import reactive demand
			4.14.0	Total export reactive demand
			32.7.0	Voltage of phase A

		(On-Demand Instantaneous Data)	52.7.0	Voltage of phase B
			72.7.0	Voltage of phase C
			31.7.0	Current of phase A
			51.7.0	Current of phase B
			71.7.0	Current of phase C
			14.7.0	Frequency
			15.7.0	Total active power of all phases
			21.7.0	Active power of phase A
			41.7.0	Active power of phase B
			61.7.0	Active power of phase C
			3.7.0	Total reactive power of all phases
			23.7.0	Reactive power of phase A
			43.7.0	Reactive power of phase B
			63.7.0	Reactive power of phase C
			13.7.0	Total power factor
			33.7.0	Ppower factor of phase A
			53.7.0	Power factor of phase B
			73.7.0	Power factor of phase C

8		Billing Value	**OBIS**	**Data List**
		(Once a Month without validation)	1.8.0	Monthly Billing Data
9	**Re gis ter**	**Energy Register** **(Once a Day)**	**OBIS**	**Data List**
			1.8.1	Active energy (+)
			1.8.2	Active energy (+) tariff 1
			1.8.3	Active energy (+) tariff 2
			1.8.4	Active energy (+) tariff 3
			2.8.0	Active energy (+) tariff 4
			2.8.1	Active energy (-)
			2.8.2	Active energy (-) tariff 1
			2.8.3	Active energy (-) tariff 2
			2.8.4	Active energy (-) tariff 3
			3.8.0	Active energy (-) tariff 4
			3.8.1	Reactive energy (+)
			3.8.2	Reactive energy (+) tariff 1
			3.8.3	Reactive energy (+) tariff 2
			3.8.4	Reactive energy (+) tariff 3

			4.8.0	Reactive energy (+) tariff 4
			4.8.1	Reactive energy (-)
			4.8.2	Reactive energy (-) tariff 1
			4.8.3	Reactive energy (-) tariff 2
			4.8.4	Reactive energy (-) tariff 3
			128.8.0	Reactive energy (-) tariff 4
			128.8.1	Apparent energy
			128.8.2	Apparent energy tariff 1
			128.8.3	Apparent energy tariff 2
			128.8.4	Apparent energy tariff 3
			9.8.0	Apparent energy tariff 4
			9.8.1	Apparent energy (+)
			9.8.2	Apparent energy (+) tariff 1
			9.8.3	Apparent energy (+) tariff 2
			9.8.4	Apparent energy (+) tariff 3
			10.8.0	Apparent energy (+) tariff 4
			10.8.1	Apparent energy (-)

			10.8.2	Apparent energy (-) tariff 1
			10.8.3	Apparent energy (-) tariff 2
			10.8.4	Apparent energy (-) tariff 3
			15.8.0	Apparent energy (-) tariff 4
			15.8.1	Active energy (|QI+QIV|+|QII+QIII|)
			15.8.2	Active energy (|QI+QIV|+|QII+QIII|) tariff 1
			15.8.3	Active energy (|QI+QIV|+|QII+QIII|) tariff 2
			15.8.4	Active energy (|QI+QIV|+|QII+QIII|) tariff 3
			5.8.0	Active energy (|QI+QIV|+|QII+QIII|) tariff 4
			5.8.1	Reactive energy (QI)
			5.8.2	Reactive energy (QI) tariff 1
			5.8.3	Reactive energy (QI) tariff 2
			5.8.4	Reactive energy (QI) tariff 3
			6.8.0	Reactive energy (QI) tariff 4
			6.8.1	Reactive energy (QII)
			6.8.2	Reactive energy (QII) tariff 1

			6.8.3	Reactive energy (QII) tariff 2
			6.8.4	Reactive energy (QII) tariff 3
			7.8.0	Reactive energy (QII) tariff 4
			7.8.1	Reactive energy (QIII)
			7.8.2	Reactive energy (QIII) tariff 1
			7.8.3	Reactive energy (QIII) tariff 2
			7.8.4	Reactive energy (QIII) tariff 3
			8.8.0	Reactive energy (QIII) tariff 4
			8.8.1	Reactive energy (QIV)
			8.8.2	Reactive energy (QIV) tariff 1
			8.8.3	Reactive energy (QIV) tariff 2
			8.8.4	Reactive energy (QIV) tariff 3
			21.8.0	Reactive energy (QIV) tariff 4
			22.8.0	Active energy (+) in phase L1
			23.8.0	Active energy (-) in phase L1
			24.8.0	Reactive energy (+) in phase L1
			29.8.0	Reactive energy (-) in phase L1

			30.8.1	Apparent energy (+) in phase L1
			25.8.1	Apparent energy (-) in phase L1
			26.8.1	Reactive energy (QI) in phase L1
			27.8.1	Reactive energy (QII) in phase L1
			28.8.1	Reactive energy (QIII) in phase L1
			41.8.1	Reactive energy (QIV) in phase L1
			42.8.1	Active energy (+) in phase L2
			43.8.1	Active energy (-) in phase L2
			44.8.1	Reactive energy (+) in phase L2
			49.8.1	Reactive energy (-) in phase L2
			50.8.1	Apparent energy (+) in phase L2
			45.8.1	Apparent energy (-) in phase L2
			46.8.1	Reactive energy (QI) in phase L2
			47.8.1	Reactive energy (QII) in phase L2
			48.8.1	Reactive energy (QIII) in phase L2
			61.8.1	Reactive energy (QIV) in phase L2
			62.8.1	Active energy (+) in phase L3

			63.8.1	Active energy (-) in phase L3
			64.8.1	Reactive energy (+) in phase L3
			69.8.1	Reactive energy (-) in phase L3
			70.8.0	Apparent energy (+) in phase L3
			65.8.0	Apparent energy (-) in phase L3
			66.8.0	Reactive energy (QI) in phase L3
			67.8.0	Reactive energy (QII) in phase L3
			68.8.0	Reactive energy (QIII) in phase L3
			16.8.0	Reactive energy (QIV) in phase L3
			16.8.1	Active energy (|QI+QIV|-|QII+QIII|)
			16.8.2	Active energy (|QI+QIV|-|QII+QIII|) tariff 1
			16.8.3	Active energy (|QI+QIV|-|QII+QIII|) tariff 2
			16.8.4	Active energy (|QI+QIV|-|QII+QIII|) tariff 3
10		**Demand Register** **(Once a Day)**	**OBIS**	**Data List**
			1.6.0	Active energy (|QI+QIV|-|QII+QIII|) tariff 4
			1.6.0	Active MD (+)

			1.6.1	occurring time
			1.6.1	Active MD(+) tariff 1
			1.6.2	occurring time
			1.6.2	Active MD(+) tariff 2
			1.6.3	occurring time
			1.6.3	Active MD(+) tariff 3
			1.6.4	occurring time
			1.6.4	Active MD(+) tariff 4
			2.6.0	occurring time
			2.6.0	Active MD (-)
			2.6.1	occurring time
			2.6.1	Active MD(-) tariff 1
			2.6.2	occurring time
			2.6.2	Active MD(-) tariff 2
			2.6.3	occurring time
			2.6.3	Active MD(-) tariff 3
			2.6.4	occurring time
			2.6.4	Active MD(-) tariff 4

			3.6.0	occurring time
			3.6.0	Reactive MD (+)
			3.6.1	occurring time
			3.6.1	Reactive MD (+) tariff 1
			3.6.2	occurring time
			3.6.2	Reactive MD (+) tariff 2
			3.6.3	occurring time
			3.6.3	Reactive MD (+) tariff 3
			3.6.4	occurring time
			3.6.4	Reactive MD (+) tariff 4
			4.6.0	occurring time
			4.6.0	Reactive MD (-)
			4.6.1	occurring time
			4.6.1	Reactive MD (-) tariff 1
			4.6.2	occurring time
			4.6.2	Reactive MD (-) tariff 2
			4.6.3	occurring time
			4.6.3	Reactive MD (-) tariff 3

			4.6.4	occurring time
			4.6.4	Reactive MD (-) tariff 4
			5.6.0	occurring time
			5.6.0	Reactive MD (QI)
			5.6.1	occurring time
			5.6.1	Reactive MD (QI) tariff 1
			5.6.2	occurring time
			5.6.2	Reactive MD (QI) tariff 2
			5.6.3	occurring time
			5.6.3	Reactive MD (QI) tariff 3
			5.6.4	occurring time
			5.6.4	Reactive MD (QI) tariff 4
			6.6.0	occurring time
			6.6.0	Reactive MD (QII)
			6.6.1	occurring time
			6.6.1	Reactive MD (QII) tariff 1
			6.6.2	occurring time
			6.6.2	Reactive MD (QII) tariff 2

			6.6.3	occurring time
			6.6.3	Reactive MD (QII) tariff 3
			6.6.4	occurring time
			6.6.4	Reactive MD (QII) tariff 4
			7.6.0	occurring time
			7.6.0	Reactive MD (QIII)
			7.6.1	occurring time
			7.6.1	Reactive MD (QIII) tariff 1
			7.6.2	occurring time
			7.6.2	Reactive MD (QIII) tariff 2
			7.6.3	occurring time
			7.6.3	Reactive MD (QIII) tariff 3
			7.6.4	occurring time
			7.6.4	Reactive MD (QIII) tariff 4
			8.6.0	occurring time
			8.6.0	Reactive MD (QIV)
			8.6.1	occurring time
			8.6.1	Reactive MD (QIV) tariff 1

			8.6.2	occurring time
			8.6.2	Reactive MD (QIV) tariff 2
			8.6.3	occurring time
			8.6.3	Reactive MD (QIV) tariff 3
			8.6.4	occurring time
			8.6.4	Reactive MD (QIV) tariff 4
			9.6.0	occurring time
			9.6.0	Apparent MD (+)
			9.6.1	occurring time
			9.6.1	Apparent MD (+) tariff 1
			9.6.2	occurring time
			9.6.2	Apparent MD (+) tariff 2
			9.6.3	occurring time
			9.6.3	Apparent MD (+) tariff 3
			9.6.4	occurring time
			9.6.4	Apparent MD (+) tariff 4
			10.6.0	occurring time
			10.6.0	Apparent MD (-)

			10.6.1	occurring time
			10.6.1	Apparent MD (-) tariff 1
			10.6.2	occurring time
			10.6.2	Apparent MD (-) tariff 2
			10.6.3	occurring time
			10.6.3	Apparent MD (-) tariff 3
			10.6.4	occurring time
			10.6.4	Apparent MD (-) tariff 4
			1.16.0	occurring time
			1.16.0	Active period MD (+)
			1.16.1	occurring time
			1.16.1	Active period MD(+) tariff 1
			1.16.2	occurring time
			1.16.2	Active period MD(+) tariff 2
			1.16.3	occurring time
			1.16.3	Active period MD(+) tariff 3
			1.16.4	occurring time
			1.16.4	Active period MD(+) tariff 4

			OBIS	Data List
11		**Instantaneous Value** **(On-Demand Instantaneous Data)**	32.7.0	occurring time
			52.7.0	Voltage in phase L1
			72.7.0	Voltage in phase L2
			31.7.0	Voltage in phase L3
			51.7.0	Current in phase L1
			71.7.0	Current in phase L2
			91.7.0	Current in phase L3
			1.7.0	Current in neutral
			2.7.0	Active power (+)
			3.7.0	Active power (-)
			4.7.0	Reactive power(+)
			9.7.0	Reactive power (-)
			10.7.0	Apparent power (+)
			21.7.0	Apparent power (-)
			22.7.0	Active power (+) in phase L1
			23.7.0	Active power (-) in phase L1
			24.7.0	Reactive power(+) in phase L1

			29.7.0	Reactive power (-) in phase L1
			41.7.0	Apparent power (+) in phase L1
			42.7.0	Active power (+) in phase L2
			43.7.0	Active power (-) in phase L2
			44.7.0	Reactive power(+) in phase L2
			49.7.0	Reactive power (-) in phase L2
			61.7.0	Apparent power (+) in phase L2
			62.7.0	Active power (+) in phase L3
			63.7.0	Active power (-) in phase L3
			64.7.0	Reactive power(+) in phase L3
			69.7.0	Reactive power (-) in phase L3
			13.7.0	Apparent power (+) in phase L3
			33.7.0	Power factor
			53.7.0	Power factor in phase L1
			73.7.0	Power factor in phase L2
			81.7.1	Power factor in phase L3
			81.7.2	Angle of U(L2) - U(L1)
			81.7.40	Angle of U(L3) - U(L1)

			81.7.51	Angle of U(L1) - I(L1)
			81.7.62	Angle of U(L2) - I(L2)
			14.7.0	Angle of U(L3) - I(L3)
12	**Security**	**Error Alarm Register** **(Once a Day)**	Load Tap	Frequency
				Error Register
				Alarm Register
13	**Time**	**Date Time** **(Once a Month with validation)**	AMR Status Of Meter	
			Clock time shift limit	
			Read date/time	
14		**Tariff** **(Once a Month with validation)**	Active Tariff	Day Table: tariff 1 (T1) & tariff2(T2)
			Passive Tariff	Day Table:tariff 1 (T1) & tariff2(T2)
				Passive TOU Activation Date

8.3. Holley Configuration

NO		Item Can Be Write	Writing data	
1	Meter parameter	**Basic Parameter**	Meter Number	
			Customer ID	
			Device Address	
2		**CTPT**	CT Ratio	
			PT Ratio	
3		**LCD Display Configuration**	Auto scrolling Display	
			Key scrolling Display	
4		**RTC**	Clock	
			Dayligt Saving Time	
5		**Demand Parameter**	Demand interval	
			Sliding Number	
			MD Season Parameter (Determined from EMRC)	
6		**TOU Configration**	**Day Profile**	Tariff 1
				Tariff 2
7		**Gprs Parameter**	Work mode	
			IP Address	

			Port	
			APN	
			PDP User Name	
			PDP Password	
			Idle Interval of GPRS	
			Remonitor Interval of GPRS	
			Interval of Heart Beat	
			Activate GPRS Parameter	
8		**Other Parameter**	Security (AES128 key)	
9		**Relay Control**	Relay Control Mode	
			Operate Relay	Connect
				Disconnect
10	**Billing Information**	**Billing Parameter**	Billing Methods	1. Billing by press button
				2. Billing at billing day
				3. Billing by communication
			Billing Day (Month, Day and Time)	
			Billing Now	
			Interval	

11	**Load Profile**	**Energy & Demand Data Channel Configuration**	**OBIS**	**Meter Channel**
			0.0.1.0.0.255	Time
			1.0.1.8.0.255	Total Import Active Energy
			1.0.2.8.0.255	Total Export Active Energy
			1.0.3.8.0.255	Total Import Reactive Energy
			1.0.4.8.0.255	Total Export Reactive Energy
			1.0.1.14.0.255	Total Import Active Demand
			1.0.2.14.0.255	Total Export Active Demand
			1.0.3.14.0.255	Total Import Reactive Demand
			1.0.4.14.0.255	Total Export Reactive Demand
12		**Instantaneous Data Channel Configuration**	Interval	
			OBIS	**Meter Channel**
			0.0.1.0.0.255	Time
			1.0.32.7.0.255	Voltage of Phase A(Ins)
			1.0.52.7.0.255	Voltage of Phase B(Ins)
			1.0.72.7.0.255	Voltage of Phase C(Ins)
			1.0.31.7.0.255	Current of Phase A(Ins)
			1.0.51.7.0.255	Current of Phase B(Ins)
			1.0.71.7.0.255	Current of Phase C(Ins)

			1.0.15.7.0.255	Total Active Power(Ins)
			1.0.21.7.0.255	Active Power of Phase A(Ins)
			1.0.41.7.0.255	Active Power of Phase B(Ins)
			1.0.61.7.0.255	Active Power of Phase C(Ins)
			1.0.3.7.0.255	Total Reactive Power(Ins)
			1.0.23.7.0.255	Reactive Power of Phase A(Ins)
			1.0.43.7.0.255	Reactive Power of Phase B(Ins)
			1.0.63.7.0.255	Reactive Power of Phase C(Ins)
			1.0.13.7.0.255	Total Power Factor(Ins)
			1.0.33.7.0.255	Power Factor of Phase A(Ins)
			1.0.53.7.0.255	Power Factor of Phase B(Ins)
			1.0.73.7.0.255	Power Factor of Phase C(Ins)
			1.0.14.7.0.255	Frequency(Ins)
13	**Event**	**Event Parameter**	Sag/Under Voltage Threshold (Level 1)	
			Sag/Under Voltage Threshold(Level 2)	
			Judgment Time of Sag/Under Voltage	
			Swell Threshold(Level 1)	
			Swell Threshold(Level 2)	
			Judgment Time of Swell	

			Judgment Time of Lose Phase	
			Lose Phase Threshold	
			Judgment Time of Reverse Phase Sequence	
			Judgment Time of Current Reverse	
			Judgment Time of Current Unbalance	
			Judgment Time of Voltage Unbalance	
			Current Lost Threshold	
			Judgment Time of Reversed Polarity	
			Over Current Threshold	
			Over Current Judgment Time 1	
			Time of Disconnect When Over Load	
			Delay Time of Disconnect by COM	
			Over Current Threshold(Level 2)	
			Over Current Judgment Time 2	
14		**Current &Voltage Event**	**Name of each event**	Power off for short time
				Power off for Long time
				Current Unbalance
				Voltage Unbalance

				Polarity reverse (Energy reverse) of Phase A
				Polarity reverse (Energy reverse) of Phase B
				Polarity reverse (Energy reverse) of Phase C
				Current lost of phase A
				Current lost of phase B
				Current lost of phase C
				Sag/Under Voltage Of Phase A (Level 1)
				Sag/Under Voltage Of Phase B (Level 1)
				Sag/Under Voltage Of Phase C (Level 1)
				Swell of phase A (Level1)
				Swell of phase B (Level1)
				Swell of phase C (Level1)
				Sag/Under Voltage Of Phase A (Level 2)
				Sag/Under Voltage Of Phase B (Level 2)
				Sag/Under Voltage Of Phase C (Level 2)

				Swell of phase A (Level2)
				Swell of phase B (Level2)
				Swell of phase C (Level2)
				Lose Phase of Phase A
				Lose Phase of Phase B
				Lose Phase of Phase C
				Incorrent Phase Sequence
15		**Other event (Alarm Meter)**	**Name of each event**	Meter cover open
				Terminal cover open
				Big Magnetic field influence
				GPRS Module Plug
				Reverse Polarity
				Low Battery
16	**Clear Data**	**Clear Data**	Clear All Events	
17	**Groups**	**Group Setting**	Configuration file	
			Group Name	
			Item Code	

	et ti n g		Item Data
			Result

8.4. Holley Reading

NO		Item Can Be Read	Reading data	
1	Meter state	**Meter Information** **(Once a Month with validation)**	Meter number	
			Meter firmware ID	
			Current Tariff	
			Meter mode	
			Meter constant	
			Meter clock	
			Meter type	
			Relay Current state	
			Relay Current control	
			TDK	
2		**Current Energy** **(Once a Day)**	**OBIS**	**Data List**
			1.8.0	Total Import Active Energy
			1.8.1	Import Active Energy Of T1
			1.8.2	Import Active Energy Of T2
			1.8.3	Import Active Energy Of T3
			1.8.4	Import Active Energy Of T4
			2.8.0	Total Export Active Energy

		2.8.1	Export Active Energy Of T1
		2.8.2	Export Active Energy Of T2
		2.8.3	Export Active Energy Of T3
		2.8.4	Export Active Energy Of T4
		3.8.0	Total Import Reactive Energy
		3.8.1	Import Reactive Energy Of T1
		3.8.2	Import Reactive Energy Of T2
		3.8.3	Import Reactive Energy Of T3
		3.8.4	Import Reactive Energy Of T4
		4.8.0	Total Export Reactive Energy
		4.8.1	Export Reactive Energy Of T1
		4.8.2	Export Reactive Energy Of T2
		4.8.3	Export Reactive Energy Of T3
		4.8.4	Export Reactive Energy Of T4
		9.8.0	Total Import Apparent Energy
		9.8.1	Import Apparent Energy Of T1
		9.8.2	Import Apparent Energy Of T2
		9.8.3	Import Apparent Energy Of T3
		9.8.4	Import Apparent Energy Of T4

		10.8.0	Total Export Apparent Energy
		10.8.1	Export Apparent Energy Of T1
		10.8.2	Export Apparent Energy Of T2
		10.8.3	Export Apparent Energy Of T3
		10.8.4	Export Apparent Energy Of T4
		5.8.0	The 1st Quadrant Reactive Energy
		6.8.0	The 2nd Quadrant Reactive Energy
		7.8.0	The 3rd Quadrant Reactive Energy
		8.8.0	The 4th Quadrant Reactive Energy
		15.8.0	Active Total Energy
		15.8.1	Active Total of T1 Energy
		15.8.2	Active Total of T2 Energy
		15.8.3	Active Total of T3 Energy
		15.8.4	Active Total of T4 Energy
		16.8.0	Total Absolutely Differ Active Energy
		16.8.1	Absolutely Differ Active Energy of T1
		16.8.2	Absolutely Differ Active Energy of T2
		16.8.3	Absolutely Differ Active Energy of T3

