

Project:

REPLACE 56" ABQAIQ YANBU PIPELINE (AY-1L) – SECTION 7
SOLAR POWER SYSTEM

Contract No. (SA)
6601019567

SA BI No.
BI-10-01575

Document No.
SA-AYPP-MTA-009

SAUDI ARABIAN OIL COMPANY

CONTRACT FOR THE
ENGINEERING, PROCUREMENT AND CONSTRUCTION

**REPLACE 56" ABQAIQ YANBU PIPELINE (AY-1L) –
SECTION 7**

SOLAR POWER SYSTEM

S.A. DUMMY #:
LZIK-K18-17-A065-DA

PREPARED BY

WORLEY

FOR

BIN QURAYA COMPANY LIMITED

Revision - 00 -



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Section 1

Scope Of Supply

Project:

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1.1. **SCOPE OF SUPPLY - SOLAR POWER SYSTEM**

Vendor shall be responsible for the design, engineering, supply of materials, manufacturing, assembly, shop testing and packing for delivery of materials listed in the present requisition.

Vendor shall assume responsibility for the design, engineering, fabrication, inspection testing and shipment.

Items shall comply with all the applicable standards code and regulations.

All items not specifically mentioned in this specification, but necessary and required to form an operational system as described herein, shall be identified and provided by the Vendor as part of the system.

Any errors or omissions in this specification shall not absolve the Vendor from the responsibility of designing and providing complete and fully functional equipment as described in this requisition.

The design / manufacturing of the Items / Materials shall be in accordance to all specifications, drawings, procedures, standards and other documents attached hereto and with the best modern practice and shall be such to facilitate inspection, cleaning, maintenance and repair to ensure satisfactory operation of the Items / Materials under all service Conditions

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1.2. EQUIPMENT / MATERIAL DESCRIPTION

A. **LINE-ITEM NO. 001: SOLAR POWER SYSTEM**

| 9COM | DESCRIPTION OF 9COM | LOI |
|------------|---|-----------------|
| 6000001239 | POWER SUPPLY SYSTEM: SOLAR, PHOTOVOLTAIC TYPE, OFF-GRID, INCLUDING ALL COMPONENTS & ACCESSORIES | NON-INSPECTABLE |

A.1 MATERIAL DESCRIPTION

SOLAR SYSTEM: 24VDC, PHOTOVOLTAIC, SYSTEM UNIT CONSISTS OF THE FOLLOWING PRIMARY COMPONENTS:

- AN ARRAY OF PHOTOVOLTAIC MODULES. (EACH STRING OF SOLAR PHOTOVOLTAIC MODULE SHALL BE EQUIPPED WITH A SHOTTKY BLOCKING DIODE). MODULES SHOULD BE MONO-CRYSTALLINE AND POLY-CRYSTALLINE TYPE ONLY.
- AN ARRAY CONTROL CENTER (CONSISTING OF PMW CHARGE CONTROLLER, METERING & CONTROL CIRCUITS, INTERCONNECTING HARDWARE, WIRING AND ENCLOSURES, COMBINER JUNCTION BOX, SOLAR MODULE JUNCTION BOXES)
- SUPPORTING STRUCTURES, HOT-DIPPED GALVANIZED PER ASTM A123.
- 24VDC POWER PANEL

SOLAR ARRAY ANGLE CALCULATION

BATTERIES SHALL BE NICKEL CADMIUM AND IN COMPLIANCE WITH 17-SAMSS-511.

GROUNDING & LIGHTNING PROTECTION FOR COMPLETE SOLAR SYSTEM AS PER SAES-P-111.

THE PROVIDED PHOTOVOLTAIC SYSTEM SHOULD BE FULLY COMPLIANCE WITH SAES-P-128 & SAES-P-103.

FUSED DISCONNECT COMBINER BETWEEN PV ARRAYS AND CHARGE CONTROLLER.

VENDOR SHALL BE RESPONSIBLE FOR SOLAR SYSTEM DESIGN, ASSEMBLY AND SUPPLY OF MATERIALS, ASSISTANCE AND SUPERVISION FOR INSTALLATION, TESTING AND COMMISSIONING OF 24VDC SOLAR SYSTEM.

ALL REQUIRED HARDWARE, SOFTWARE SYSTEM ENGINEERING AND SERVICES, DOCUMENTATION AND ACCESSORIES TO FORM A COMPLETE AND FUNCTIONAL WORKING SYSTEM TO PROVIDE POWER TO THE NEW EQUIPMENT IN ACCORDANCE WITH SAUDI ENGINEERING STANDARD SAES-P-128 & SAES-P-103.

SOLAR (PHOTOVOLTAIC) POWER SUPPLY SHALL BE SUPPLIED IN ACCORDANCE WITH THE BELOW DATA.