		16.8.4	Absolutely Differ Active Energy of T4
		21.8.0	Total Import Active Energy of Phase A
		41.8.0	Total Import Active Energy of Phase B
		61.8.0	Total Import Active Energy of Phase C
		22.8.0	Total Export Active Energy of Phase A
		42.8.0	Total Export Active Energy of Phase B
		62.8.0	Total Export Active Energy of Phase C
		23.8.0	Total Import Reactive Energy of Phase A
		43.8.0	Total Import Reactive Energy of Phase B
		63.8.0	Total Import Reactive Energy of Phase C
		24.8.0	Total Exort Reactive Energy of Phase A
		44.8.0	Total Exort Reactive Energy of Phase B
		64.8.0	Total Exort Reactive Energy of Phase C

			OBIS	Data List
			1.6.0	Total Import Active MD
			1.6.0	Total Import Active MD(Occurrence Time)
			1.6.1	Import Active MD of T1
			1.6.1	Import Active MD of T1(Occurrence Time)
			1.6.2	Import Active MD of T2
			1.6.2	Import Active MD of T2(Occurrence Time)
			1.6.3	Import Active MD of T3
3		**Current Demand** **(Once a Day)**	1.6.3	Import Active MD of T3(Occurrence Time)
			1.6.4	Import Active MD of T4
			1.6.4	Import Active MD of T4(Occurrence Time)
			2.6.0	Total Export Active MD
			2.6.0	Total Export Active MD(Occurrence Time)
			2.6.1	Export Active MD of T1
			2.6.1	Export Active MD of T1(Occurrence Time)
			2.6.2	Export Active MD of T2

		2.6.2	Export Active MD of T2(Occurrence Time)
		2.6.3	Export Active MD of T3
		2.6.3	Export Active MD of T3(Occurrence Time)
		2.6.4	Export Active MD of T4
		2.6.4	Export Active MD of T4(Occurrence Time)
		3.6.0	Total Import Reactive MD
		3.6.0	Total Import Reactive MD(Occurrence Time)
		3.6.1	Import Reactive MD of T1
		3.6.1	Import Reactive MD of T1(Occurrence Time)
		3.6.2	Import Reactive MD of T2
		3.6.2	Import Reactive MD of T2(Occurrence Time)
		3.6.3	Import Reactive MD of T3
		3.6.3	Import Reactive MD of T3(Occurrence Time)
		3.6.4	Import Reactive MD of T4
		3.6.4	Import Reactive MD of T4(Occurrence Time)

		4.6.0	Total Export Reactive MD
		4.6.0	Total Export Reactive MD(Occurrence Time)
		4.6.1	Export Reactive MD of T1
		4.6.1	Export Reactive MD of T1(Occurrence Time)
		4.6.2	Export Reactive MD of T2
		4.6.2	Export Reactive MD of T2(Occurrence Time)
		4.6.3	Export Reactive MD of T3
		4.6.3	Export Reactive MD of T3(Occurrence Time)
		4.6.4	Export Reactive MD of T4
		4.6.4	Export Reactive MD of T4(Occurrence Time)
		1.2.0	Total Import Active Accumulative MD
		1.2.1	Import Active Accumulative MD of T1
		1.2.2	Import Active Accumulative MD of T2
		1.2.3	Import Active Accumulative MD of T3
		1.2.4	Import Active Accumulative MD of T4

			2.2.0	Total Export Active Accumulative MD
			2.2.1	Export Active Accumulative MD of T1
			2.2.2	Export Active Accumulative MD of T2
			2.2.3	Export Active Accumulative MD of T3
			2.2.4	Export Active Accumulative MD of T4
			3.2.0	Total Import Reactive Accumulative MD
			3.2.1	Import Reactive Accumulative MD of T1
			3.2.2	Import Reactive Accumulative MD of T2
			3.2.3	Import Reactive Accumulative MD of T3
			3.2.4	Import Reactive Accumulative MD of T4
			4.2.0	Total Export Reactive Accumulative MD
			4.2.1	Export Rective Accumulative MD of T1
			4.2.2	Export Rective Accumulative MD of T2

			4.2.3	Export Rective Accumulative MD of T3
			4.2.4	Export Rective Accumulative MD of T4
			1.16.0	Total period MD
			1.16.0	Total period MD(Occurrence Time)
			1.16.1	Period MD of Season 1
			1.16.1	Period MD of Season 1(Occurrence Time)
			1.16.2	Period MD of Season 2
			1.16.2	Period MD of Season 2(Occurrence Time)
			1.16.3	Period MD of Season 3
			1.16.3	Period MD of Season 3(Occurrence Time)
			1.16.4	Period MD of Season 4
			1.16.4	Period MD of Season 4(Occurrence Time)
4		**Instantaneous Data** **(On-Demand Instantaneous Data)**	**OBIS**	**Data List**
			32.7.0	Voltage of Phase A
			52.7.0	Voltage of Phase B
			72.7.0	Voltage of Phase C

		31.7.0	Current of Phase A
		51.7.0	Current of Phase B
		71.7.0	Current of Phase C
		15.7.0	Total Active Power
		21.7.0	Active Power of Phase A
		41.7.0	Active Power of Phase B
		61.7.0	Active Power of Phase C
		22.7.0	Export Active Power of Phase A
		42.7.0	Export Active Power of Phase B
		62.7.0	Export Active Power of Phase C
		16.7.0	Total Reactive Power
		23.7.0	Reactive Power of Phase A
		43.7.0	Reactive Power of Phase B
		63.7.0	Reactive Power of Phase C
		24.7.0	Export Reactive Power of Phase A
		44.7.0	Export Reactive Power of Phase B
		64.7.0	Export Reactive Power of Phase C
		9.7.0	Total Apparent Power
		29.7.0	Apparent Power of Phase A

			49.7.0	Apparent Power of Phase B
			69.7.0	Apparent Power of Phase C
			14.7.0	Frequency
			13.7.0	Total Power Factor
			33.7.0	Power Factor of Phase A
			53.7.0	Power Factor of Phase B
			73.7.0	Power Factor of Phase C
			81.7.10	Voltage Angle Between Phase B and A
			81.7.20	Voltage Angle Between Phase C and A
			81.7.40	Voltage and Current Angle of Phase A
			81.7.51	Voltage and Current Angle of Phase B
			81.7.62	Voltage and Current Angle of Phase C
5	Meter parameter	**Basic Parameter** **(Once a Month with validation)**	Meter Number	
			Customer ID	
			Device Address	
6		**CTPT** **(Once a Month with validation)**	CT Ratio	
			PT Ratio	
			Auto scrolling Display	

7	**LCD Display Configuration** **(Once a Month with validation)**	Key scrolling Display	
8	**RTC** **(Once a Month with validation)**	Clock	
		Dayligt Saving Time	
9	**Demand Parameter** **(Once a Month with validation)**	Demand interval	
		Sliding Number	
		MD Season Parameter	
10	**TOU Configration** **(Once a Month with validation)**	**Day Profile**	Tariff 1
			Tariff 2
11	**Gprs Parameter** **(Once a Month with validation)**	Work mode	
		IP Address	
		Port	
		APN	
		PDP User Name	
		PDP Password	
		Idle Interval of GPRS	
		Remonitor Interval of GPRS	
			Interval of Heart Beat
12	**Other Parameter**	Security (AES128 key)	

		(Once a Month with validation)		
13		**Relay Control** **(Once a Month with validation)**	Relay Current State	
				Relay Control State
				Relay Control Mode
14	**Billing Information**	**Billing Parameter** **(Once a Month without validation)**	Billing Methods	1. Billing by press button
				2. Billing at billing day
				3. Billing by communication
			Billing Day (Month, Day and Time)	
15		**Billing Data** **(Once a Month without validation)**	Energy Monthly + Time Range	
			Active Demand Monthly + Time Range	
			Reactive Demand Monthly + Time Range	
			Period Max Demand + Time Range	
			Cumulative Maximum Demand + Time Range	
16	**Load Profile**	**Energy & Demand Data Channel Configuration** **(Once a Month without validation)**	Interval	
			OBIS	**Meter Channel**
			0.0.1.0.0.255	Time
			1.0.1.8.0.255	Total Import Active Energy
			1.0.2.8.0.255	Total Export Active Energy
			1.0.3.8.0.255	Total Import Reactive Energy

		1.0.4.8.0.255	Total Export Reactive Energy
		1.0.1.14.0.255	Total Import Active Demand
		1.0.2.14.0.255	Total Export Active Demand
		1.0.3.14.0.255	Total Import Reactive Demand
		1.0.4.14.0.255	Total Export Reactive Demand
17	**Read Energy & Demand Load Profile** **(Once a Day)**	Time	
		Total Import Active Energy(kWh)	
		Total Export Active Energy(kWh)	
		Total Import Reactive Energy(kvarh)	
		Total Export Reactive Energy(kvarh)	
		Total Import Active Demand(kW)	
		Total Export Active Demand(kW)	
		Total Import Reactive Demand(kvar)	
		Total Export Reactive Demand(kvar)	
18	**Instantaneous Data Channel Configuration** **(On-Demand Instantaneous Data)**	Interval	
		OBIS	**Meter Channel**
		0.0.1.0.0.255	Time
		1.0.32.7.0.255	Voltage of Phase A(Ins)
		1.0.52.7.0.255	Voltage of Phase B(Ins)

			1.0.72.7.0.255	Voltage of Phase C(Ins)
			1.0.31.7.0.255	Current of Phase A(Ins)
			1.0.51.7.0.255	Current of Phase B(Ins)
			1.0.71.7.0.255	Current of Phase C(Ins)
			1.0.15.7.0.255	Total Active Power(Ins)
			1.0.21.7.0.255	Active Power of Phase A(Ins)
			1.0.41.7.0.255	Active Power of Phase B(Ins)
			1.0.61.7.0.255	Active Power of Phase C(Ins)
			1.0.3.7.0.255	Total Reactive Power(Ins)
			1.0.23.7.0.255	Reactive Power of Phase A(Ins)
			1.0.43.7.0.255	Reactive Power of Phase B(Ins)
			1.0.63.7.0.255	Reactive Power of Phase C(Ins)
			1.0.13.7.0.255	Total Power Factor(Ins)
			1.0.33.7.0.255	Power Factor of Phase A(Ins)
			1.0.53.7.0.255	Power Factor of Phase B(Ins)
			1.0.73.7.0.255	Power Factor of Phase C(Ins)
			1.0.14.7.0.255	Frequency(Ins)
19		**Read Instantaneous Load Profile** **(On-Demand Instantaneous Data)**	Time	
			Voltage of Phase A(Ins)(V)	

			Voltage of Phase B(Ins)(V)
			Voltage of Phase C(Ins)(V)
			Current of Phase A(Ins)(A)
			Current of Phase B(Ins)(A)
			Current of Phase C(Ins)(A)
			Total Active Power(Ins)(kW)
			Active Power of Phase A(Ins)(kW)
			Active Power of Phase B(Ins)(kW)
			Active Power of Phase C(Ins)(kW)
			Total Reactive Power(Ins)(kvar)
			Reactive Power of Phase A(Ins)(kvar)
			Reactive Power of Phase B(Ins)(kvar)
			Reactive Power of Phase C(Ins)(kvar)
			Total Power Factor(Ins)
			Power Factor of Phase A(Ins)
			Power Factor of Phase B(Ins)
			Power Factor of Phase C(Ins)
			Frequency(Ins)(Hz)

20	Event	**Event Parameter** **(Once a Month with validation)**	Sag/Under Voltage Threshold (Level 1)
			Sag/Under Voltage Threshold(Level 2)
			Judgment Time of Sag/Under Voltage
			Swell Threshold(Level 1)
			Swell Threshold(Level 2)
			Judgment Time of Swell
			Judgment Time of Lose Phase
			Lose Phase Threshold
			Judgment Time of Reverse Phase Sequence
			Judgment Time of Current Reverse
			Judgment Time of Current Unbalance
			Judgment Time of Voltage Unbalance
			Current Lost Threshold
			Judgment Time of Reversed Polarity
			Over Current Threshold
			Over Current Judgment Time 1
			Time of Disconnect When Over Load
			Delay Time of Disconnect by COM

		Over Current Threshold(Level 2)	
		Over Current Judgment Time 2	
21	Standard Event (Once a Month without validation)	Clock Change	
		Programming Event	
		(Number, Date and Time) of the Event	
		etc……(Any event occur in the meter)	
22	Power Grid Event (Once a Month without validation)	Swell of Phase B Start(Level 1)	
		Swell of Phase B End(Level 1)	
		Current Unbalance Start	
		Current Unbalance End	
		etc…… (Any event occur in the meter)	
23	Current &Voltage Event **(Once a Day)**	Number of each event	
		Start time of each event	
		End time of eachevent	
		Name of each event	Power off for short time
			Power off for Long time
			Current Unbalance
			Voltage Unbalance

			Polarity reverse (Energy reverse) of Phase A
			Polarity reverse (Energy reverse) of Phase B
			Polarity reverse (Energy reverse) of Phase C
			Current lost of phase A
			Current lost of phase B
			Current lost of phase C
			Sag/Under Voltage Of Phase A (Level 1)
			Sag/Under Voltage Of Phase B (Level 1)
			Sag/Under Voltage Of Phase C (Level 1)
			Swell of phase A (Level1)
			Swell of phase B (Level1)
			Swell of phase C (Level1)
			Sag/Under Voltage Of Phase A (Level 2)
			Sag/Under Voltage Of Phase B (Level 2)
			Sag/Under Voltage Of Phase C (Level 2)

				Swell of phase A (Level2)
				Swell of phase B (Level2)
				Swell of phase C (Level2)
				Lose Phase of Phase A
				Lose Phase of Phase B
				Lose Phase of Phase C
				Incorrent Phase Sequence
24		Other event (Alarm Meter) **(Once a Day)**	Number of each event	
			Start time of each event	
			End time of eachevent	
			Name of each event	Meter cover open
				Terminal cover open
				Big Magnetic field influence
				GPRS Module Plug
				Reverse Polarity
				Low Battery

8.5. L&G Configuration

Item Can Be write	Writing data	
mains	current ratio	
	voltage ratio	
clock	daylight saving time	
time of use (TOU)	Active TOU	table TOU
	passive TOU	table TOU
	Special day table	
	emergency sitting	
Display IEC readout list	operating display auto scrolling	
	display list manual scrolling	
load profile	**OBIS Code**	**Reading data**
	1.8.0	Active energy import +A (QI+QIV)
	2.8.0	Active energy export -A (QII+QIII)
	15.8.0	Active energy A (QI+QII+QIII+QIV)
	3.8.0	Reactive energy import +R (QI+QII)
	4.8.0	Reactive energy export -R (QIII+QIV)
	16.5.0	Total active power of all phases
	131.5.0	Total reactive power of all phases
	32.5.0	Voltage of phase A
	72.5.0	Voltage of phase C
	31.5.0	Current of phase A
	71.5.0	Current of phase C
	2.5.0	Total export active demand
	3.5.0	total import reactive demand

	4.5.0	Total export reactive demand
	10.5.0	Last Average Demand -VA (QII+QIII)
	1.5.0	Total import active demand
	9.5.0	Last Average Demand +VA (QI+QIV)
	13.5.0	Last average power factor
Stored value /billing date	**OBIS Code**	**Reading data**
	1-1:1.8.0	Active energy import +A (QI+QIV)
	1-1:1.8.1	Active energy import +A (QI+QIV) rate 1
	1-1:1.8.2	Active energy import +A (QI+QIV) rate 2
	1-1:1.8.3	Active energy import +A (QI+QIV) rate 3
	1-1:1.8.4	Active energy import +A (QI+QIV) rate 4
	1-1:2.8.0	Active energy export -A (QII+QIII)
	1-1:15.8.0	Active energy A (QI+QII+QIII+QIV)
	1-1:3.8.0	Reactive energy import +R (QI+QII)
	1-1:4.8.0	Reactive energy export -R (QIII+QIV)
	1-1:1.6.1.5	max demand +A (QI , QIV) RATE 1
	1-1:1.6.2.2	TimeStamp max demand +A (QI , QIV) RATE 1
	1-1:1.6.2.5	TimeStamp max demand +A (QI , QIV) RATE 2
	1-1:2.8.1	Active energy export -A (QII+QIII)
	1-1:2.8.2	Active energy export -A (QII+QIII)

8.6. L&G Reading

No.		Item Can Be Read	OBIS Code	Reading data
1	Dlms read commands	**Billing Value** **(Once a Month without validation)**	0-0:42.0.0	COSEM logical device name
			0-0:97.97.0	Error code
			0-0:1.0.0	Clock
			1-0:0.0.0	Identification number 1.1
			1-0:0.0.1	Identification number 1.2
			1-0:0.0.2	Identification number 1.3
			1-0:0.0.3	Identification number 1.4
			0-0:96.1.0	Identification number 2.1
			0-0:96.1.1	Identification number 2.2
			1-1:2.8.0	Active energy export -A (QII+QIII)
			1-1:3.8.0	Reactive energy import +R (QI+QII)
			1-1:4.8.0	Reactive energy export -R (QIII+QIV)
			1-1:15.8.0	Active energy A (QI+QII+QIII+QIV)
			1-1:16.8.0	Active energy A (QI+QIV-QII-QIII)
			1-1:10.8.0	Apparent energy export -VA (QII+QIII)
			1-1:1.8.0	Active energy import +A (QI+QIV)

			1-1:9.8.0	Apparent energy import +VA (QI+QIV)
			1-1:1.8.1	Active energy import +A (QI+QIV) rate 1
			1-1:1.8.2	Active energy import +A (QI+QIV) rate 2
			1-1:1.8.3	Active energy import +A (QI+QIV) rate 3
			1-1:1.8.4	Active energy import +A (QI+QIV) rate 4
			1-1:2.8.1	Active energy export -A (QII+QIII) rate 1
			1-1:2.8.2	Active energy export -A (QII+QIII) rate 2
			1-1:2.8.3	Active energy export -A (QII+QIII) rate 3
			1-1:2.8.4	Active energy export -A (QII+QIII) rate 4
			1-1:9.8.1	Apparent energy import +VA (QI+QIV) rate 1
			1-1:9.8.2	Apparent energy import +VA (QI+QIV) rate 2
			1-1:10.8.1	Apparent energy export -VA (QII+QIII) rate 1
			1-1:10.8.2	Apparent energy export -VA (QII+QIII) rate 2
			1-1:15.8.1	Active energy A (QI+QII+QIII+QIV) rate 1
			1-1:15.8.2	Active energy A (QI+QII+QIII+QIV) rate 2
			1-1:15.8.3	Active energy A (QI+QII+QIII+QIV) rate 3
			1-1:15.8.4	Active energy A (QI+QII+QIII+QIV) rate 4
			1-1:1.8.5	Active energy import +A (QI+QIV) rate 5

			1-1:1.9.0	Energy delta over billing period +A (QI+QIV)
			1-1:9.9.0	Energy delta over billing period +VA (QI+QIV)
			1-0:1.8.128	Total harmonic energy import
			1-0:2.8.128	Total harmonic energy export
			1-1:2.5.0	Last average demand -A (QII+QIII)
			1-1:3.5.0	Last average demand +R (QI+QII)
			1-1:4.5.0	Last average demand -R (QIII+QIV)
			1-1:15.5.0	Last average demand A (QI+QII+QIII+QIV)
			1-1:10.5.0	Last average demand -VA (QII+QIII)
			1-1:1.5.0	Last average demand +A (QI+QIV)
			1-1:9.5.0	Last average demand +VA (QI+QIV)
			1-1:1.6.0	Maximum demand +A (QI+QIV)
			1-1:2.6.0	Maximum demand -A (QII+QIII)
			1-1:3.6.0	Maximum demand +R (QI+QII)
			1-1:4.6.0	Maximum demand -R (QIII+QIV)
			1-1:1.6.1	Maximum demand +A (QI+QIV) rate 1
			1-1:1.6.2	Maximum demand +A (QI+QIV) rate 2
			1-1:9.6.1	Maximum demand +VA (QI+QIV) rate 1

			1-1:9.6.2	Maximum demand +VA (QI+QIV) rate 2
			1-1:10.6.1	Maximum demand -VA (QII+QIII) rate 1
			1-1:10.6.2	Maximum demand -VA (QII+QIII) rate 2
			1-1:1.2.0	Cumulative maximum demand +A (QI+QIV)
			1-1:2.2.0	Cumulative maximum demand -A (QII+QIII)
			1-1:3.2.0	Cumulative maximum demand +R (QI+QII)
			1-1:4.2.0	Cumulative maximum demand -R (QIII+QIV)
			1-1:1.2.1	Cumulative maximum demand +A (QI+QIV) rate 1
			1-1:1.2.2	Cumulative maximum demand +A (QI+QIV) rate 2
			1-1:9.2.1	Cumulative maximum demand +VA (QI+QIV) rate 1
			1-1:9.2.2	Cumulative maximum demand +VA (QI+QIV) rate 2
			1-1:10.2.1	Cumulative maximum demand -VA (QII+QIII) rate 1
			1-1:10.2.2	Cumulative maximum demand -VA (QII+QIII) rate 2
			1-1:32.7.0	Voltage L1
			1-1:72.7.0	Voltage L3
			1-4:32.7.0	Primary voltage L1

1-4:72.7.0	Primary voltage L3
1-1:31.7.0	Current L1
1-1:71.7.0	Current L3
1-4:31.7.0	Primary current L1
1-4:71.7.0	Primary current L3
1-1:14.7.0	Mains frequency
1-4:16.7.0	Primary active power all phases
1-4:36.7.0	Primary active power L1
1-4:76.7.0	Primary active power L3
1-4:131.7.0	Primary reactive power all phases
1-4:151.7.0	Primary reactive power L1
1-4:191.7.0	Primary reactive power L3
1-1:13.7.0	Total power factor
0-0:96.7.1	Number of power failures L1
0-0:96.7.3	Number of power failures L3
1-0:32.7.126	Voltage L1 all harmonics
1-0:72.7.126	Voltage L3 all harmonics
1-0:31.7.126	Current L1 all harmonics
1-0:71.7.126	Current L3 all harmonics

1-0:15.7.127	Relative THD [%] active power QI+QII+QIII+QIV
1-0:12.7.127	Relative THD [%] voltage
1-0:11.7.127	Relative THD [%] current
1-1:83.8.3	Active line losses (OLA)
1-1:83.8.6	Active transformer losses (NLA)
1-1:83.8.19	Total transformer losses U^2 (Fe)
1-1:83.8.20	Total line losses I^2 (Cu)
1-0:0.1.0	Billing period reset counter
1-0:0.1.2	Date of last billing period reset
0-0:96.8.0	Operating time
0-0:96.2.0	Number of parameterisations (configuration program changes)
0-0:96.2.1	Date of last parameterisation (configuration program change)
0-1:96.2.5	Date of last calibration
0-0:96.2.2	Activation date of active calendar (TOU)
0-0:96.2.7	Activation date of passive calendar (TOU)
0-0:96.3.1	State of input control signals
0-0:96.3.2	State of output control signals
0-0:96.4.0	State of internal control signals

			0-0:96.5.0	Internal operating status
			0-0:96.6.0	Battery use time
			0-0:96.6.3	Battery voltage
			1-0:0.2.0	Active firmware identifier
			1-0:0.2.1	Parameterisation ID
			1-0:0.2.2	Active calendar name (active TOU ID)
			1-0:0.2.7	Passive calendar name (passive TOU ID)
			0-0:96.90	Configuration ID
			1-0:0.2.4	Connection ID
			0-0:96.99.8	Display and readout list ID
			0-0:96.90.2	HDLC lower MAC address
			0-0:96.90.1	IEC device address
			1-1:0.3.0	LED active energy
			1-1:0.3.1	LED reactive energy
			1-1:0.4.0	Demand reading factor
			1-1:0.4.1	Energy reading factor
			1-1:0.4.2	Current transformer ratio
			1-1:0.4.3	Voltage transformer ratio
			OBIS Code	**Reading data**

2		**Meter Value** **(Once a Day)**	0-0:42.0.0	COSEM logical device name
			0-0:97.97.0	Error code
			0-0:1.0.0	Clock
			1-0:0.0.0	Identification number 1.1
			1-0:0.0.1	Identification number 1.2
			1-0:0.0.2	Identification number 1.3
			1-0:0.0.3	Identification number 1.4
			0-0:96.1.0	Identification number 2.1
			0-0:96.1.1	Identification number 2.2
			1-1:1.8.0	Active energy import +A (QI+QIV)
			1-1:2.8.0	Active energy export -A (QII+QIII)
			1-1:3.8.0	Reactive energy import +R (QI+QII)
			1-1:4.8.0	Reactive energy export -R (QIII+QIV)
			1-1:9.8.0	Apparent energy import +VA (QI+QIV)
			1-1:10.8.0	Apparent energy export -VA (QII+QIII)
			1-1:15.8.0	Active energy A (QI+QII+QIII+QIV)
			1-1:16.8.0	Active energy A (QI+QIV-QII-QIII)
			1-0:1.8.128	Total harmonic energy import
			1-0:2.8.128	Total harmonic energy export

			1-1:1.8.1	Active energy import +A (QI+QIV) rate 1
			1-1:1.8.2	Active energy import +A (QI+QIV) rate 2
			1-1:1.8.3	Active energy import +A (QI+QIV) rate 3
			1-1:1.8.4	Active energy import +A (QI+QIV) rate 4
			1-1:1.8.5	Active energy import +A (QI+QIV) rate 5
			1-1:2.8.1	Active energy export -A (QII+QIII) rate 1
			1-1:2.8.2	Active energy export -A (QII+QIII) rate 2
			1-1:2.8.3	Active energy export -A (QII+QIII) rate 3
			1-1:2.8.4	Active energy export -A (QII+QIII) rate 4
			1-1:9.8.1	Apparent energy import +VA (QI+QIV) rate 1
			1-1:9.8.2	Apparent energy import +VA (QI+QIV) rate 2
			1-1:10.8.1	Apparent energy export -VA (QII+QIII) rate 1
			1-1:10.8.2	Apparent energy export -VA (QII+QIII) rate 2
			1-1:15.8.1	Active energy A (QI+QII+QIII+QIV) rate 1
			1-1:15.8.2	Active energy A (QI+QII+QIII+QIV) rate 2
			1-1:15.8.3	Active energy A (QI+QII+QIII+QIV) rate 3
			1-1:15.8.4	Active energy A (QI+QII+QIII+QIV) rate 4
			1-1:1.9.0	Energy delta over billing period +A (QI+QIV)

			1-1:9.9.0	Energy delta over billing period +VA (QI+QIV)
			1-1:1.5.0	Last average demand +A (QI+QIV)
			1-1:2.5.0	Last average demand -A (QII+QIII)
			1-1:3.5.0	Last average demand +R (QI+QII)
			1-1:4.5.0	Last average demand -R (QIII+QIV)
			1-1:9.5.0	Last average demand +VA (QI+QIV)
			1-1:10.5.0	Last average demand -VA (QII+QIII)
			1-1:15.5.0	Last average demand A (QI+QII+QIII+QIV)
			1-1:1.6.0	Maximum demand +A (QI+QIV)
			1-1:2.6.0	Maximum demand -A (QII+QIII)
			1-1:3.6.0	Maximum demand +R (QI+QII)
			1-1:4.6.0	Maximum demand -R (QIII+QIV)
			1-1:1.6.1	Maximum demand +A (QI+QIV) rate 1
			1-1:1.6.2	Maximum demand +A (QI+QIV) rate 2
			1-1:9.6.1	Maximum demand +VA (QI+QIV) rate 1
			1-1:9.6.2	Maximum demand +VA (QI+QIV) rate 2
			1-1:10.6.1	Maximum demand -VA (QII+QIII) rate 1
			1-1:10.6.2	Maximum demand -VA (QII+QIII) rate 2

			1-1:1.2.0	Cumulative maximum demand +A (QI+QIV)
			1-1:2.2.0	Cumulative maximum demand -A (QII+QIII)
			1-1:3.2.0	Cumulative maximum demand +R (QI+QII)
			1-1:4.2.0	Cumulative maximum demand -R (QIII+QIV)
			1-1:1.2.1	Cumulative maximum demand +A (QI+QIV) rate 1
			1-1:1.2.2	Cumulative maximum demand +A (QI+QIV) rate 2
			1-1:9.2.1	Cumulative maximum demand +VA (QI+QIV) rate 1
			1-1:9.2.2	Cumulative maximum demand +VA (QI+QIV) rate 2
			1-1:10.2.1	Cumulative maximum demand -VA (QII+QIII) rate 1
			1-1:10.2.2	Cumulative maximum demand -VA (QII+QIII) rate 2
			1-1:13.7.0	Total power factor
			1-1:14.7.0	Mains frequency
			1-1:32.7.0	Voltage L1
			1-1:31.7.0	Current L1
			1-1:72.7.0	Voltage L3
			1-1:71.7.0	Current L3

			1-4:16.7.0	Primary active power all phases
			1-4:32.7.0	Primary voltage L1
			1-4:31.7.0	Primary current L1
			1-4:36.7.0	Primary active power L1
			1-4:72.7.0	Primary voltage L3
			1-4:71.7.0	Primary current L3
			1-4:76.7.0	Primary active power L3
			1-4:131.7.0	Primary reactive power all phases
			1-4:151.7.0	Primary reactive power L1
			1-4:191.7.0	Primary reactive power L3
			1-0:11.7.127	Relative THD [%] current
			1-0:12.7.127	Relative THD [%] voltage
			1-0:15.7.127	Relative THD [%] active power QI+QII+QIII+QIV
			1-0:31.7.126	Current L1 all harmonics
			1-0:32.7.126	Voltage L1 all harmonics
			1-0:71.7.126	Current L3 all harmonics
			1-0:72.7.126	Voltage L3 all harmonics
			0-0:96.7.0	Number of power failures in all phases

			0-0:96.7.1	Number of power failures L1
			0-0:96.7.3	Number of power failures L3
			1-1:13.5.0	Last average power factor
			1-1:13.0.0	Billing period average power factor
			1-1:83.8.3	Active line losses (OLA)
			1-1:83.8.6	Active transformer losses (NLA)
			1-1:83.8.19	Total transformer losses U^2 (Fe)
			1-1:83.8.20	Total line losses I^2 (Cu)
			0-0:96.2.0	Number of parameterisations (configuration program changes)
			0-0:96.2.1	Date of last parameterisation (configuration program change)
			0-0:96.2.2	Activation date of active calendar (TOU)
			0-0:96.2.7	Activation date of passive calendar (TOU)
			0-0:96.3.1	State of input control signals
			0-0:96.3.2	State of output control signals
			0-0:96.4.0	State of internal control signals
			0-0:96.5.0	Internal operating status
			0-0:96.6.0	Battery use time
			0-0:96.6.3	Battery voltage

0-0:96.8.0	Operating time
0-0:96.2.7	Activation date of passive calendar (TOU)
1-0:0.1.0	Billing period reset counter
1-0:0.1.2	Date of last billing period reset
0-1:96.2.5	Date of last calibration
1-0:0.2.0	Active firmware identifier
1-0:0.2.1	Parameterisation ID
1-0:0.2.4	Connection ID
1-0:0.2.7	Passive calendar name (passive TOU ID)
1-0:0.2.8	Active firmware signature
1-0:0.2.2	Active calendar name (active TOU ID)
1-0:0.2.7	Passive calendar name (passive TOU ID)
0-0:96.90	Configuration ID
0-0:96.99.8	Display and readout list ID
0-0:22.0.0	HDLC device address
0-1:22.0.0	HDLC device address channel 1
0-0:96.90.1	IEC device address
0-0:96.90.2	HDLC lower MAC address
1-0:0.3.6	LED ampere squared hours

			1-0:0.3.7	LED voltage squared hours
			1-1:0.3.0	LED active energy
			1-1:0.3.1	LED reactive energy
			1-1:0.4.0	Demand reading factor
			1-1:0.4.1	Energy reading factor
			1-1:0.4.2	Current transformer ratio
			1-1:0.4.3	Voltage transformer ratio
			0-0:96.240.12	Event number
			0-1:96.240.8	Hardware ID
			0-2:96.240.8	Hardware ID
			0-2:96.240.9	HW ID reference
3		**Energy Value** **(Once a Day)**	**OBIS Code**	**Reading data**
			0-0:42.0.0	COSEM logical device name
			1-1:1.8.0	Active energy import +A (QI+QIV)
			1-1:2.8.0	Active energy export -A (QII+QIII)
			1-1:3.8.0	Reactive energy import +R (QI+QII)
			1-1:4.8.0	Reactive energy export -R (QIII+QIV)
			1-1:9.8.0	Apparent energy import +VA (QI+QIV)
			1-1:10.8.0	Apparent energy export -VA (QII+QIII)

			1-1:15.8.0	Active energy A (QI+QII+QIII+QIV)
			1-1:16.8.0	Active energy A (QI+QIV-QII-QIII)
			1-0:1.8.128	Total harmonic energy import
			1-0:2.8.128	Total harmonic energy export
			1-1:1.8.1	Active energy import +A (QI+QIV) rate 1
			1-1:1.8.2	Active energy import +A (QI+QIV) rate 2
			1-1:1.8.3	Active energy import +A (QI+QIV) rate 3
			1-1:1.8.4	Active energy import +A (QI+QIV) rate 4
			1-1:1.8.5	Active energy import +A (QI+QIV) rate 5
			1-1:2.8.1	Active energy export -A (QII+QIII) rate 1
			1-1:2.8.2	Active energy export -A (QII+QIII) rate 2
			1-1:2.8.3	Active energy export -A (QII+QIII) rate 3
			1-1:2.8.4	Active energy export -A (QII+QIII) rate 4
			1-1:9.8.1	Apparent energy import +VA (QI+QIV) rate 1
			1-1:9.8.2	Apparent energy import +VA (QI+QIV) rate 2
			1-1:10.8.1	Apparent energy export -VA (QII+QIII) rate 1
			1-1:10.8.2	Apparent energy export -VA (QII+QIII) rate 2
			1-1:15.8.1	Active energy A (QI+QII+QIII+QIV) rate 1

			1-1:15.8.2	Active energy A (QI+QII+QIII+QIV) rate 2
			1-1:15.8.3	Active energy A (QI+QII+QIII+QIV) rate 3
			1-1:15.8.4	Active energy A (QI+QII+QIII+QIV) rate 4
			OBIS Code	**Reading data**
4		**Instantaneous Value** **(On-Demand Instantaneous Data)**	1-1:32.7.0	Voltage L1
			1-1:72.7.0	Voltage L3
			1-1:31.7.0	Current L1
			1-1:71.7.0	Current L3
			1-1:14.7.0	Mains frequency
			1-1:13.7.0	Total power factor
			1-0:15.7.127	Relative THD [%] active power QI+QII+QIII+QIV
			1-0:32.7.126	Voltage L1 all harmonics
			1-0:72.7.126	Voltage L3 all harmonics
			1-0:12.7.127	Relative THD [%] voltage
			1-0:31.7.126	Current L1 all harmonics
			1-0:71.7.126	Current L3 all harmonics
			1-0:11.7.127	Relative THD [%] current
			1-4:32.7.0	Primary voltage L1

			1-4:72.7.0	Primary voltage L3
			1-4:31.7.0	Primary current L1
			1-4:71.7.0	Primary current L3
			1-4:36.7.0	Primary active power L1
			1-4:76.7.0	Primary active power L3
			1-4:16.7.0	Primary active power all phases
			1-4:151.7.0	Primary reactive power L1
			1-4:191.7.0	Primary reactive power L3
			1-4:131.7.0	Primary reactive power all phases
5	**Clock**	**Date &Time** **(Once a Month with validation)**	**OBIS Code**	**Reading data**
			Local Date /Time	
			Diveation of local time to (UTC)	
			Clock status	(0) invalid value
				(1) doubiful value
				(2) Different clock base
				(3) invalid clock status
				(4) Reversed
				(5) Reversed
				(6) Reversed

				(7) Daylight saving time
6		**Clock Base (Once a Month with validation)**	internal crystal	period length
7		**Integration period** **(Once a Month with validation)**	has subintervals	restart of **period after**
				period output
				End of integration period trigger
8	**Profile**	**Capture period**	capture period load profile	
		(Once a Month with validation)	capture period load profile 2	
9		**Load profile1** **(On-Demand Instantaneous Data)**	**OBIS Code**	**Reading data**
			1.8.0	Active energy import +A (QI+QIV)
			2.8.0	Active energy export -A (QII+QIII)
			15.8.0	Active energy A (QI+QII+QIII+QIV)
			3.8.0	Reactive energy import +R (QI+QII)
			4.8.0	Reactive energy export -R (QIII+QIV)
			16.5.0	Total active power of all phases
			131.5.0	Total reactive power of all phases

			32.5.0	Voltage of phase A
			72.5.0	Voltage of phase C
			31.5.0	Current of phase A
			71.5.0	Current of phase C
			2.5.0	Total export active demand
			3.5.0	total import reactive demand
			4.5.0	Total export reactive demand
			10.5.0	Last Average Demand -VA (QII+QIII)
			1.5.0	Total import active demand
			9.5.0	Last Average Demand +VA (QI+QIV)
			13.5.0	Last average power factor
10		**Load profile2** **(On-Demand Instantaneous Data)**	EDIS Status of profile 2	
11		**Stored value /billing date** **(Once a Month without validation)**	1-1:1.8.0	Active energy import +A (QI+QIV)
			1-1:1.8.1	Active energy import +A (QI+QIV) rate 1
			1-1:1.8.2	Active energy import +A (QI+QIV) rate 2
			1-1:1.8.3	Active energy import +A (QI+QIV) rate 3
			1-1:1.8.4	Active energy import +A (QI+QIV) rate 4
			1-1:2.8.0	Active energy export -A (QII+QIII)

			1-1:15.8.0	Active energy A (QI+QII+QIII+QIV)
			1-1:3.8.0	Reactive energy import +R (QI+QII)
			1-1:4.8.0	Reactive energy export -R (QIII+QIV)
			1-1:1.6.1.5	max demand +A (QI , QIV) RATE 1
			1-1:1.6.2.2	TimeStamp max demand +A (QI , QIV) RATE 1
			1-1:1.6.2.5	TimeStamp max demand +A (QI , QIV) RATE 2
			1-1:2.8.1	Active energy export -A (QII+QIII)
			1-1:2.8.2	Active energy export -A (QII+QIII)
12		**Event logs** **(Once a Month with validation)**	standared event logs	EDIS Status
				Event Number
				Error Code
			quality of supply	overvoltage L1 log
				overvoltage L2 log
				overvoltage L3 log
				undervoltage L1 log
				undervoltage L2 log
				undervoltage L3 log
				phasefailure L1 log

				phasefailure L1 log
				phasefailure L1 log
				overvoltage L1-L2 log
				overvoltage L2-L3 log
				overvoltage L1-L3 log
				undervoltage L1-L2 log
				undervoltage L2-L3 log
				undervoltage L3-L1 log
13	**Energy Register**	**Energy Total Register** **(Once a Day)**	1-1:2.8.0	Active energy export -A (QII+QIII)
			1-1:3.8.0	Reactive energy import +R (QI+QII)
			1-1:4.8.0	Reactive energy export -R (QIII+QIV)
			1-1:15.8.0	Active energy A (QI+QII+QIII+QIV)
			1-1:16.8.0	Active energy A (QI+QIV-QII-QIII)
			1-1:10.8.0	Apparent energy export -VA (QII+QIII)
			1-1:1.8.0	Active energy import +A (QI+QIV)
			1-1:9.8.0	Apparent energy import +VA (QI+QIV)
			1-0:1.8.128	Total harmonic energy import
			1-0:2.8.128	Total harmonic energy export
			1-1:83.8.3	Active line losses (OLA)

			1-1:83.8.6	Active transformer losses (NLA)
			1-1:83.8.20	Total line losses I^2 (Cu)
			1-1:83.8.19	Total transformer losses U^2 (Fe)
14		**Energy Register** **(Once a Day)**	1-1:1.8.1	Active energy import +A (QI+QIV) rate 1
			1-1:1.8.2	Active energy import +A (QI+QIV) rate 2
			1-1:1.8.3	Active energy import +A (QI+QIV) rate 3
			1-1:1.8.4	Active energy import +A (QI+QIV) rate 4
			1-1:2.8.1	Active energy export -A (QII+QIII) rate 1
			1-1:2.8.2	Active energy export -A (QII+QIII) rate 2
			1-1:2.8.3	Active energy export -A (QII+QIII) rate 3
			1-1:2.8.4	Active energy export -A (QII+QIII) rate 4
			1-1:9.8.1	Apparent energy import +VA (QI+QIV) rate 1
			1-1:9.8.2	Apparent energy import +VA (QI+QIV) rate 2
			1-1:10.8.1	Apparent energy export -VA (QII+QIII) rate 1
			1-1:10.8.2	Apparent energy export -VA (QII+QIII) rate 2
			1-1:15.8.1	Active energy A (QI+QII+QIII+QIV) rate 1
			1-1:15.8.2	Active energy A (QI+QII+QIII+QIV) rate 2
			1-1:15.8.3	Active energy A (QI+QII+QIII+QIV) rate 3
			1-1:15.8.4	Active energy A (QI+QII+QIII+QIV) rate 4
			1-1:1.8.5	Active energy import +A (QI+QIV) rate 5