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SYSTEM DESIGN OPERATION:

BATTERY CAPACITY: FULLY CHARGED - 5 DAYS FULL OPERATION OF ELECTRONIC LOAD WITHOUT SOLAR CHARGING. THE SOLAR PANELS TO BE USED SHALL HAVE DEMONSTRATED AT LEAST FIVE (5) YEARS OF FIELD USE IN SAUDI ARABIA OR OTHER MIDDLE EASTERN DESERT ENVIRONMENTS. THE PHOTOVOLTAIC BATTERY SYSTEM SHALL BE DESIGNED AND SIZED IN ACCORDANCE WITH SAUDI ENGINEERING STANDARD SAES-P-103.

SOLAR PANEL STRUCTURE AND MOUNTING

THE SOLAR PANEL STRUCTURE AND MOUNTING SHALL MEET THE FOLLOWING REQUIREMENTS:

1. ALL SUPPORTING STRUCTURE AND HARDWARE SHALL BE OF NON-CORROSIVE MATERIALS.
2. THE ENTIRE STRUCTURE SHALL BE CAPABLE OF WITHSTANDING WIND VELOCITIES IN EXCESS OF 145 KM/HOUR WITHOUT DAMAGE.
3. THE SOLAR PANEL SUPPORT STRUCTURE SHALL BE MOUNTED AT THE OPTIMUM AZIMUTH AND TILT ANGLE FOR MAXIMUM ELECTRICAL OUTPUT DURING THE WINTER SOLSTICE.
4. SOLAR PHOTOVOLTAIC ARRAY SHALL BE DIRECTED TOWARD THE GEOGRAPHICAL SOUTH (± 5 DEGREES).
5. SUPPORTING STRUCTURE SHALL BE DESIGNED IN ACCORDANCE WITH 12-SAMSS-007

FOUNDATION DESIGN DATA

THE VENDOR SHALL PROVIDE ALL DATA REQUIRED FOR PERFORMING THE FOUNDATION DESIGN. AS A MINIMUM, THE VENDOR SHALL PROVIDE BEARING LOADS AND WIND INDUCED FORCES ON THE FOUNDATION FOR THE SOLAR PANEL ARRAY FOUNDATIONS.

THE VENDOR SHALL PROVIDE ANCHOR BOLT SPECIFICATIONS, SIZE, TYPE, LOCATION AND PROJECTION. REFER TO ARAMCO STANDARD DRAWING AA-036322.001 REV. 08 FOR ANCHOR BOLT DETAILS.

SERVICE CONDITIONS:

THE PHOTOVOLTAIC (SOLAR) POWER SUPPLY ASSEMBLY SHALL BE WEATHERPROOF, CORROSIVE RESISTANT, SUITABLE FOR CONTINUOUS OPERATION AT 56°C EFFECTIVE AMBIENT TEMPERATURE AND IN ACCORDANCE WITH SAUDI ENGINEERING STANDARD SAES-A-112.

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A.2 BILL OF MATERIALS: 01 BOM SA-AYPP-MTA-009 SOLAR POWER SYSTEM

A.3 SUBCOMPONENT LIST:

VENDOR SHALL PROCURE THE SUBCOMPONENT THROUGH THE FOLLOWING 9COM

| 9COM | DESCRIPTION | SAMSS | SA-175 FORM | IR LEVEL |
|------------|--------------------------------------|--------------|-------------|----------|
| 6000001076 | BATTERY: NICKEL-CADMIUM STA. STORAGE | 17-SAMSS-511 | NA | Level 0 |
| 6000000859 | PANELBOARD; LOW VOLTAGE, NON-XPROOF | 16-SAMSS-518 | NA | Level 0 |

A.4 NOTES:

- THE ATTACHED BILL OF MATERIAL IS AS PER 60% DESIGN DOCUMENTS AT THIS STAGE AND IS SUBJECT TO CHANGES AS PER DETAILED DESIGN DEVELOPMENT.
- FINAL TAG NUMBERS, DESIGN PARAMETERS, AND TECHNICAL SPECIFICATIONS SHALL BE AS PER APPROVED IFC DESIGN PACKAGE.
- FINAL COUNT WILL BE CONFIRMED UPON PLACEMENT OF PURCHASE ORDER.
- SUB-ORDERS SHALL BE UNDER PROJECT STANDARD CUT-OFF **31 MAY 2023**.
- VENDOR SHALL SUBMIT SVL FOR THE ARAMCO APPROVAL AND ALL SUB ITEMS SHALL BE PROCURED FROM ARAMCO APPROVED SOURCE.

A.5 REFERENCES

NOTE-1:

SAUDI ARAMCO STANDARDS CUT-OFF DATE - **31 MAY 2023**.

NOTE-2:

REFERENCES TO SAUDI ARAMCO REQUIREMENTS, PROJECT SPECIFIC DOCUMENTS AND SPECIFICATIONS ARE LISTED IN PARA 1.6

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1.3. **SPARE PARTS DATA PACKAGE**

The Spare Part Data Package (SPDP) requirements for this enquiry / purchase requisition shall be based on the vendors recommendations for two (2) years operating spare parts.

The SPDP is required to be submitted in accordance with SAUDI ARAMCO procedure SAEP-31:

Appendix B - Spare Parts Data Package Submittal Plan Format

Appendix C - Supplier Instructions

Appendix D - General Cataloguing Criteria & Equipment Templates

Appendix E - Equipment Prices Spare Parts List - Request for Waiver from SPDP (SAEP-302)

A capital spare parts list for two (2) years operation is also required.