			1-1:1.9.0	Energy delta over billing period +A (QI+QIV)
			1-1:9.9.0	Energy delta over billing period +VA (QI+QIV)
15	Demand Register	**Last Average Demand Register** **(Once a Month without validation)**	1-1:2.5.0	Last average demand -A (QII+QIII)
			1-1:3.5.0	Last average demand +R (QI+QII)
			1-1:4.5.0	Last average demand -R (QIII+QIV)
			1-1:15.5.0	Last average demand A (QI+QII+QIII+QIV)
			1-1:10.5.0	Last average demand -VA (QII+QIII)
			1-1:1.5.0	Last average demand +A (QI+QIV)
			1-1:9.5.0	Last average demand +VA (QI+QIV)
16		**Maximum Demand Register** **(Once a Day)**	1-1:1.6.0	Maximum demand +A (QI+QIV)
			1-1:2.6.0	Maximum demand -A (QII+QIII)
			1-1:3.6.0	Maximum demand +R (QI+QII)
			1-1:4.6.0	Maximum demand -R (QIII+QIV)
			1-1:1.6.1	Maximum demand +A (QI+QIV) rate 1
			1-1:1.6.2	Maximum demand +A (QI+QIV) rate 2
			1-1:9.6.1	Maximum demand +VA (QI+QIV) rate 1
			1-1:9.6.2	Maximum demand +VA (QI+QIV) rate 2
			1-1:10.6.1	Maximum demand -VA (QII+QIII) rate 1
			1-1:10.6.2	Maximum demand -VA (QII+QIII) rate 2
			1-1:1.2.0	Cumulative maximum demand +A (QI+QIV)

			1-1:2.2.0	Cumulative maximum demand -A (QII+QIII)
			1-1:3.2.0	Cumulative maximum demand +R (QI+QII)
			1-1:4.2.0	Cumulative maximum demand -R (QIII+QIV)
			1-1:1.2.1	Cumulative maximum demand +A (QI+QIV) rate 1
			1-1:1.2.2	Cumulative maximum demand +A (QI+QIV) rate 2
			1-1:9.2.1	Cumulative maximum demand +VA (QI+QIV) rate 1
			1-1:9.2.2	Cumulative maximum demand +VA (QI+QIV) rate 2
			1-1:10.2.1	Cumulative maximum demand -VA (QII+QIII) rate 1
			1-1:10.2.2	Cumulative maximum demand -VA (QII+QIII) rate 2
17	**Reading Data**	**Identification Number** **(Once a Month with validation)**	COSEM logical device name	
			firmware version	
			Identification Nomber 1.1	
			Identification Nomber 1.2	
			Identification Nomber 1.3	
			Identification Nomber 1.4	
			Device ID 1(utility serial nomber 1.ID 2.1)	
			Device ID 2(utility serial nomber 1.ID 2.2)	

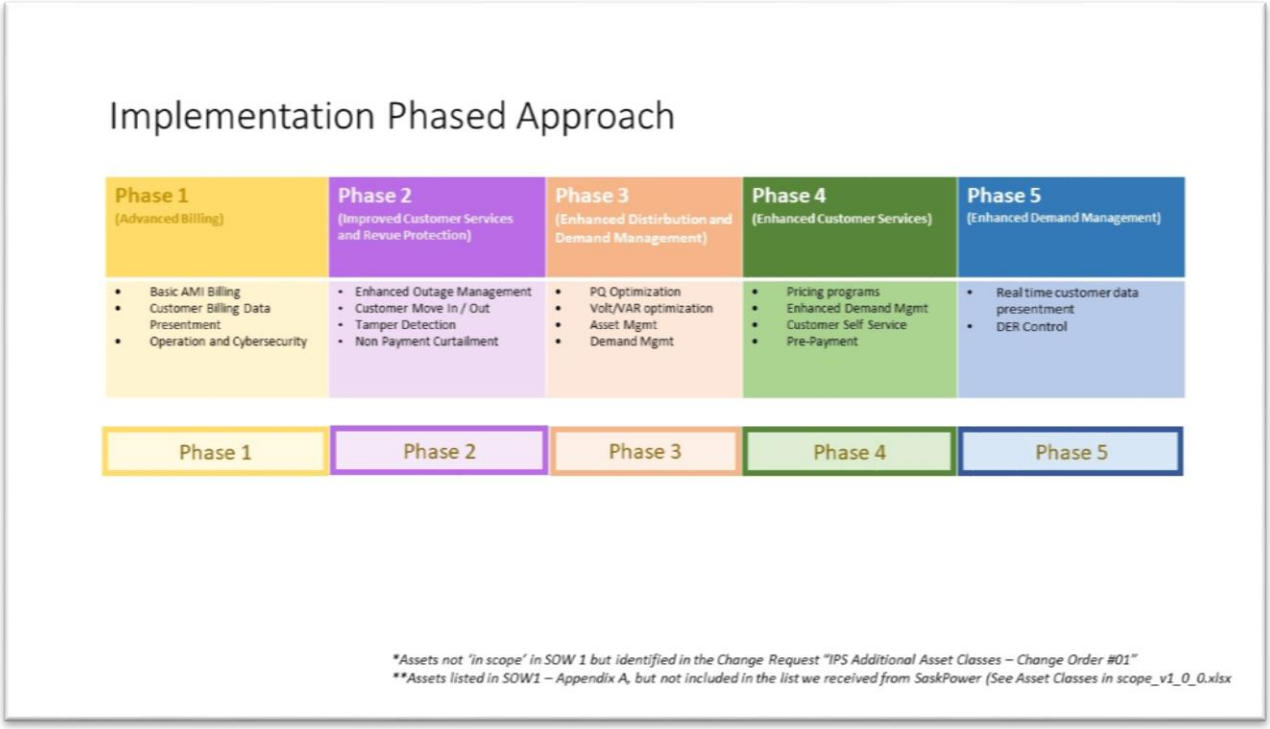
			Connection ID
			parameterisation ID
			Configuration ID
18		**Time OF Use** **(Once a Month with validation)**	TOU(time of use)
			Passive TOU ID And Activation Date
			Active TOU ID And Activation Date

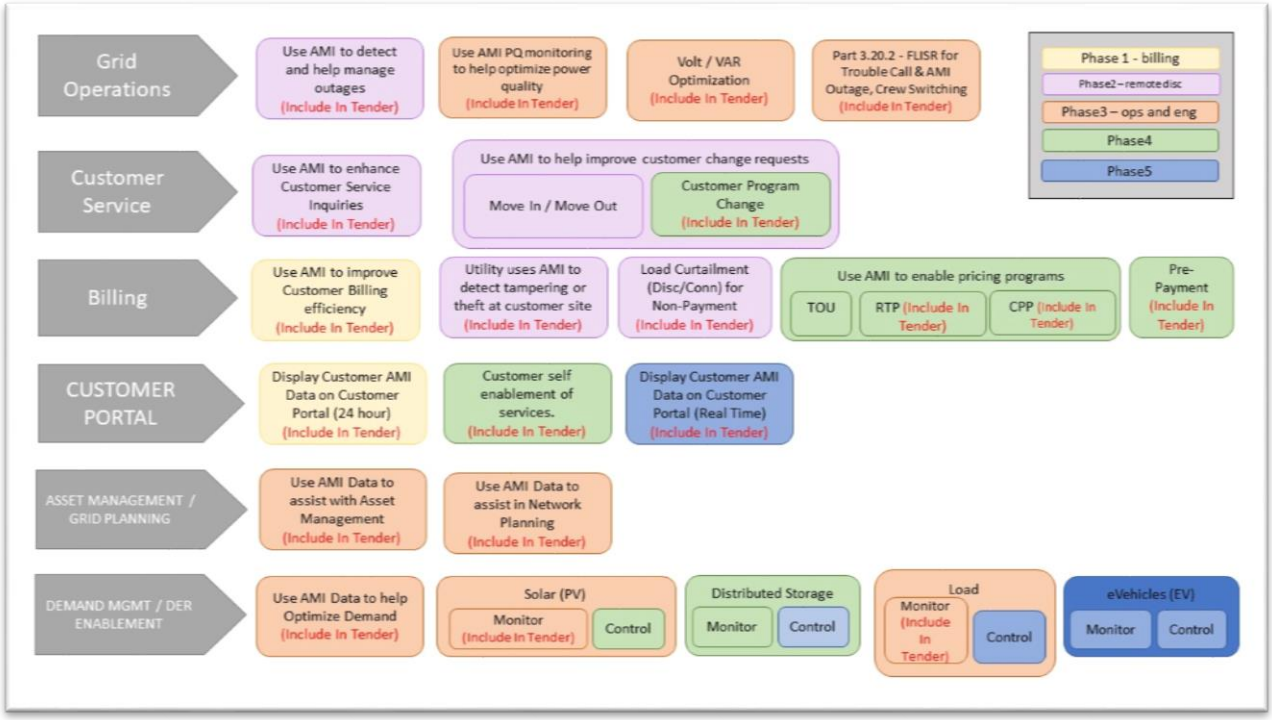
9. Appendix V: The National Institute of Standards and Technology Interagency Report (NISTIR) 7628 “Guidelines for Smart Grid Cyber Security”

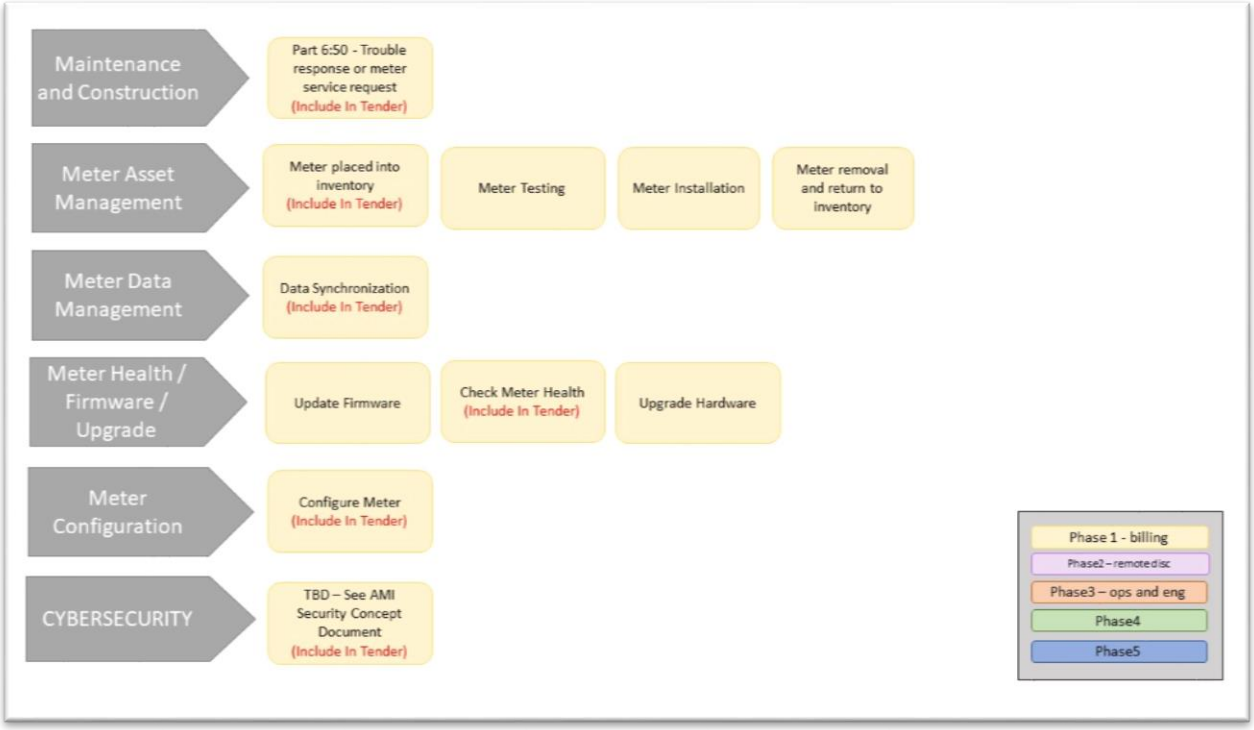
This three-volume report, Guidelines for Smart Grid Cyber Security, presents an analytical framework that organizations can use to develop effective cyber security strategies tailored to their particular combinations of Smart Grid-related characteristics, risks, and vulnerabilities. Organizations in the diverse community of Smart Grid stakeholders—from utilities to providers of energy management services to manufacturers of electric vehicles and charging stations—can use the methods and supporting information presented in this report as guidance for assessing risk and identifying and applying appropriate security requirements. This approach recognizes that the electric grid is changing from a relatively closed system to a complex, highly interconnected environment. Each organization’s cyber security requirements should evolve as technology advances and as threats to grid security inevitably multiply and diversify.

You can download the complete version of NIST.IR.7628 from this link https://nvlpubs.nist.gov/nistpubs/ir/2010/NIST.IR.7628.pdf.

10. Appendix VI: Implementation Plan






Maintenance and Construction
Part 6:50 - Trouble response or meter service request
(Include In Tender)
Meter Asset Management
Meter placed into inventory
(Include In Tender)
Meter Testing
Meter Installation
Meter removal and return to inventory
Meter Data Management
Data Synchronization
(Include In Tender)
Meter Health / Firmware / Upgrade
Update Firmware
Check Meter Health
(Include In Tender)
Upgrade Hardware
Meter Configuration
Configure Meter
(Include In Tender)
CYBERSECURITY
TBD – See AMI Security Concept Document
(Include In Tender)
Phase 1 - billing
Phase2 – remotedisc
Phase3 – ops and eng
Phase4
Phase5

11. Appendix VII: Business Use Cases

ITEM 2: IDECO HES Technical Specifications for Procurement Purposes

Technical Document

Table of Contents

1. Universal Head End System

An Advanced Meter Management (HES) system is communicating with gateways, or meters. It should manage devices and configurations and unifies data formats and structures before it sends these to applications such as MDM. It collects meter consumption data but also monitoring data, e.g. network quality parameters, battery status of communication modules, radio quality and much more.

The HES should be capable of managing the entire smart meter infrastructure: meters and communication modules, radio repeaters, gateways and MUCs. The scalability of the system assures operation with large amounts of device data (configurations, measurement data and topologies), thus enabling economics of scale and more cost efficiency. It should be possible to add new devices very easily.

Further expected functionalities:

Priority	Reqt #	Requirement
Mandatory	R1.01	The HES must provide connection of meters without headend via, DLMS,
Mandatory	R1.02	The HES must provide quick and flexible connection with new meters and communication modules via plugins.
Mandatory	R1.03	The HES must provide import / export functionalities for meter archives, customer information, and data reporting.
Mandatory	R1.04	The HES must provide extensive and device-specific management.
Mandatory	R1.05	The HES must provide configuration management of meters and other devices.
Mandatory	R1.06	The HES must have centralized and uniform event and alarm management.
Mandatory	R1.07	The HES must have automatic topology compilation (meters, communication modules, gateways, concentrators, repeaters, etc.).
Mandatory	R1.08	**
Mandatory	R1.09	The HES must support of OBIS-codes
Mandatory	R1.10	The HES must have process management

Mandatory	R1.11	**
Mandatory	R1.12	The HES must be vendor independent and shall read meter from different vendors (bidder should provide evidence from utility company for at least two projects more than 50,000 meters, each project shall include meter from different brand of meters)
Mandatory	R1.13	The proposed HES solution shall have been implemented and completed for large-scale implementation . (bidder should provide evidence from utility company and project should be done for different meters brands)
Mandatory	R1.14	The HES should support different communication (GSM, and Fiber(Ethernet ip4).) other communication will be preferred
Mandatory	R1.15	The HES should be based on device and can accommodate Meter. Communication modem and Gateway
Mandatory	R1.16	**
Mandatory	R1.17	**

1.1. General Requirements

IDECO requires a communication channel (Head-End System) for all type of meters used in the grid, and this HES must connect the meters with MDM to support all parameters mentioned in this document.

The vendor must work alongside meter vendors to build drivers in order to connect the meters to MDM via HES.

The vendor must provide all hardware and software required to run HES.

The HES must have the ability to connect to all type of meters used in the grid including:

- Holley
- Hexing
- Landis and Gyr

1.2. HES should have SOA Architecture

a) SOA offers access mechanisms to the application logic as a service to users and other applications where:
b) Service interfaces are independent of user interfaces.
c) Services are business-process-oriented.
d) Business-level services are coarse-grained and can be easily mapped to business functions.
e) Coarse-grained services can be combined or assembled from lower-level, fine-grained service primitives at run time.
f) Services are published in a standard fashion for discovery and execution.
g) Services can be used and reused by existing applications and systems.
h) SOA permits the construction of scalable applications over the network.
i) SOA supports asynchronous communications.
j) SOA supports application-level conversations as well as process and state management.

SOA should simplify and accelerate the development of new applications by invoking a variety of published services and organizing or orchestrating them to achieve the desired business functionality. Because SOA allows business-level

services to be assembled at run time, developers do not have to design all possible variations of services in advance. This reduces the development time and helps minimize the number of errors in the application code.

SOA should Leverage the power and flexibility of Web Services across the enterprise by building loosely-coupled, standards-based applications that produce and consume services.

1.3. EDA (event driven architecture)

Priority	Reqt #	Requirement
Mandatory	R1.19	HES Architecture should be EDA, Events should be at the center of the HES system design, and HES system should critically focused on: a) communicating, b) capturing, c) processing, and d) persisting/replaying events
Mandatory	R1.20	This should allow a transaction save and secure communication between system components as well as external connected components.
Mandatory	R1.21	The EDA shall be used to ensure scalability, performance and also the possibility for and distributed installation of the whole solution.
Mandatory	R1.22	HES's EDA Architecture should support following: I. Loosely-coupled II. Scaling III. Asynchronous messaging IV. Smart routing V. Partitioning VI. Persistence and replay

1.4. Defines and stable interfaces

Integrations to third party systems as well as extensions of the solution itself should not be realized by direct access to the database. All access to HES should be accomplished through well-defined API following an international standard like OpenAPI.

1.5. APIs should follow REST (Representational State Transfer) based and follow the OpenAPI standard

HES System architecture should support REST (Representational State Transfer) based and follow the OpenAPI standard, from we UTILITY expects

Priority	Reqt #	Requirement
Mandatory	R1.22	Performance in component interactions, which can be the dominant factor in user-perceived performance and network efficiency
Mandatory	R1.23	Scalability allowing the support of large numbers of system components and interactions among components.
Mandatory	R1.24	A simple and uniform interface specification, allow to connect other modern solution easily;
Mandatory	R1.25	Modifiability of components to meet changing needs (even while the application is running);
Mandatory	R1.26	Visibility of communication between components by service agents;
Mandatory	R1.27	Portability of components by moving program code with the data;
Mandatory	R1.28	Reliability in the resistance to failure at the system level in the presence of failures within components, connectors, or data.

1.6. Zone-base security concept

I1.1.

Priority	Reqt #	Requirement
Mandatory	R1.29	HES system architecture should support a security zone-base deployment concept. This means that solution components like data acquisition, processing, DB storage, Interfaces, representation layers and so on can be grouped into different security zones
Mandatory	R1.30	Zoning should be used to mitigate the risk of an open network by segmenting HES services into logical groupings that have the same communication security policies and security requirements.
Mandatory	R1.31	Zoning should be used to control and restrict access and data communication flows only to those components and users as per security policy and which relay need that data. A new zone is defined by a logical grouping of services under the same policy constraints, driven by business requirements. When a new set of policy constraints are established, then a new zone is required. The bidder should describe how he applies a zone concept to separate solution components form each other. Furthermore, that should be described with reference to the scalability concept.

1.7. Support to connect to supporting systems providing functions like BPM (Business Process Management)

Priority	Reqt #	Requirement
Mandatory	R1.32	**

1.8. Internal process handling

Priority	Reqt #	Requirement
Mandatory	R1.32	HES system Architecture should support Multi Queuing and should prioritize requests sent to services so that requests with a higher priority are received and processed more quickly than those with a lower priority
Mandatory	R1.33	The periodization should be flexible and configurable
Mandatory	R1.34	All processes should be tracked and auditable with their creation time, execution time, execution duration and their final status like success, failed or stopped
Mandatory	R1.35	Processes should allow to be configured as recurring ones with a definable interval and number of retries or a maximum number of repetitions.
Mandatory	R1.36	All process related data should be available in a single report in the GUI which support searching e.g. for all processes which only successes after a couple of retries, long running processes or all processes which stopped because of a specific reason.

2. Security

Priority	Reqt #	Requirement
Mandatory	R2.01	HES provider should provide ISO27001 certificate for security purpose
Mandatory	R2.02	HES vendor should be ISO9001 certified or equivalent
Mandatory	R2.03	All APIs should run at least https protected and by applying a username and password credential (different for each system connected)
Mandatory	R2.04	strong roles-based authorization model for all functions available in the GUI. It should support to only disable functions (like greyed out) but also to hide them completely as a second option.
Mandatory	R2.05	The number of roles for users should not be limited. Roles should be structure in a hierarchical manner and inherit their rights.
Mandatory	R2.06	User can be maintained within the solution and in parallel allows to add users from other central systems as well like LDAP or Active Directory or by using full SSO (see section 2.3 Support of SSO (Single Sign -on)).

3. Others

Priority	Reqt #	Requirement
Mandatory	R3.01	HES system should be delivered in the following staring environments: different • development system • acceptance system and • production system
Mandatory	R3.02	Production system should be HA (high available) and should also include a DB backup and restore mechanism.
Mandatory	R3.03	HA concept should be described and explain the internal concepts as well as concepts towards the third-party system including the Headend
Mandatory	R3.04	**

4. APIs (Application Programming Interface)

For an easy integration with other systems and for future extensions of the solution, it needs to support powerful, standardized and well described APIs.

Priority	Reqt #	Requirement
Mandatory	R4.01	HES system should have well described APIs
Mandatory	R4.02	**
Mandatory	R4.03	HES system should have mass-data API
Mandatory	R4.04	HES system should forward data in real time, all kind of information are required like meter related readings, events, alarms, process state changes, changes of master data and also devices data which are the result of data processing
Mandatory	R4.05	All functions which are available in the HES system's GUI should also be available in APIs
Mandatory	R4.06	**
Mandatory	R4.07	Solution should support a native logging function. All data should be traceable via which interface or connected solution it came in.
Mandatory	R4.08	Unit mapping should be configurable per connector and without adapting the code
Mandatory	R4.09	The system should be able to work with identifier mappings, meaning different connected systems might use different identifiers for the same things. The solution should provide a native mapping functionally for unlimited number of mappings

5. System Functions

5.1. Reporting and real time dash boarding

A reporting solution should support:

Priority	Reqt #	Requirement
Mandatory	R5.01	Real time dash boarding (connected to the main HES solution) via a real time interface
Mandatory	R5.02	Dashboard should be interactive, e.g. filter can be applied on the fly, while result will be displayed instantaneously
Mandatory	R5.03	Filters should support time ranges, filtering via topological maps (like selected areas) and all the parameters linked to a metering point in HES
optional	R5.04	Unlimited number of report templates
Mandatory	R5.05	Dashboards should be configurable by tenderer
Mandatory	R5.06	Reports should be configurable by the tenderer
Mandatory	R5.07	Reports and Dashboards should not require a local software, should run in standard browsers only
Mandatory	R5.08	The reporting solution should support high scalability and high availability concept, to allow future scale up if necessary, bidder should describe the concept as part of the tender document)
Mandatory	R5.09	Dashboards and Report should be integrated into the Main GUI of the HES (also respecting the roles of the users)
optional	R5.10	It should be possible to easily connect other data sources like a SCDA system, and Outage Management system or a workforce system to apply data blending

5.2. Standard load cures (MDM only)

To be able to use standard values e.g. in case of estimations and validation the solution must support standard load curves:

Priority	Reqt #	Requirement
Mandatory	R5.11	The number of load curves should not be limited
Mandatory	R5.12	Load curves for at least the following classification of customers should be possible: (residential users in flats, in villas, small industries, and big industries)
Mandatory	R5.13	The load curves can be imported via the GUI in an easy to generate file format
Mandatory	R5.14	Load curves should support 15min, hourly intervals
Mandatory	R5.15	Active Load curves should be visualized as a graph which also allows to compare two or more load curves to each other. (the graph needs to support zoom in and zoom out features)

5.3. Special day calendar

**

5.4. Events

Priority	Reqt #	Requirement
Mandatory	R5.15	identification should be available, the HES gathers events from different source but events of the same type should have the same identifications within the HES
Mandatory	R5.16	**
Mandatory	R5.17	The number of different event types should not be limited, tenderer can also create new event types
Mandatory	R5.18	There should be a central view of all events independent of the source
Mandatory	R5.19	There central view of events should support filter mechanisms like for certain time ranges, event types, meters or metering points, severities,
Mandatory	R5.20	All events independent of the source should be made available in real time to the reporting

5.5. Data acquisition

Priority	Reqt #	Requirement
Mandatory	R5.21	Data interval of incoming data can be hourly values but also 15 min values
Mandatory	R5.22	Per meter or metering points the data interval can be different for each register
Mandatory	R5.23	Both cumulated values as well as interval values are supported
Mandatory	R5.24	Cumulated values can be transformed into interval values by the HES (like 1.8.0 into 1.9.0)

Mandatory	R5.25	**
Mandatory	R5.26	**
Mandatory	R5.27	The HES support push and pull methods for data acquisition
Mandatory	R5.28	At least two work force solutions in parallel should be supported
Mandatory	R5.29	At any time the incoming data should be traceable back to which source has injected them
Mandatory	R5.30	All data sources should be connected via APIs supporting a high level and detailed level of logging and auditing
Optional	R5.31	furthermore data should be added by connecting other solution like GIS, outage management, helpdesk
Mandatory	R5.32	Raw data should not be changed by the system
Mandatory	R5.33	Next to the timestamp of the meter data the solution also has to store the timestamp when the data has been stored in the DB
Mandatory	R5.34	All incoming data should be unified and tagged with an appropriate OBIS (COSEM model) code. All events independent from which data source should be mapped to unique event codes.(example a temper event has always the same ID in the system independent if the HES' delivering it use proprietary codes for it)

11.2.

5.6. Commands

A variety of command should be support which mainly should be sent to the HES or MDM and works force solutions

Priority	Reqt #	Requirement
Mandatory	R5.35	Command: on demand read
Mandatory	R5.36	Command: profile configuration
Mandatory	R5.37	Command: TOU configuration
Mandatory	R5.38	Command: write to display
Mandatory	R5.39	Command: switch breaker
Mandatory	R5.40	Command: apply load limitation
Mandatory	R5.41	**
Mandatory	R5.42	Command: meter installation (add address information after installation)
Mandatory	R5.43	Command: meter provisioning (prepare master data of a meter for installation)

ITEM 3: Availability Tests for MDM & HES

Technical Document

1. Field Acceptance Testing

The FAT phase of a HES & MDM project will consist of deploying a limited (typically 500 – 5000) set of meters and communication modules across a selected cross section of customer types (i.e., Residential, C&I and Electric) and geographical areas representing communication challenges typical of IDECO service territory.

2. Field Performance Metrics

HES & MDM performance requires testing and reporting on three key metrics: Availability, Accuracy, and Events/Alarms.

2.1. Availability

IDECO need a HES & MDM solution to provide a high percentage of data on a daily basis – this is a key decision factor when selecting a HES & MDM solution.

Delivery should be verified and validated. Availability testing measures and reports the availability of the HES & MDM data – to ensure that the data that is expected to be delivered by the HES system, and subsequently to any downstream MDMS and/or customer information system for billing – occurs according to the SLA levels agreed to by IDECO and the HES & MDM vendor.

Types of availability reports include the following:

- Register read availability
- Interval read availability
- Time-of-use (TOU) availability
- Demand and coincident demand read availability

All of these reports should verify that the expected data is delivered for each data type for a 24-hour period by a given time of day such that it can be used appropriately in other systems. Additionally, reports showing meters that repeatedly fail to communicate data, or meter types that have a high rate of communication failure, are useful in identifying communications, hardware and software issues across the HES & MDM. Differentiation by customer type is important because a small percentage of commercial and industrial meters accounts for a larger percentage of IDECO revenue.

2.2. Accuracy

Accuracy reporting measures and calibrates the accuracy of the MDM+HES usage data against the utility's existing automated and manual meter reading systems to ensure that the AMI meters are accurately recording data and the MDM system is accurately storing and then to billing.

2.3. Events/Alarms

this metric assesses meter level alarms and events to ensure that AMI meters installed in the field are functioning correctly and real-time events such as power outages can be correlated to real world events.

3. Automated Testing and Reporting

The use of automated tools for these tests allows IDECO to perform the tests daily (or even more often, if required) in a controlled and repeatable fashion for a large set of meters. Data may be collected from the head-end, analysis of the data performed and then performance metrics reports created for analysis by the AMI team. Automated tools can also be used to determine that the integrity of the data flowing from AMI to MDMS is being maintained, and to validate that the data being passed from MDMS to the billing system is intact.

Dashboards may be used to report daily results and more detailed reports distributed automatically via email to the AMI team. The metrics reports can be used by the AMI team and AMI vendor to pinpoint sets and/or types of meters that consistently fail the performance criteria. The analysis allows the combined teams to drive out any issues with meter, network configuration and software

technologies as well as physical and geographical issues in the AMI deployment area(s).

An automated solution that evaluates AMI data should provide audit quality reports of system performance and contractual metrics, in addition to being quick and easy to use. IDECO Should benefit from a solution that provides both executive-level dashboards for monitoring progress, and detailed report information in a mainstream format that can be used for analysis and troubleshooting. There are several options to consider when looking for automated metrics tools:

- In House Tools
  these may require ground-up construction to support reporting around the AMI and MDMS technologies and databases.
- AMI Systems
  The AMI head-end itself may provide some tools and reporting functionality
- MDMS
  The MDMS provides reporting functionality but the timeline of MDMS implementation is often in parallel with the initial AMI FAT timeline.
- Third-party Tools
  Analysis and reporting tools can enable the IDECO team to produce objective reports on the AMI data while also insuring that the tool can be implemented in a rapid and straightforward manner without requiring excessive customization or configuration.

4. Test Playbook

A test 'playbook' should be developed in the initial phases of the FAT, prior to actual testing. The playbook lists all of the tests – automated and manual, often broken down by meter type – to take place during FAT. The playbook needs to be based on contractual/SLA requirements, for example to ensure that 99.5% of interval reads are being delivered to the head-end system within eight hours of the end of the day.

The FAT data can then be utilized to facilitate system acceptance – IDECO should not formally accept an AMI deployment without validating key criteria. The end of FAT can be used as a contract gate for continuing with mass AMI deployment.

5. Meter Shop and Trailer Testing

Field acceptance testing allows for repeatable availability and accuracy testing across the entire meter population; however, there are other meter and AMI system functions that should be tested in a controlled

environment on a more limited basis. These tests can be performed in the meter shop and in a field located trailer.

A 'trailer' test involves placing a trailer containing AMI meters in a field location with AMI network coverage to simulate a set of AMI meters deployed in the field. The trailer can be placed in a location typical of the utility's service territory or even moved around to atypical locations. The meter shop and trailer tests are constructed around a bank or bench of meters that are subject to manually triggered tests to confirm that meter functionality is working as expected.

The testing playbook is used by the AMI team to execute the tests. During the test process, the meters are subject to load/flow, events and other conditions while an AMI engineer and the AMI team monitors network traffic and the AMI system and head-end. The AMI team checks that the resulting data in the AMI head-end is as expected, based on an individual test. If the test does not function as expected, monitoring and recording the meter and network data aids in the triage of any issues.

An example of this type of test would be to reverse the meter in the socket to ensure that a reverse rotation event is sent back to the AMI head-end. If the event is received at the AMI head-end, the meter passes the test; if not then the test fails and analysis is performed to determine the cause of the failure. Based on the data output, the testing playbook can be used to record the results of the tests. It is important to involve the IDECO engineers to validate the required functionality and output of the AMI system.

6. Performance Management for Full Deployment

While the automated testing is important in the initial testing and FAT phases of an AMI implementation, it is useful in the full AMI meter deployment phase. Testing should continue throughout full deployment to verify system health and performance. Additional analysis and reporting tools should be added to expand on the information provided by the basic FAT reporting results to support contract enforcement and regulatory reporting.

During full deployment, testing can be performed on the full population of meters deployed to continue to monitor performance against the SLAs. Typically, this phase will leverage other Business Intelligence (BI) tools to allow more complex analyses to be performed in the AMI dataset and with other datasets. (See BI & Spatial Analysis section, below).

As part of deployment, testing can also be performed on a subset of the AMI meters (i.e., a different subset than that used in the FAT phase) to ensure that the FAT metrics achieved earlier are repeatable in a consistent manner. This ensures

that any tuning performed for the FAT meter population and AMI infrastructure was repeated for newly deployed areas and not specially tuned just to pass SLA levels for FAT.

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BI & Spatial Analysis

- FAT Planning
  Potential areas for FAT deployment of AMI meters can be identified using spatial data sources to 'score' zip codes, or other areas, based on socio-economic and physical attributes such as meter density, topology, high customer turnover, theft occurrences and rate class. Different attributes may be assigned different weights in the scoring, For example, zip codes with high scores may be more likely to be selected for FAT deployment, as they are more likely to provide a diverse set of conditions to test and validate the AMI technology.
- Deployment Planning
  this is similar to the FAT planning but the objective in this case is full deployment planning. Zip codes or other areas can be ranked to plan deployment sequences for MDM &HES. Additional scoring factors may be used during the deployment planning; some examples are high cost to read meters and new customer locations. Certain factors may be assigned heavier weighting since it may be more important to deploy AMI meters to specific areas to get a faster return on MDM&HES investment.

Priority	Test	Requirement	Bidder Response			
			Comply (Yes/No/May be)	Response + Benchmark	Standards Of Tests	Comments
Mandatory	**Field Acceptance Testing**	As mentioned in point no.1				
Mandatory	**Field Performance Metrics**	As mentioned in point no.2				
Mandatory	**Automated Testing and Reporting**	As mentioned in point no.3				
Mandatory	**Test Playbook**	As mentioned in point no.4				
Mandatory	**Meter Shop and Trailer Testing**	As mentioned in point no.5				
Mandatory	**Performance Management for Full Deployment**	As mentioned in point no.6				

CLOUD SERVICE:

Despite everything mentioned in the bid file about the storage mechanism and devices, all of this is considered canceled and replaced by cloud storage within the following specifications as minimum requirements.

Customer Expectations

- The customer is expected to have the following services:

1- Provide flexible and scalable hosting services.
2- Cost efficiency
3- High availability
4- Technical excellence
5- Local cloud service provider is highly preferred.

Environment Protection

Hosting service and communicating to a service hosted in cloud expose and threat the environment to hackers and attackers, here Orange recommends the following:

1- vDOM Firewall for Infrastructure protection.
2- WAF to protect the application traffic.
3- Endpoint Protection for the hosted services.
4- SOC/NOC Monitoring.

Deliverables:

The following shall be considered as a deliverable of the customer:

- Data center shall be of Tier III.
- High Availability Infrastructures
- Flexibility to offer any future expansion required.
- Provide IDECO with cloud compliance certificates (CSA, ISO 27001, …)
- SOC and NOC Enabled services.
- Firewall as a Service for protecting the infrastructure (vDOM).
- WAF as a Service for protecting the application traffic.
- tow redundant communication line with the cloud

Backup service

- cloud provides a fully trusted and reliable backup solution that supports the following points:
    - All the VMs at cloud along with their data.
    - Compression and Deduplication
    - High backup performance
    - Support all backup types (full, differential, and incremental)
- Three deferent locations of installation

offering the backup of the proposed solution that covers all the VMs and services. Our backup runs on a daily basis with customized retention as per the customer's request.

Number of Meters

Despite everything that was mentioned in the bid file about the number of meters to be operated, all of that is considered canceled and replaced with the following.

	1-2022	1-2023	1-2024	1-2025	1-2026	1-2035
Smart Meter Quantity(*1000)	70	130	250	300	360	1000

- The system pricing and sizing should consider the previous numbers
- The bidder is asked to submit a price schedule showing all costs during the first five years, and he is obligated that they are fixed, even if they are outside the assignment clauses, and he can suggest a pre-payment mechanism for the first five years
  In addition, a proposed pricing plan for the remainder of the period must be attached

FEDERATION INTERNATIONALE
DES INGENIEURS-CONSEILS

CONDITIONS OF CONTRACT
(INTERNATIONAL)

FOR ELECTRICAL AND MECHANICAL WORKS
(INCLUDING ERECTION ON SITE)

WITH FORMS OF TENDER AND AGREEMENT

First Edition
MAY 1963
(Reprint: May 1983)

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GENERAL CONDITIONS

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PART I. - GENERAL CONDITIONS

Definitions and Interpretation

Definitions

1.1. In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires:

a. 'Employer' means the party named in Part II who has called for Tenders to provide and execute the Works and who will employ the Contractor and the legal successors in title to the Employer but not (except with the consent of the Contractor) any assignee of the Employer.

b. 'Contractor' means the person or persons firm or company whose tender has been accepted by the Employer and includes the Contractor's personal representatives, successors and permitted assigns.

c. 'Sub-contractor' means any person (other than the Contractor) named in the Contract for any part of the Works or any person to whom any part of the Contract has been sub-let with the consent in writing of the Engineer, and the legal personal representatives, successors and assigns of such person.

d. 'Engineer' means the Engineer designated as such in Part II or other the Engineer appointed from time to time by the Employer and notified in writing to the Contractor to act as Engineer for the purposes of the Contract in place of the Engineer so designated.

e. 'Engineer's Representative' means any Resident Engineer or assistant of the Engineer appointed from time to time by the Engineer to perform the duties delegated in terms of Clause 2.3. whose authority shall be notified in writing to the Contractor by the Engineer.

f. 'Works' means all Plant to be provided and work to be done by the Contractor under the Contract.

g. 'Contract' means the Conditions of Contract, Specification, Schedules, Tender and the Contract Agreement.

h. 'Contract Price' means the sum named in the Tender, subject to such additions thereto or deductions therefrom as may be made under the provisions hereinafter contained.

i. 'Contract Value' means that part of the Contract Price which is properly apportionable to the Plant or work in question having regard to the state, condition, and topographical location of the Plant, the amount of work done, and all other relevant circumstances, and disregarding any changes that may have occurred since the date of the Contract in the cost of executing the Works.

j. 'Time for Completion' means the time for completion of the Works as stated in the Appendix to Tender, and shall be calculated from the date of written acceptance of the Tender.

k. 'Contractor's Equipment' means all appliances or things of whatsoever nature required in or about the execution, completion or maintenance of the Works but does not include plant, materials or other things intended to form or forming part of the permanent work.

l. 'Plant' means machinery, apparatus, materials, articles and things of all kinds to be provided under the Contract other than Contractor's Equipment.

m. 'Specification' means the specification annexed to or issued with these General Conditions.

n. 'Site' means the lands and other places on under in or through which the Works are to be executed or carried out, and any other lands or places provided by the Employer for the purposes of the Contract, together with such other places as may be specifically designated in the Contract as forming part of the Site.

o. 'Tests on Completion' means such tests to be made by the Contractor before the Works are taken over by the Employer as are provided for in the Contract and such other tests as may be agreed between the Employer and the Contractor.

p. 'Month' means calendar month.

q. 'Writing' means any manuscript type-written or printed statement under seal or hand.

1.2. Words importing persons shall include firms and corporations.

1.3. Words importing the singular only also include the plural and vice versa where the context requires.

1.4. The marginal headings or notes in these General Conditions shall not be deemed to be part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract.

Engineer's Supervision

Engineer's Instructions

2.1. After the tender has been accepted by the Employer all instructions and orders to the Contractor shall, except as herein otherwise provided, be given by the Engineer.

Setting-out

2.2. The Contractor shall be responsible for the true and proper setting-out of the Works in relation to original points lines and levels of reference given by the Engineer in writing, and for the correctness (subject as above-mentioned) of the positions, levels, dimensions and alignment of all parts of the Works and for the provision of all necessary instruments appliances and labour in connection therewith. The checking of any setting-out or of any line or level by the Engineer or the Engineer's Representative shall not in any way relieve the Contractor of his responsibility for the correctness thereof.

Engineer's Representative

2.3. The Engineer may from time to time delegate to the Engineer's Representative any of the powers discretions functions and authorities vested in him and may at any time revoke any such delegation. Any such delegation or revocation shall be in writing signed by the Engineer and in the case of a delegation shall specify the powers, discretions, functions and authorities thereby delegated and the person or persons to whom the same are delegated. No such delegation shall have effect until a copy thereof has been delivered to the Contractor. Any person to whom any such delegation is made shall be entitled to exercise the powers discretions functions and authorities so delegated to him as aforesaid.

Resident Engineer

2.4. If a Resident Engineer be appointed in accordance with Sub-clause 3. of this Clause to watch the carrying out of the Contract, the Contractor shall afford him every reasonable facility for so doing, but the Resident Engineer shall not be authorised to relieve the Contractor in any way of his duties or obligations under the Contract. Any written notice from the Resident Engineer condemning any Plant or workmanship shall have the effect of a similar notice given by the Engineer under Clause **28** (Rejection) except that the Contractor may appeal to the Engineer for his decision in the matter.

Assignment and Sub-letting

Assignment

3.1. The Contractor shall not assign the Contract or any part thereof or any benefit or interest therein or thereunder (otherwise than by a charge in favour of the Contractor's Bankers of any monies due or to become due under this Contract) without the prior written consent of the Employer.

Sub-letting

3.2. The Contractor shall not sub-let the whole of the Works. Except where otherwise provided by the Contract the Contractor shall not sub-let any part of the Works without the prior written consent of the Engineer (which shall not be unreasonably withheld) and such consent if given shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts defaults and neglects of any sub-contractor, his agents servants or workmen as fully as if they were the acts defaults or neglects of the Contractor his agents servants or workmen. Provided always that the provision of labour on a piecework basis shall not be deemed to be a sub-letting under this clause.

Extent of Contract

4. The Contract comprises the manufacture, testing, transport and delivery to site, erection, completion, setting to work and maintenance of the Works and, except in so far as the Contract otherwise provides, the provision of all labour, materials, Contractor's equipment and everything, whether of a temporary or permanent nature, required in and for such manufacture, testing, transport and delivery to site, erection, completion, setting to work and maintenance so far as the necessity for providing the same is specified in or reasonably to be inferred from the Contract.

Contract Documents

Language/s

5.1. The language or languages in which the Contract documents shall be drawn up shall be set out in Part II, and if the said documents are written in more than one language the language according to which the Contract is to be construed and interpreted shall also be designated in Part II, being therein designated the 'Ruling Language'. All correspondence, Drawings and Operating and Maintenance Instructions shall conform to the 'Ruling Language'.

Documents Mutually Explanatory

5.2. The provisions of the General Conditions and Conditions of Particular Application shall prevail over those of any other document forming part of the Contract. Subject to the foregoing the several documents forming the Contract are to be taken as mutually explanatory of one another but in case of ambiguities or discrepancies the same shall be explained and adjusted by the Engineer, who shall thereupon issue to the Contractor instructions directing in what manner the work is to be carried out. Provided always that if, in the opinion of the Engineer, compliance with any such instructions shall involve the Contractor in any expense which, by reason of any such ambiguity or discrepancy, the Contractor did not and had reason not to anticipate, the Engineer shall certify and the Employer shall pay such additional sum as may be reasonable to cover such expense.

Drawings

6.1. The Contractor shall submit to the Engineer for approval, within the times named in the Specification, such drawings, samples, patterns and models as may be called for therein or as the Engineer may reasonably require, provided that the Contractor shall not be under any obligation to supply copies of shop drawings. Within a reasonable period after receiving such drawings, samples, patterns and models the Engineer shall signify his approval or otherwise. Copies of all drawings which require to be approved by the Engineer shall be provided in triplicate by the Contractor. The Contractor shall supply additional copies of approved drawings in accordance with the details set out in the Specification.

6.2. Drawings approved as above described shall not be departed from except as provided in Clause 34 (Variations and Omissions).

6.3. The Engineer shall have the right at all reasonable times to inspect at the factory of the Contractor all drawings of any portion of the Works.

6.4. The Contractor shall, within the times named in the Specification, provide drawings showing the manner in which the Plant is to be affixed together with all information relating, unless otherwise agreed, only to the Works, required for preparing suitable foundations, for providing suitable access for the Plant and any necessary equipment to the point on Site where the Plant is to be erected and for making all necessary connections to the Plant (whether such connections are to be made by the Contractor under the Contract or not).

6.5. Any expenses resulting from an error or omission in or from delay in delivery of the drawings and information mentioned in paragraph 4. of this Clause shall be borne by the Contractor.

Operating and Maintenance Instructions

6.6. The Contractor shall furnish to the Employer before the Works are taken over, Operating and Maintenance Instructions together with drawings (other than shop drawings) of the Works as completed, in sufficient detail to enable the Employer to maintain, dismantle, reassemble and adjust all parts of the Works. The Works shall not be considered to be completed for purposes of taking over under the terms of Clause 32 (Taking Over) until such Instructions and Drawings have been supplied to the Employer.

Mistakes in Drawings

7. The Contractor shall be responsible for any discrepancies, errors, or omissions in the drawings and other particulars supplied by him, whether such drawings and particulars have been approved by the Engineer or not, provided that such discrepancies, errors, or omissions be not due to inaccurate information or particulars furnished in writing to the Contractor by the Employer or the Engineer. The Employer shall be responsible for drawings and information supplied in writing by the Employer or the Engineer and for the details of special work specified by either of them. The Employer shall pay any extra cost reasonably incurred by the Contractor due to any alterations of the work necessitated by reason of inaccurate information so supplied to the Contractor.

General Obligations

Contract Agreement

8. The Contractor shall when called upon so to do enter into and execute a contract agreement (to be prepared at the cost of the Employer) in the form annexed with such modifications as may be necessary.

Performance Bond

9. If the Tender shall contain an undertaking by the Contractor to obtain when required the guarantee of an Insurance Company or Bank or alternatively to provide two good and sufficient sureties, to be jointly and severally bound with the Contractor to the Employer in a sum not exceeding 10 per cent of the tender sum for the due performance of the Contract under the terms of a Bond, the said Insurance Company or Bank or sureties and the terms of the said Bond shall be such as shall be approved by the Employer, and the obtaining of such guarantee or the provision of such sureties and the cost of the Bond to be so entered into shall be at the expense in all respects of the Contractor unless the Contract otherwise provides.

Contractor to inform himself fully

10. The Contractor by tendering shall be deemed to have satisfied himself as to all the conditions and circumstances affecting the Contract Price, as to the possibility of executing the Works as shown and described in the Contract, as to the general circumstances at the

site of the Works and as to the general labour position at the Site, and to have fixed his prices according to his own view for these as no additional allowance, except as otherwise expressly provided, will afterwards be made beyond the Contract Price. The Contractor shall be responsible for any misunderstanding or incorrect information however obtained except information given in writing by the Engineer.

Engineer's Decisions

11. The Contractor shall proceed with the Works in accordance with decisions, instructions and orders given by the Engineer in accordance with these Conditions, provided always that:

a. if the Contractor shall, without undue delay after being given any decision, instruction or order otherwise than in writing, require it to be confirmed in writing, such decision instruction or order shall not be effective until written confirmation thereof has been received by the Contractor, and

b. if the Contractor shall, by written notice to the Engineer within 14 days after receiving any decision, instruction or order of the Engineer in writing or written confirmation thereof, intimate that he disputes or questions the decision, instruction or order, giving his reasons for so doing, either party to the Contract shall be at liberty to refer the matter to arbitration pursuant to Clause **45** (Settlement of Disputes - Arbitration) but such an intimation shall not relieve the Contractor of his obligation to proceed with the Works in accordance with the decision, instruction or order in respect of which the intimation has been given. The Contractor shall be at liberty in any such arbitration to rely on reasons additional to the reasons stated in the said intimation.

Programme to be furnished

12.1. As soon as practicable after the acceptance of his Tender the Contractor shall if required submit to the Engineer for his approval a programme showing the order in which he proposes to carry out the works including design, manufacture, delivery to site, erection and commissioning. The submission to and approval by the Engineer of such programme shall not relieve the Contractor of any of his duties or responsibilities under the Contract.

12.2. After submission to and approval by the Engineer of such programme the Contractor shall adhere to the order of procedure and method stated therein unless he obtains the written permission of the Engineer to vary such order or method.

Contractor's Representatives and Workmen

13.1. The Contractor shall employ one or more competent representatives, whose name or names shall have previously been communicated in writing to the Engineer by the Contractor, to superintend the carrying out of the Works on the Site. The said representative, or if more than one shall be employed, then one of such representatives, shall be present on the Site during working hours, and any orders or instructions which the Engineer may give to the said representative of the Contractor shall be deemed to have been given to the Contractor.

13.2. The Engineer shall be at liberty by notice in writing to the Contractor to object to any representative or person employed by the Contractor in the execution of or otherwise about the Works who shall, in the opinion of the Engineer, misconduct himself or be incompetent or negligent, and the Contractor shall remove such person from the Works.

Contractor's Equipment

14.1. Unless specific arrangements be made to the contrary the Contractor shall, at his own expense, provide all Contractor's Equipment, labour, haulage and power necessary to execute and complete the Works.

Fencing Lighting and Guarding

14.2. The Contractor shall be responsible for the proper fencing, lighting, guarding and watching of all the Works on the Site until taken over and for the proper provision during a like period of temporary roadways, footways, guards and fences as far as the same may be rendered necessary by reason of the Works for the accommodation and protection of the owners and occupiers of adjacent property the public and others. No naked light shall be used by the Contractor on the Site otherwise than in the open air without special permission in writing from the Engineer.

Electricity Water and Gas

14.3. The Contractor shall be entitled to use such supplies of electricity, water and gas as may be available on the Site for the purposes of the Works and shall, at his own expense, provide any apparatus necessary for such use and shall pay to the Employer for such use such sum as may be reasonable in the circumstances.

Employer's lifting Equipment

14.4. The Employer shall at the request of the Contractor and for the execution of the Works operate any suitable lifting equipment belonging to the Employer that may be available on the Site and the Contractor shall pay a reasonable sum therefor. The Employer shall during such operation retain control of and be responsible for the safe working of the lifting equipment but shall not be responsible for any negligence of the Contractor.

Liability for Accidents and Damage

15.1. The Contractor shall properly cover up and protect until taken over any section or portion of the Works liable to injury by exposure to the weather, and shall take every reasonable precaution to protect any section or portion of the Works not taken over against loss or damage from any cause.

Damage to works

15.2. In the case of loss of or damage to the Works on the Site arising from or occasioned by causes for which the Contractor is not responsible under the Contract the same shall if required by the Employer, be made good by the Contractor but at the cost of the Employer at a price to be agreed between the Contractor and the Employer or in default of agreement to be settled by arbitration and such cost shall be added to the Contract Price.

15.3. Subject to Sub-clauses 6. and 7. of this Clause all losses of and damage to any section or portion of the Works that shall not have been taken over, which shall arise from or be occasioned by any act of the Contractor or any Sub-contractor, or by a failure of the Contractor to comply with any obligation imposed on him by Sub-clause 1. of this Clause, shall be made good by and at the sole cost of the Contractor and to the satisfaction of the Engineer.

Injury to third Parties

15.4. The Contractor shall, subject to Sub-clauses 6. and 7. of this Clause, indemnify the Employer in respect of all damage or injury occurring before all the Works shall have been

taken over to any person or to any property (other than property forming part of the Works) and against all actions, suits, claims, demands, costs, charges and expenses arising in connection therewith which shall be occasioned by the negligence of the Contractor or any Sub-contractor, or by defective design (other than a design made, furnished or specified by the Employer and for which the Contractor has disclaimed responsibility in writing within a reasonable time after the receipt of the Employer's instructions), materials or workmanship but not otherwise.

15.5. If while the Contractor is on the Site for the purpose of making good a defect pursuant to Clause **33.2.** (Defects) there shall occur any losses of or damage or injury to the Works or to any other property or to any person, the Contractor's liability in respect thereof shall be the same as if the said losses damage or injury had occurred before any part of the Works had been taken over.

Limitations on Contractor's Liability

15.6. The Contractor shall not be liable to the Employer for:

a. any loss of profit or of contracts suffered by the Employer,

b. any claim made against the Employer except as provided in these Conditions,

c. any damage or injury caused by or arising from the acts or omissions of the Employer or of others (not being the Contractor's servants or Sub-contractors),

d. any loss or damage in circumstances over which the Contractor has no control (except loss or damage caused by any such risk as by Clause **16** (Insurance of Plant) is required to be covered by insurance).

15.7. Except in respect of personal injury or damage to property conferring on a person other than the Employer a good cause of action against the Contractor the liability of the Contractor to the Employer for any one act or default shall not exceed the Contract Price.

15.8. In the event of any claim being made against the Employer arising out of the matters referred to in and in respect of which the Contractor is liable under this Clause the Contractor shall be promptly notified thereof and may at his own expense conduct all negotiations for the settlement of the same and any litigation that may arise therefrom. The Employer shall not unless and until the Contractor shall have failed to take over the conduct of the negotiations or litigation make any admission which might be prejudicial thereto. The conduct by the Contractor of such negotiations or litigation shall be conditional upon the Contractor having first given to the Employer such reasonable security as shall from time to time be required by the Employer to cover the amount ascertained or agreed or estimated, as the case may be, of any compensation, damages, expenses and costs for which the Employer may become liable. The Employer shall, at the request of the Contractor, afford all available assistance for any such purpose and shall be repaid any out-of-pocket expenses incurred in so doing.

Accident or Injury to Workmen

15.9. The Contractor shall indemnify the Employer against all actions, suits, claims, demands, costs or expenses arising in connection with injuries (other than such as may be attributable to the Employer his agents or servants) suffered by persons employed by the Contractor or his Sub-contractors on the Works, whether at Common Law or under any Statutes in force at the date of the Contract dealing with the question of the liability of employers for injuries suffered by employees, and shall take out the necessary policy or policies of insurance to cover and indemnify.

Insurance of Plant

16.1. Unless the Employer shall have approved in writing other arrangements the Contractor shall, in the joint names of the Contractor and the Employer, insure the Plant and keep each part thereof insured for its full value against loss, damage or destruction by fire, lightning, earthquake, theft, perils of the sea and such other risks, if any, as are specified in the Appendix from the date of shipment or the date on which it becomes the property of the Employer, whichever is the earlier, until it is taken over by the Employer and shall from time to time, when so required by the Engineer, produce the policy and receipts for the premiums. All moneys received under any such policy shall be applied in or towards the replacement and repair of the Plant lost, damaged or destroyed but this provision shall not affect the Contractor's liabilities under the Contract.

Third Party Insurance

16.2. The Contractor shall, in the joint names of the Contractor the Employer and the Engineer, insure against all damage or injury occurring before all the Works have been taken over to any person or to any property (other than property forming part of the Works) due to or arising out of the execution of the Works. Such insurance shall be effected for an amount and in terms to be approved by the Employer, and the Contractor shall from time to time when so required by the Engineer produce the policy and the receipts for the premiums.

Remedy on Failure to Insure

16.3. If the Contractor shall fail to effect and keep in force the insurances referred to in this and the preceding Clause the Employer may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the Employer from any moneys due or which may become due to the Contractor or recover the same as a debt from the Contractor

Compliance with Statutes Regulations etc.

17.1. The Contractor shall, in all matters arising in the performance of the Contract, conform in all respects with the provisions of any National or State Statute, Ordinance or other Law or any Regulation or Bye-law of any local or other duly constituted authority that shall be applicable to the Works, and shall keep the Employer indemnified against all penalties and liability of every kind for Breach of any such Statute, Ordinance or Law Regulation or Bey-law.

17.2. If the cost to the Contractor of the performance of the Contract shall be increased or reduced by reason of the making after the date of his tender of any law or of any order, regulation or Bye-law having the force of law the amount of such increase or reduction shall be added to or deducted from the Contract Price as the case may be.

Patent Rights etc.

18.1. The Contractor shall fully indemnify the Employer against all actions, claims, demands, costs, charges and expenses arising from or incurred by reason of any infringement of letters patent design or copyright protected in the Contractor's country or in the country in which the Plant is to be erected by the use of any Plant supplied by the Contractor but such indemnity shall not cover any use of the Works otherwise than for the purpose indicated by or reasonably to be inferred from the Specification.

18.2. In the event of any claim being made or action brought against the Employer arising out of the matters referred to in this clause the Contractor shall be promptly notified thereof and may at his own expense conduct all negotiations for the settlement of the same and any litigation that may arise therefrom. The Employer shall not, unless and until the Contractor shall have failed to take over the conduct of the negotiations or litigation, make any admission which might be prejudicial thereto. The conduct by the Contractor of such negotiations or litigation shall be conditional upon the Contractor having first given to the Employer such reasonable security as shall from time to time be required by the Employer to cover the amount ascertained or agreed or estimated as the case may be of any compensation damages expenses and costs for which the Employer may become liable in respect of such infringement as aforesaid. The Employer shall, at the request of the Contractor, afford all available assistance for the purpose of contesting any such claim or action and shall be repaid any expenses incurred in so doing.

18.3. The Employer on his part warrants that any design or instructions furnished or given by him shall not be such as will cause the Contractor to infringe any letters patent registered design trade mark or copyright in the performance of the Contract.

Access to and Possession of the Site

19.1. Subject to Sub-clause 4. of this Clause access to and possession of the Site shall be afforded to the Contractor by the Employer in reasonable time and, except in so far as the Specification may provide to the contrary, the Employer shall provide a road or railway suitable for the transport of all Plant and Contractor's Equipment necessary for the execution of the Works from an adequate public thoroughfare or railway available to the Contractor to the point on the Site where it is to be delivered or used.

19.2. If a building structure foundation or approach is by the Contract to be provided by the Employer such building structure foundation or approach shall be in a condition suitable for the efficient transport reception installation and maintenance of the Works.

19.3. In the execution of the Works no persons other than the Contractor Sub-contractors and his and their employees shall be allowed on the Site except by the written permission of the Engineer but facilities to inspect the Works at all times shall be afforded to the Engineer and his representatives and other authorised officials or representatives of the Employer.

19.4. The access to and possession of the Site referred to in Sub-clause 1. hereof shall not be exclusive to the Contractor but only such as shall enable him to execute the Works. The Contractor shall afford to the Employer and to other contractors whose names shall have been previously communicated in writing to the Contractor by the Engineer every reasonable facility for the execution of work concurrently with his own.

Hours of Work

19.5. Unless otherwise provided in the Specification the Employer shall give the Contractor facilities for carrying out the Works on the Site continuously during the normal working hours generally recognised in the district. The Engineer may after consulting with the Contractor direct that work shall be done at other times if it shall be practicable in the circumstances for work to be so done, and the extra cost of work shall be added to the Contract Price unless such work has, by the default of the Contractor, become necessary for the completion of the Works within the Time for Completion.

No Night or Sunday Work

19.6. No work shall be carried out on Site during the night or on Sundays (if locally recognised as days of rest) or their locally recognised equivalent without the permission in writing of the Engineer or the Engineer's Representative save when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works in which case the Contractor shall immediately advise the Engineer or his Representative.

Clearance of Site on Completion

19.7. On the completion of the Works the Contractor shall clear away and remove from the Site all Contractor's Equipment surplus materials and rubbish and leave the whole of the Site and Works clean and in a workmanlike condition to the satisfaction of the Engineer.

Labour

Engagement of Labour

20.1. The Contractor shall make his own arrangements for the engagement of all labour local or otherwise and, save in so far as the Contract otherwise provides, for the transport housing feeding and payment thereof.

Alcoholic Liquor or Drugs

20.2. The Contractor shall not, otherwise than in accordance with the Statutes Ordinances and Government Regulations or Orders for the time being in force, import sell give barter or otherwise dispose of any alcoholic liquor or drugs or permit or suffer any such importation sale gift barter or disposal by his Sub-contractors, agents or employees.

Arms and Ammunition

20.3. The Contractor shall not give barter or otherwise dispose of to any person or persons any arms or ammunition of any kind or permit or suffer the same as aforesaid.

Festivals and Religious Customs

20.4. The Contractor shall, in all dealings with labour in his employ, have due regard to all recognised festivals days of rest and religious or other customs.

Epidemics

20.5. In the event of any outbreak of illness of an epidemic nature the Contractor shall comply with and carry out such regulations orders and requirements as may be made by the Government or the local medical or sanitary authorities for the purpose of dealing with and overcoming the same.

Disorderly Conduct

20.6. The Contractor shall at all times take all reasonable precautions to prevent any unlawful riotous or disorderly conduct by or amongst his employees and for the preservation of peace and protection of persons and property in the neighbourhood of the Works against the same.

First aid

20.7. The Contractor shall provide and maintain in an easily accessible position on the Site an adequate First aid outfit. At least one of his staff shall be fully qualified in the administration of First aid.

Temporary Offices etc.

20.8. The Contractor shall at his own cost provide office and other temporary accommodation for his staff and workmen, including where necessary canteen facilities and sanitary accommodation.

Observance by Sub-contractors

20.9. The Contractor shall be responsible for observance by his Sub-contractors of the foregoing provisions.

20.10. Any other conditions affecting labour and wages shall be as set out in Part II in sub-clauses numbered **20.10.** 11. etc. as may be necessary.

Returns of Labour

21. The Contractor shall, if required by the Engineer, deliver to the Resident Engineer or at his office a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the supervisory staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site.

Workmanship and Materials

Manner of Execution

22. All Plant to be supplied and all work to be done under the Contract shall be manufactured and executed in the manner set out in the Specification, or where not so set out to the satisfaction of the Engineer, and all the Works on Site shall be carried out in accordance with such reasonable directions as the Engineer may give.

Underground Works

23. In the case of work underground or involving excavation, where the actual conditions of the ground are not stated in the Contract and could not reasonably have been inferred from an inspection of the Site by the Contractor before he prepared his tender, if rock rocky soil solid chalk water running sand slag pipes concrete or other obstructions are found or if it should be necessary to leave in timber or provide support for existing works, such necessity not having been indicated in the Contract, a reasonable sum in respect of any extra cost incurred by the Contractor in consequence thereof shall be added to the Contract Price, provided that the Contractor has given to the Employer, as soon as reasonably practicable, notice in writing that he intends to make a claim for extra payment.

Inspection and Testing during Manufacture

24.1. The Engineer shall be entitled at all reasonable times during manufacture to inspect, examine and test on the Contractor's premises the materials and workmanship of all Plant to be supplied under the Contract, and if part of the said Plant is being manufactured on other premises the Contractor shall obtain for the Engineer permission to inspect, examine and test as if the said Plant were being manufactured on the Contractor's premises. Such inspection examination or testing if made shall not release the Contractor from any obligation under the Contract.

24.2. The Contractor shall give the Engineer reasonable notice in writing of the date on and the place at which any Plant will be ready for testing as provided in the Contract and unless the Engineer shall attend at the place so named within 10 days of the date which the Contractor has stated in his notice the Contractor may proceed with the tests, which shall be deemed to have been made in the Engineer's presence, and shall forthwith forward to the Engineer duly certified copies of the test readings. The Engineer shall give the Contractor 24 hours' notice in writing of his intention to attend the tests.

24.3. Where the Contract provides for tests on the premises of the Contractor or of any Sub-contractor the Contractor shall provide such assistance, labour, materials, electricity, fuel, stores, apparatus and instruments as may be requisite and as may be reasonably demanded to carry out such tests efficiently.

24.4. As and when any Plant shall have passed the tests referred to in this Clause the Engineer shall furnish to the Contractor a certificate in writing to that effect.

Delivery

25.1. No Plant or Contractor's Equipment shall be shipped or delivered to the Site until an intimation in writing has been applied for and obtained by the Contractor from the Engineer that the Plant may be delivered. The Contractor shall be responsible for the reception on the Site of all Plant and Contractor's Equipment delivered for the purpose of the Contract.

25.2. If by delay or failure on the part of the Engineer to give the said intimation, or from any cause for which the Employer or some other contractor employed by him is responsible, the Contractor shall be prevented from delivering any Plant to the Site at the time specified for the delivery thereof, or, if no time is specified, at the time when it is reasonable for it to be delivered having regard to the date by which the Works ought to be completed, and shall have given notice in writing to the Employer that such Plant (hereinafter in this sub-clause referred to as 'the delayed Plant') is ready for delivery, and shall have suitably and sufficiently marked the delayed Plant as appropriated to the Contract, and shall have given to the Engineer an opportunity of inspecting the delayed Plant, then and in any such case:

a. there shall be added to the Contract Price the reasonable additional expense incurred in storing and taking reasonable measures to protect and preserve the delayed Plant from, and insuring it against, loss, deterioration and damage however caused from the time when, but for the said delay failure or other cause, the delayed Plant would have been delivered to the Site (hereinafter in this sub-clause referred to as 'the normal delivery date') until the Contractor shall no longer be prevented from delivering it or shall be relieved of responsibility therefor under Paragraph d. of this sub-clause whichever shall first happen,

b. the Contractor shall after one month from the normal delivery date be entitled to be paid 90 per cent of the Contract Value of the delayed Plant,

c. if at the expiration of three months from the normal delivery date the Contractor shall still be prevented as aforesaid from delivering the delayed Plant to the Site he shall be entitled to be paid 95 per cent of the Contract Value of the delayed Plant less any sum previously paid to him in respect thereof,

d. if at the expiration of twelve months from the date of the said notice the Contractor shall still be prevented as aforesaid he may, by notice in writing expiring 30 days after receipt thereof by the Employer, require the Employer to assume responsibility for storing protecting and preserving the delayed Plant and upon the expiration of the last-mentioned notice the Contractor shall be relieved of any responsibility for the delayed Plant until either the expiration of 30 days after the receipt of notice in writing from the Engineer that the delayed Plant may be delivered to the Site (hereinafter referred to as 'the notice to deliver') or the Contractor, having received the notice to deliver, shall resume possession of the said Plant whichever shall first occur, provided always that if the notice to deliver shall be given within 30 days after the receipt of the lastmentioned notice given by the Contractor this paragraph of this sub-clause shall not operate,

e. after the receipt of the notice to deliver the Contractor, if he has been relieved of responsibility under the last preceding paragraph of this sub-clause, shall (and in any other case may) examine the delayed Plant and any Plant on the Site that has not been taken over by reason of the delay in the delivery of the delayed Plant and make good any deterioration or defect therein that may have developed or loss thereof that may have occurred after the normal delivery date,

f. there shall be added to the Contract Price any reasonable expense to which the Contractor may be put in making the examination referred to in Paragraph e. of this sub-clause, or in making good any deterioration, defect or loss as therein mentioned, except in so far as the same was caused by faulty workmanship or materials or by the Contractor's failure to take the measures referred to in Paragraph a. of this sub-clause or in Sub-clause 1. of Clause **15** (Liability for Accidents and Damage). Any expense to which the Contractor may be put in delivering the delayed Plant to the Site or in erecting the same or any other Plant or in carrying out the Tests on Completion or in performing his obligations under Clause 33.2. (Defects) which would not have been incurred had the delivery of the delayed Plant not been prevented as aforesaid shall also be added to the Contract Price.

g. the obligations of the Contractor under Sub-clause 2. of Clause 33. (Defects) with respect to the plant shall not apply to any defect that may develop therein after the expiration of three years from the normal delivery date.

Delayed Erection

26. If by delay or failure on the part of the Engineer, or some other cause for which the Employer or some other contractor employed by him is responsible, the Contractor shall be prevented from erecting any Plant which has been delivered to the Site (hereinafter in this clause referred to as 'unerected Plant') and shall have given notice in writing to the Employer of his intention to rely on this clause, then and in any such case:

a. there shall be added to the Contract Price the reasonable additional expense incurred in storing and taking reasonable measures to protect and preserve the unerected Plant from, and insuring it against, loss, deterioration and damage however caused from the date of the said notice until the Contractor shall no longer be prevented from erecting it or shall be relieved of responsibility therefor under Paragraph b. of this clause whichever shall first happen,

b. the Contractor may, by notice in writing expiring 30 days after receipt thereof by the Employer, require the Employer to assume responsibility for storing protecting and preserving the unerected Plant and upon the expiration of the last-mentioned notice the Contractor shall be relieved of any responsibility for the unerected Plant until either the expiration of 30 days after the receipt of notice in writing from the Engineer that the unerected Plant may be erected forthwith (hereinafter referred to as 'the notice to erect') or until the Contractor, having received the notice to erect, shall resume possession of the said Plant whichever shall first occur, provided always that if the notice to erect shall be given within 30 days after the receipt of the said notice given by the Contractor this paragraph of this clause shall not operate,

c. after the receipt of the notice to erect the Contractor, if he has been relieved of responsibility under the last preceding paragraph of this clause, shall (and in any other case may) examine the unerected Plant and any Plant on the Site that has not been taken over by reason of the delay in the erection of the unerected Plant and make good any deterioration or defect therein that may have developed or loss thereof that may have occurred after the date of the notice first mentioned in this clause,

d. if at the expiration of six months from the date of the notice first mentioned in this clause the Contractor shall still be prevented as aforesaid he shall be entitled to be paid 95 per cent of the Contract Value of the unerected Plant less any sum previously paid to him in respect thereof,

e. there shall be added to the Contract Price any expense to which the Contractor may be put in making the examination referred to in Paragraph c. of this clause, or in making good any deterioration, defect or loss therein mentioned, except in so far as the same was caused by faulty workmanship or materials or by the Contractor's failure to take the measures referred to in Paragraph a. of this clause or in Sub-clause 1. of Clause **15.** (Liability for Accidents and Damage). Any expense to which the Contractor may be put in erecting the unerected or any other Plant or in carrying out the Tests on Completion or in performing his obligations under Clause 33.2. (Defects) which would not have been incurred had the erection of the unerected Plant not been prevented as aforesaid shall also be added to the Contract Price,

f. the obligations of the Contractor under Clause **33.2.** (Defects) with respect to the Plant shall not apply to any defect that may develop therein after the expiration of three years from the date of the notice first mentioned in this Clause.

Suspension of Works

27. The Contractor shall, on the written order of the Engineer, suspend the progress of the Works or any part thereof for such time or times and in such manner as the Engineer may consider necessary, and shall during such suspension properly protect and secure the work so far as is necessary in the opinion of the Engineer. The extra cost including all running wages to be paid, salaries, depreciation and maintenance of Contractor's Equipment, on-costs and general overhead costs of the Contract incurred by the Contractor in giving effect to the Engineer's instructions under this Clause shall be borne and paid by the Employer unless such suspension is:

a. otherwise provided for in the Contract or

b. necessary for the proper execution of the work or by reason of weather conditions affecting the safety or quality of the Works or by some default on the part of the Contractor or

c. necessary for the safety of the Works or any part thereof.

Provided that the Contractor shall not be entitled to recover any such extra cost unless he gives notice in writing of his intention to claim to the Engineer within 28 days of the Engineer's order. The Engineer shall settle and determine such extra payment to be made to the Contractor in respect of such claim as shall in the opinion of the Engineer be fair and reasonable.

Rejection

28. If at any time before the Works are taken over the Engineer shall:

a. decide that any work done or Plant supplied or materials used by the Contractor or any Sub-contractor is or are defective or not in accordance with the Contract, or that the Works or any portion thereof are defective or do not fulfil the requirements of the Contract (all such matters being hereinafter in this clause called 'defects'), and

b. as soon as reasonably practicable give to the Contractor notice in writing of the said decision specifying particulars of the defects alleged and of where the same are alleged to exist or to have occurred and

c. so far as may be necessary place the Plant at the Contractor's disposal,

then the Contractor shall with all speed and, except as provided in Clauses **25.** (Delivery) and **26.** (Delayed Erection), at his own expense, make good the defects so specified. In case the Contractor shall fail so to do the Employer may, provided he does so without undue delay, take at the cost of the Contractor such steps as may in all the circumstances be reasonable to make good such defects. All Plant provided by the Employer to replace defective Plant shall comply with the Contract and shall be obtained at reasonable prices and where reasonably practicable under competitive conditions. The Contractor shall be entitled to remove and retain all Plant that the Employer may have replaced at the Contractor's cost.

Nothing contained in this clause shall affect any claim by the Employer under Clause **31.** (Delay in Completion).

Tests on Completion

29.1. The Contractor shall give to the Engineer in writing 21 days' notice of the date after which he will be ready to make the Tests on Completion. Unless otherwise agreed the tests shall take place within 10 days after the said date on such day or days as the Engineer shall in writing notify the Contractor.

29.2. If the Engineer fail to appoint a time after having been asked so to do or to attend at any time or place duly appointed for making the said tests the Contractor shall be entitled to proceed in his absence and the said tests shall be deemed to have been made in the presence of the Engineer.

29.3. If in the opinion of the Engineer the tests are being unduly delayed he may, by notice in writing, call upon the Contractor to make such tests within 10 days from the receipt of the said notice, and the Contractor shall make the said tests on such day within the said 10 days as the Contractor may fix and of which he shall give notice to the Engineer. If the Contractor fail to make such tests within the time aforesaid the Engineer may himself proceed to make the tests. All tests so made by the Engineer shall be at the risk and expense of the Contractor unless the Contractor shall establish that the tests were not being unduly delayed in which case tests so made shall be at the risk and expense of the Employer.

29.4. The Employer, except where otherwise specified, shall provide free of charge subject to the provisions of Sub-clause 5. of this clause such labour, materials, electricity, fuel, water, stores and apparatus as may be requisite and as may be reasonably demanded to carry out such tests efficiently.

29.5. If any portion of the Works fail to pass the tests, tests of the said portion shall, if required by the Engineer or by the Contractor, be repeated within a reasonable time upon the same terms and conditions, save that all reasonable expenses to which the Employer may be put by the repetition of the tests shall be deducted from the Contract Price.

Extension of Time for Completion

30. If by reason of extra or additional work or any industrial dispute or any cause beyond the reasonable control of the Contractor the Contractor shall have been delayed or impeded in the completion of the Works, whether such delay or impediment occur before or after the time or extended time fixed for completion, provided that the Contractor shall without delay have given to the Employer or the Engineer notice in writing of his claim for an extension of time, the Engineer shall on receipt of such notice grant the Contractor from time to time in writing either prospectively or retrospectively such extension of the time fixed by the Contract for the completion of the Works as may be justified. The Contractor shall have no other claim against the Employer in respect of delay and disorganisation of work arising from the occurrences herein mentioned, except where such is elsewhere expressly provided for in the Contract.

Delay in Completion

31. If the Contractor shall fail to complete the Works in accordance with the Contract (except the maintenance thereof as provided in Clause 33.2. (Defects) and such tests as are to be made in accordance with Clause 29. (Tests on Completion)) within the Time for Completion or any extension of such time, and the Employer shall have suffered any loss from such failure, there shall be deducted from the Contract Price, as and for liquidated and ascertained damages and not by way of penalty, a sum of money equal to the percentage named in the Appendix of such fraction of the Contract Price as would, on the due completion of the Works, be properly attributable to such portion or portions only of the Works as cannot in consequence of the said failure be put to the use intended, for each week between the Time for Completion of the Works as aforesaid and the actual date of completion, but the sum so deducted shall not in any case exceed the maximum percentage named in the Appendix of the said fraction of the Contract Price, and such deduction shall be in full satisfaction of the Contractor's liability for the said failure.

Taking over and Defects

Taking over

32.1. As soon as the Works have been completed in accordance with the Contract (except in minor respects that do not affect their use for the purpose for which they are intended and except for the maintenance thereof as provided in Clause 33.2. (Defects)) and have passed the Tests on Completion, the Engineer shall issue a certificate to the Contractor, with a copy to the Employer, (herein called a 'taking-over certificate') in which he shall certify the date on which the Works have been so completed and have passed the said tests, and the Employer shall be deemed to have taken over the Works on the date so certified, but the issue of a taking-over certificate shall not operate as an admission that the Works have been completed in every respect. In the event of the Works being divided by the Contract into two or more sections the Employer shall be entitled to take over any section or sections before the other or others, and thereupon the Engineer shall issue a taking-over certificate in respect thereof. If by agreement between the Employer the Engineer and the Contractor any portion of the Works (other than a section or sections) shall be taken over before the remainder of the Works the Engineer shall issue a taking-over certificate in respect of that portion.

Use before taking over

32.2. If, by reason of any default on the part of the Contractor, a taking-over certificate has not been issued in respect of every portion of the Works within one month after the Time for Completion or extended time as the case may be, the Employer shall be at liberty to use the works or any portion thereof in respect of which a taking-over certificate has not been issued, provided that the Works or the portion so used as aforesaid shall be reasonably capable of being used and that the Contractor shall be afforded the earliest possible opportunity of taking such steps as may be necessary to permit of the issue of the taking-over certificate.

Interference with tests

32.3. If, by reason of any act or omission of the Employer or the Engineer, the Contractor shall be prevented from carrying out the Tests on Completion as provided in Sub-clause 1. of Clause **29.** (Tests on Completion) then, unless in the meantime the Works shall have been proved not to be substantially in accordance with the Contract, the Employer shall be deemed to have taken over the Works and the Engineer shall issue a taking-over certificate accordingly; nevertheless the Contractor shall make the said tests during the Period of Maintenance as and when required by the Engineer by 14 days' notice in writing and Sub-clauses 2., 3., 4. and 5. of Clause **29.** (Tests on Completion) shall apply. Any additional expense to which the Contractor may be put in making the said tests during the Period of Maintenance pursuant to this sub-clause shall be added to the Contract Price, and such allowances shall be made from the performances required to be attained in the said tests as may be reasonable having regard to any use of the Works by the Employer prior to the tests.

Period of Maintenance

33.1. In these Conditions the expression 'Period of Maintenance' shall mean the period of maintenance named in the Tender calculated from the date of Taking-over in accordance with Clause **32.** or, in the event of more than one certificate having been issued by the Engineer under the said Clause, from the respective dates so certified, and in relation to the Period of Maintenance the expression 'the Works' shall be construed accordingly.

Defects

33.2. Subject to the provisions of Sub-clause 2. of Clause **25.** (Delivery) and Clause **26.** (Delayed Erection) the Contractor shall be responsible for making good with all possible speed any defects arising from defective design (other than a design made, furnished or specified by the Employer and for which the Contractor has disclaimed responsibility in writing within a reasonable time after the receipt of the Employer's instructions) materials or workmanship or from any act or omission of the Contractor that may develop under the conditions provided for by the Contract and under proper use in the Works or any portion thereof during the Period of Maintenance.

33.3. If any such defect shall occur the Engineer shall inform the Contractor thereof stating in writing the nature of the defect. If the Contractor replaces or renews any portion of the Works the provisions of this clause shall apply to the portion of the Works so replaced or renewed as if that portion had been taken over on the date of replacement or renewal.

33.4. If any defects be not remedied within a reasonable time the Employer may proceed to do the work at the Contractor's risk and expense, but without prejudice to any other rights which the Employer may have against the Contractor in respect of the failure of the Contractor to remedy such defects.

33.5. If the replacements or renewals are of such a character as may affect the efficiency of the Works or any portion thereof the Employer may, within one month of such replacement or renewal, give to the Contractor notice in writing requiring that Tests on Completion be made, in which case such tests shall be carried out as provided in Clause **29.** (Tests on Completion).

33.6. These General Conditions shall apply to all inspections adjustments replacements and renewals and to all tests occasioned thereby carried out by the Contractor pursuant to this clause.

33.7. Save as in this clause expressed the Contractor shall be under no liability in respect of the said defects after the Works have been taken over.

33.8. Until the final certificate shall have been issued the Contractor shall have the right of access, at all reasonable working hours, at his own risk and expense, by himself or his duly authorised representatives whose names shall have previously been communicated in writing to the Engineer, to all parts of the Works for the purpose of inspecting the working thereof and to the records of the working and performance thereof for the purpose of inspecting the same and taking notes therefrom. Subject to the Engineer's approval, which shall not be unreasonably withheld, the Contractor may at his own risk and expense make any tests which he considers desirable.

Contractor to search

33.9. The Contractor shall, if required by the Engineer in writing, search for the cause of any defect imperfection or fault under the directions of the Engineer. Unless such defect imperfection or fault shall be one for which the Contractor is liable under the Contract the

cost of the work carried out by the Contractor in searching as aforesaid shall be borne by the Employer. But if such defect imperfection or fault shall be one for which the Contractor is liable as aforesaid the cost of the work carried out in searching as aforesaid shall be borne by the Contractor, and he shall in such case repair rectify and make good such defect imperfection or fault at his own expense in accordance with the provisions of this Clause.

Variations and Omissions

34.1. The Contractor shall not alter any of the Works except as directed in writing by the Engineer; but the Engineer shall have full power, subject to the proviso hereinafter contained, from time to time during the execution of the Contract by notice in writing to direct the Contractor to alter, amend, omit, add to or otherwise vary any of the Works, and the Contractor shall carry out such variations and be bound by the same conditions, so far as applicable, as though the said variations were stated in the Specification. Provided that no such variation shall, except with the consent in writing of the Contractor, be such as will, with any variations already directed to be made, involve a net increase or decrease in the Contract Price of more than 15 per cent thereof. In any case in which the Contractor has received any such direction from the Engineer which either then or later will, in the opinion of the Contractor, involve an increase or decrease in the Contract Price, the Contractor shall as soon as reasonably possible and before proceeding therewith advise the Engineer in writing to that effect. The difference in cost to the Employer, if any, occasioned by any such variations, shall be added to or deducted from the Contract Price as the case may require. The amount of such difference shall be ascertained and determined in accordance with the rates specified in the schedules of prices, so far as the same may be applicable, and where rates are not contained in the said schedules or are not applicable such amount shall be agreed between the Engineer and the Contractor.

34.2. If the Engineer shall make any such variation in any part of the Works such reasonable notice in writing shall be given to the Contractor as will enable him to make his arrangements accordingly, and in cases where Plant is already manufactured or in course of manufacture, or any matter done or drawings or patterns made that require to be altered, a reasonable sum in respect thereof shall be allowed by the Engineer. If, in the opinion of the Contractor, any such variation is likely to prevent or prejudice the Contractor from or in fulfilling any of his obligations under the Contract, he shall notify the Engineer thereof in writing and the Engineer shall decide forthwith whether or not the same shall be carried out. If the Engineer confirms his instructions in writing the said obligations shall be modified to such an extent as may be justified. Until the Engineer so confirms his instructions they shall be deemed not to have been given.

34.3. On receipt of the Engineer's confirmation of instructions in respect of any variation the Contractor shall immediately proceed to carry out such instructions. The work shall not, without the express permission of the Engineer, be delayed pending agreement on price.

Claims

34.4. The Contractor shall send to the Engineer, once in every month, an account giving particulars (as full and detailed as possible) of all claims for any additional expense to which the Contractor may consider himself entitled and of all extra or additional work ordered by the Engineer which he has executed during the preceding month, and no claim for payment for any such work will be considered which has not been included in such particulars. Provided always that the Engineer shall be entitled to authorise payment to be made for any such work, nothwithstanding the Contractor's failure to comply with this condition, if the Contractor has at the earliest practicable opportunity notified the Engineer that he intends to make a claim for such work.

Variations exceeding 15 per cent

34.5. If, with the consent in writing of the Contractor, the total value of all variations ordered under the provisions of this Clause exceeds 15 per cent of the Tender Price, the Contract Price shall be amended by such sum as shall be agreed upon between the Engineer and the Contractor. In the event of disagreement the Engineer shall fix such sum as shall in his opinion be reasonable and proper, regard being had to all material and relevant factors including the Contractor's oncosts and overheads.

Ownership of plant

35. Plant supplied pursuant to the Contract shall become the property of the Employer at whichever is the earlier of the following times namely:

a. when the Plant is delivered pursuant to the Contract,

b. when the Contractor has been paid any sum to which he may become entitled in respect thereof either pursuant to Paragraph b. of Sub-clause 2. of Clause **25.** (Delivery) or pursuant to Clause **40.** (Terms of Payment).

Ownership of Contractor's Equipment

36. All Contractor's Equipment shall, on being brought upon the Site for the purpose of the Works, become the property of the Employer and shall be used solely for the purpose of the Works, and shall not be taken away by the Contractor while it is required on the Site for the purpose of the Works without the permission in writing of the Engineer, and the Contractor shall be liable for the loss or destruction thereof or damage thereto which may happen otherwise than through the fault of the Employer. If there shall be due owing or accruing to the Employer from the Contractor any moneys under or in respect of the Contract of which the Employer shall be unable to obtain payment the Employer shall be at liberty, at the cost of the Contractor, to sell and dispose of any of the Contractor's Equipment as he shall think fit and to apply the proceeds in or towards the satisfaction of such moneys as aforesaid. Subject to the foregoing the property in any Contractor's Equipment shall revert to the Contractor on being properly removed from the Site or on the completion of the Works or on the termination of the Contract whichever may be the earliest.

Certificates and Payment

Interim Certificates

37.1. The Contractor may at the times and in the manner following apply for interim and final certificates as referred to in Clause **40.** (Terms of Payment) for Plant shipped from the country of manufacture en route to the Site and for work executed on the Site.

37.2. Applications for interim certificates may be made to the Engineer in respect of each shipment of Plant and from time to time as work on the Site progresses. Each such application in respect of shipment shall identify the Plant shipped, state the amount claimed, and be accompanied by such evidence of shipment and of payment of freight and insurance as the Engineer may reasonably require.

Each other such application shall state the amount claimed and shall set forth in detail, in the order of the schedule of prices, particulars of the work executed on the Site and of the Plant delivered to the Site pursuant to the Contract to a date named in the application and since the period covered by the last preceding certificate, if any, which includes work on Site.

37.3. The Engineer shall issue to the Contractor an interim certificate within 28 days after receiving an application therefor made in accordance with this clause. If the Engineer shall fail to issue an interim certificate as provided in this clause the Contractor shall be at liberty, after giving to the Employer or the Engineer 14 days' notice in writing of his intention so to do, to stop the Works or any part thereof until the said certificate be issued, and any expense to the Contractor occasioned by the stoppage and the subsequent resumption of work shall be added to the Contract Price.

37.4. Every interim certificate shall certify the Contract Value of Plant shipped or as the case may be the Contract Value of the work duly executed on the Site and of the Plant delivered to the Site for use in the Works pursuant to the Contract up to the date named in the application for the certificate, less the total of any sums previously certified in interim certificates, provided that no sum shall be included in any interim certificate in respect of any Plant that, according to the decision of the Engineer, does not comply with the Contract, or has been brought and is at the date of the certificate prematurely upon the Site.

Progress Payments

37.5. If it is desired to provide in the Contract for progress payments during manufacture at the Contractor's works details shall be given in the Clause numbered 37.5. in Part II and any amounts becoming due to the Contractor shall be included in Interim Certificates.

37.6. No interim certificate shall be relied on as conclusive evidence of any matter stated therein nor affect or prejudice any right of the Employer or the Contractor against the other.

Final Certificate

37.7. Application for the final certificate may be made to the Engineer at the end of the Period of Maintenance for the Works or any portion thereof, provided that the Contractor has fulfilled his obligations under Clause 33.2. (Defects). Provided that if, by reason of the fact that it has become necessary for the Contractor to replace or renew any portion of the Works, the

obligations of the Contractor under Clause 33.2. (Defects) shall continue after the period first therein mentioned, the right of the Contractor to apply for a final certificate in respect of the Works or portion thereof other than the portions so replaced or renewed shall not be affected by that fact, and after the Contractor has ceased to be under any obligation under Clause 33.2. (Defects) in respect of the portions replaced or renewed he may apply for a final certificate in respect thereof.

37.8. The Engineer shall issue to the Contractor a final certificate within 28 days after receiving an application therefor which the Contractor was entitled to make.

37.9. A final certificate shall certify the total of all amounts comprised in interim certificates previously issued in respect of the Works or the portion thereof to which the final certificate relates, subject to such additions thereto or deductions therefrom as may be authorised in Sub-clause 12. of this clause.

37.10. A final certificate shall, save in the case of fraud or dishonesty relating to or affecting any matter dealt with in the certificate, be conclusive evidence as to the sufficiency of the Works and of the value thereof.

37.11. The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or the execution of the Works unless the Contractor shall have made a claim in writing in respect thereof before the giving of the Final Certificate under this Clause.

Interim and final Certificates

37.12. Any sum payable under the Contract by or to the Contractor otherwise than for work executed or Plant delivered shall be included or deducted in the next certificate (interim or final) issued by the Engineer.

37.13. The Engineer may in any certificate give effect to any correction or modification that should properly be made in respect of any previous certificate.

Provisional Sums and P.C. Items

38.1. A provisional sum included in the Contract Price shall be expended or used as the Engineer may in writing direct and not otherwise. In so far as a provisional sum is not expended or used it shall be deducted from the Contract Price.

38.2. All P.C. (prime cost) items included in the Contract Price shall be expended or used as the Engineer may in writing direct and not otherwise. To the net amount paid by the Contractor in respect of each P.C. item there shall be added the percentage named in the Appendix of the said amount. The sum by which the net amount so paid in respect of any P.C. item plus the said percentage thereof exceeds or is less than the sum included in the Contract Price in respect of that item shall be added to or deducted from the Contract Price as the case may be.

38.3. The Engineer shall have power to direct the Contractor to place orders with any other person for work or Plant included in the Contract as Provisional Sums or P.C. Items. The Contractor shall however have no responsibility for work done or for Plant supplied by any other person in pursuance of such directions unless the Contractor shall have approved the person by whom such work is done or such Plant is to be supplied and the Plant if any to be supplied.

Payments due from the Contractor

39. All costs damages or expenses for which under the Contract the Contractor is liable to the Employer may be deducted by the Employer from any moneys due or becoming due to the Contractor under the Contract or may be recovered by action at law or otherwise from the Contractor.

Terms of Payment

40.1. Unless otherwise agreed the Employer shall pay to the Contractor in the following manner the Contract Price adjusted to give effect to such additions thereto and such deductions therefrom as are provided for in these Conditions:

a. within one month from the presentation of each interim certificate a sum equal to 90 per cent of the sum certified therein;

b. 95 per cent of the Contract Price adjusted as aforesaid within one month from the date certified in the taking-over certificate;

c. the balance of the Contract Price adjusted as aforesaid within one month after the presentation of the final certificate.

If any section or portion of the Works shall be taken over separately the payments herein provided for on or after taking over shall be made in respect of the section or portion taken over, and references to the Contract Price shall mean such part of the Contract Price as shall in the absence of agreement be apportioned thereto by the Engineer.

In determining the amount of any payment under this clause in respect of any portion of the Works due account shall be taken of all payments previously made in respect of the same portion whether under this clause or under Clauses **25.** (Delivery) or **26.** (Delayed Erection).

Delayed Payment

40.2. If the payment of any sum payable under paragraphs b. and c. of Sub-clause 1. of this clause shall be improperly delayed by the Employer or the Engineer interest at the rate of 5 per cent per annum on the amount of the delayed payment for the period of the delay shall be added to the Contract Price.

40.3. If the Employer shall fail to make any payment as provided in this clause the Contractor shall be at liberty, without prejudice to any other remedy, after giving to the Employer 28 days' notice in writing of his intention so to do, to stop the Works or any part thereof until the said payment be made, and the expenses of the Contractor occasioned by the stoppage and the subsequent resumption of work shall be added to the Contract Price.

Payment in foreign Currencies

40.4. Arrangements for payment in foreign currencies shall be as set out in Part II.

Remedies and Powers

Contractor's Default

41. If the Contractor shall neglect to execute the Works with due diligence and expedition, or shall refuse or neglect to comply with any reasonable orders given him in writing by the Engineer in connection with the Works, or shall contravene the provisions of the Contract, the Employer may give notice in writing to the Contractor to make good the failure neglect or contravention complained of. Should the Contractor fail to comply with the notice within a reasonable time from the date of service thereof, then and in such case the Employer shall be at liberty to employ other workmen and forthwith execute such part of the Works as the Contractor may have neglected to do, or if the Employer shall think fit it shall be lawful for him, without prejudice to any other rights he may have under the Contract, to take the Works wholly or in part out of the Contractor's hands and re-contract with any other person or persons to complete the Works or any part thereof, and in that event the Employer shall have the free use of all Contractor's Equipment that may be at any time on the Site in connection with the Works, without being responsible to the Contractor for fair wear and tear thereof and to the exclusion of any right of the Contractor over the same, and the Employer shall be entitled to retain and apply any balance which may be otherwise due on the Contract by him to the Contractor, or such part thereof as may be necessary, to the payment of the cost of executing the said part of the Works or of completing the Works as the case may be. If the cost of completing the Works or executing a part thereof as aforesaid shall exceed the balance due to the Contractor the Contractor shall pay such excess.

Bankruptcy

42. If the Contractor shall become bankrupt or insolvent, or have a receiving order made against him, or compound with his creditors, or being a corporation commence to be wound up, not being a members' voluntary winding up for the purpose of amalgamation or reconstruction, or carry on its business under a receiver for the benefit of its creditors or any of them, the Employer shall be at liberty (a) to terminate the Contract forthwith by notice in writing to the Contractor or to the receiver or liquidator or to any person in whom the Contract may become vested, and to act in the manner provided in Clause **41.** (Contractor's Default) as though the last-mentioned notice had been the notice referred to in such clause and the Works had been taken out of the Contractor's hands or (b) to give such receiver liquidator or other person the option of carrying out the Contract subject to his providing a guarantee for the due and faithful performance of the Contract up to an amount to be agreed.

Outbreak of War

Outbreak of War

43.1. If during the currency of the Contract there shall be an outbreak of war (whether war is declared or not) in any part of the world which, whether financially or otherwise, materially affects the execution of the Works the Contractor shall, unless and until the Contract is terminated under the provisions in this clause contained, use his best endeavours to complete

the execution of the Works, provided always that the Employer shall be entitled, at any time after such outbreak of war, to terminate this Contract by giving notice in writing to the Contractor, and upon such notice being given this Contract shall (save as to the rights of the parties under this clause and to the operation of Clause **45.** hereof) terminate, but without prejudice to the rights of either party in respect of any antecedent breach thereof.

Removal of Contractor's Equipment on Termination

43.2. If the Contract shall be terminated under the provisions of the last preceding sub-clause the Contractor shall with all reasonable despatch remove from the Site all Contractor's Equipment and shall give similar facilities to his sub-contractors to do so.

Payment if Contract Terminated

43.3. If the Contract shall be terminated as aforesaid the Contractor shall be paid by the Employer (in so far as such amounts or items shall not have already been covered by payments on account made to the Contractor) for all work executed prior to the date of termination at the rates and prices provided in the Contract and in addition:

a. The amounts payable in respect of any preliminary items, so far as the work or service comprised therein has been carried out or performed, and a proper proportion as certified by the Engineer of any such items the work or service comprised in which has been partially carried out or performed.

b. The cost of materials or goods reasonably ordered for the Works or for use in connection with the Works which shall have been delivered to the Contractor or of which the Contractor is legally liable to accept delivery (such materials or goods becoming the property of the Employer upon such payment being made by him).

c. A sum, to be certified by the Engineer, being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Works, in so far as such expenditure shall not have been covered by the payments in this sub-clause before mentioned.

d. The reasonable cost of removal under sub-clause 2. of this Clause and (if required by the Contractor) return thereof to the Contractor's works in his country of registration or to any other destination at no greater cost.

e. The reasonable cost of repatriation of all the Contractor's staff and workmen employed on or in connection with the Works at the time of such termination.

Provided always that, against any payments due from the Employer under this sub-clause, the Employer shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of plant and materials, and any sum previously paid by the Employer to the Contractor in respect of the execution of the Works.

Frustration

44.1. In the event of the Contract being frustrated the sum payable by the Employer to the Contractor in respect of the work executed shall be the same as that which would have been

payable under Clause 43. (Outbreak of War) hereof if the Contract had been terminated under the provisions of Clause 43. hereof.

44.2. For the purpose of this Clause the term 'Frustrated' shall mean the prevention of the fulfilment of the Contract by reason of war or by any cause or causes agreed by both the Employer and the Contractor to be beyond the control of either of them.

Settlement of Disputes - Arbitration

45. If any dispute or difference of any kind whatsoever shall arise between the Employer or the Engineer and the Contractor in connection with or arising out of the Contract or the carrying out of the Works (whether during the progress of the Works or after their completion, and whether before or after the termination abandonment or breach of the Contract) it shall in the first place be referred to and settled by the Engineer, who within a period of 90 days after being requested by either party to do so shall give written notice of his decision to the Employer and the Contractor. Save as hereinafter provided such decision in respect of every matter so referred shall be final and binding upon the Employer and the Contractor until the completion of the work, and shall forthwith be given effect to by the Contractor who shall proceed with the Works with all due diligence, whether he or the Employer requires arbitration as hereinafter provided or not. If the Engineer has given written notice of his decision to the Employer and the Contractor and no claim to arbitration has been communicated to him by either the Employer or the Contractor within a period of 90 days from receipt of such notice the said decision shall remain final and binding upon the Employer and the Contractor. If the Engineer shall fail to give notice of his decision as aforesaid within a period of 90 days after being requested as aforesaid, or if either the Employer or the Contractor be dissatisfied with any such decision, then and in any such case either the Employer or the Contractor may within 90 days after receiving notice of such decision or within 90 days after the expiration of the first named period of 90 days (as the case may be) require that the matter or matters in dispute be referred to arbitration as hereinafter provided. All disputes or differences in respect of which the decision (if any) of the Engineer has not become final and binding as aforesaid shall be finally settled under the Rules of Conciliation and Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with the said Rules. The said arbitrator/s shall have full power to open up review and revise any decision, opinion, direction, certificate or valuation of the Engineer and neither party shall be limited in the proceedings before such arbitrator/s to the evidence or arguments put before the Engineer for the purpose of obtaining his said decision. No decision given by the Engineer in accordance with the foregoing provisions shall disqualify him from being called as a witness and giving evidence before the arbitrator/s on any matter whatsoever relevant to the dispute or difference referred to the arbitrator/s as aforesaid.

Notices

46.1. Any notice to be given to the Contractor under the terms of the Contract shall be served by sending the same by registered post to or leaving the same at the Contractors'

principal place of business (or in the event of the Contractor being a Company to or at its registered office).

46.2. Any notice to be given to the Employer under the terms of the Contract shall be served by sending the same by registered post to or leaving the same at the Employer's last known address (or in the event of the Employer being a Company to or at its registered office).

Default of Employer

47.1. In the event of the Employer:

a. failing to pay to the Contractor the amount due under any certificate of the Engineer within two months after the same shall have become due under the terms of the Contract; or

b. interfering with or obstructing the issue of any such certificate; or

c. becoming bankrupt or (being a company) going into liquidation other than for the purposes of a scheme of reconstruction or amalgamation

the Contractor shall be entitled without prejudice to any other rights or remedies (and in respect of sub-clause a. above as an alternative to the provisions of Clause **40.2.** and 3. (Terms of Payment)) to terminate the employment of the Contractor under the Contract by giving notice in writing to the Employer.

47.2. Upon the giving of such notice the Contractor shall (nothwithstanding the provisions of Clause **36.1.** (Contractor's Equipment on Site) hereof) with all reasonable despatch remove from the Site all Contractor's Equipment brought by him thereon.

47.3. In the event of such termination the Employer shall be under the same obligations to the Contractor in regard to payment as if the Contract had been terminated under the provisions of Clause **43.** (Outbreak of War) hereof, but in addition to the payments specified in Clause **43.3.** the Employer shall pay to the Contractor the amount of any loss or damage to the Contractor arising out of or in connection with or by consequence of such termination.

47.4. Nothing in this Clause contained shall prejudice the right of the Contractor to exercise, either in lieu of or in addition to the rights and remedies in this clause specified, any other rights or remedies to which the Contractor may be entitled.

Variations in Costs

48. Where adjustments are to be made in respect of rise or fall in the cost of labour and/or materials or any other matters affecting the cost of execution of the Works these are as set out in Part II in the Clause numbered **48.**

Customs and Import Duties

49.1 The obligations of the Employer and the Contractor in respect of the payment of Customs and Import Duties shall be as set out in Part II.

49.2. The Employer will assist the Contractor where required in obtaining clearance through the Customs of all Plant and Contractor's Equipment and in procuring any necessary Government consent to the re-export of Contractor's Equipment upon removal from the Site.

Note
For Conditions of Particular Application - See Part II.

PART II - CONDITIONS OF PARTICULAR APPLICATION

The following notes are intended as an aide-memoire in the preparation of clauses (some of which are dealt with but not exhaustively in Part I) which will vary as necessary to take account of the circumstances and locality of the Works. These variable clauses which must be specially prepared to suit each particular contract should cover such of the undermentioned matters and any others as are applicable.

Clause 1. Definitions

Employer. The Employer is .....
Engineer. The Engineer is .....

Clause 5.1. Language/s

Language. The language/s is/are .....
The ruling language is .....

Clause 20. Labour

10., 11. etc. Permits for imported labour control health hours and conditions rates of pay compliance with labour legislation.

Clause 31. Delay in Completion

If it is desired to offer a compensating bonus for early completion details should be inserted in Part II.

Clause 37.5. Progress Payments

Provision for Progress Payments during manufacture at Contractor's Works.

Clause 40.4. Payment in Foreign Currencies

Foreign currencies in which payment to be made proportions rate of exchange and conditions applicable thereto.

Clause 48. Variations in Costs

In appropriate cases this clause should cover such matters as:
Adjustment of contract price by reason of alteration in rates of wages and allowances payable to labour and local staff: change in conditions of employment of labour and local staff; change in cost of materials for permanent or temporary works or in consumable stores fuel and power; variation in freight and insurance rates; Customs or other import duties; the operation of any law statute etc.

Clause 49. Customs and Import Duties

Method of payment whether by Employer or Contractor. Whether included in or excluded from Contract Price.

Clause 50. Taxation

Payment of or exemption from local income or other taxes both as regards the Contractor and his staff.

Clause 51. etc. Miscellaneous

In certain cases it may be desirable to insert clauses to cover (and number accordingly) such matters as:

a. regulations governing importation and use of explosives for blasting;
b. bribery and corruption;
c. photographs of the Works and advertising;
d. undertakings regarding non-disclosure of secret information;
e. any other matters special to the contract.

Final Clause. Law Governing Contract

This clause should state the country to the law of which the contract is subject and in accordance with which it will be construed.

Note. The specially prepared Clauses should be substituted for this Aide-Memoire, which is to be detached when inviting tenders.