The SPDP, unless specified to the contrary, requires delivery of both hard copy (as referenced above) and electronic copy data (via CD). The SPDP is to be submitted no later than 90 calendar days prior to the shipment date of the equipment.

The supplier shall note that at least 20% of the full value of this purchase order will be withheld until all of the applicable SPDP requirements have been delivered and accepted by SAUDI ARAMCO or BIN QURAYA COMPANY LIMITED.

Supplier must use the forms and formats provided for the data to be considered acceptable.

The SPDP shall be prepared in accordance with:

SAUDI ARAMCO SPARE PARTS DATA PACKAGE (SPDP)

SAEP-31 - Corporate Equipment and Spare Parts Data Requirements and Responsibilities

Data Requirements Appendices - For LSTK CONTRACTOR Procured Equipment

Hard copies 3 nos. and soft copy 1 no.

1.4. **START-UP COMMISSIONING SPARE PARTS**

Start-up and Commissioning Spare Parts, being parts or components required during construction, pre-commissioning and commissioning.

Start-up and Commissioning Spare Parts shall be advised by the supplier and agreed by SAUDI ARAMCO Spare parts data shall be submitted in accordance with Spare Data Package (SPDP) appendices C and D.

The supplier shall provide a list of start-up spares required for commissioning and start-up. This shall also be provided in electronic media via CD. This list shall identify all materials required by:

- Manufacturer Part Number
- Description
- Quantity recommended

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- Unit Of
- Issue Price
- Volume
- Unit weight of each item if greater than one pound (1 lb)

Spare parts and data shall be in accordance with attached documents listed below and technical specification attached.

1.5. INCIDENTAL SERVICES (IF REQUIRED)

1.5.1 Detailed Scope of Work

Technical / Commissioning assistance from the vendor is required to include in the following:

- Installation Supervision – if required
- Commissioning / site acceptance testing – if required
- Training and system support – if required
- Other assistance required in the technical specification – if required

1.5.2 Estimated Date of Installation

Vendor to advise

1.5.3 Expected Duration (Number of Days or Weeks) of the Incidental Services

Vendor to advise

1.5.4 Job Titles and Rates

Vendor to provide the Job Title and rates of all required personnel

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1.6. LIST OF ATTACHMENT

Note: Any of the Engineering Standards, Procedures, Specifications, Mandatory Drawings cross referenced in the following Standards and Documents shall be taken from **31 MAY 2023** issue of **SAUDI ARAMCO** Desktop Standards.

| DOCUMENT | SHT. | REV. | ISSUE DATE | TITLE |
|--|---------|------|------------|--|
| ENGINEERING DATA SHEETS / TECH SPECS / DRAWINGS/ETC | | | | |
| BOM | | | | BILL OF MATERIAL |
| VE -077567 | 001 | B | 10/19/2025 | DATA SHEET - POWER PANEL K18-(SP-001)-PP-0001 |
| VE-077568 | 001-004 | B | 10/19/2025 | DATA SHEET: STATIONARY BATTERIES K18-(SP-001)-SB-0001 |
| VE-077552 | 001 | B | 10/19/2025 | DATA SHEET - POWER PANEL K18-(SP-002)-PP-0001 |
| VE-077553 | 001-004 | B | 10/19/2025 | DATA SHEET: STATIONARY BATTERIES K18-(SP-002)-SB-0001 |
| VE -077582 | 001 | B | 10/19/2025 | DATA SHEET - POWER PANEL K18-(SP-003)-PP-0001 |
| VE-077583 | 001-004 | B | 10/19/2025 | DATA SHEET: STATIONARY BATTERIES K18-(SP-003)-SB-0001 |
| VA-077561 | 001 | B | 10/19/2025 | EIL-MLIV STATION @ KM. 3.40 |
| VA-077546 | 001 | B | 10/19/2025 | EIL-MLIV STATION @ KM.19.400 |
| VA-077576 | 001 | B | 10/19/2025 | EIL-MLIV STATION @ KM. 34.00 |
| VE- 200705 | 001-017 | B | 10/19/2025 | SOLAR SYSTEM SIZING CALCULATION |
| SAUDI ARAMCO MATERIAL SYSTEM SPECIFICATIONS | | | | |
| 16-SAMSS-518 | | | 08/24/2021 | Low Voltage Panel boards |
| 17-SAMSS-511 | | | 11/23/2021 | Stationary Storage Batteries |
| SAUDI ARAMCO ENGINEERING STANDARDS | | | | |
| SAES-M-001 | | | 05/30/2022 | Structural Design Criteria for Non-Building Structures |
| SAES-A-112 | | | 06/27/2022 | Meteorological and Seismic Design Data |
| SAES-A-202 | | | 12/12/2022 | Saudi Aramco Engineering Drawing Preparation |
| SAES-J-902 | | | 03/26/2020 | Electrical Systems for Instrumentation |
| SAES-P-100 | | | 04/28/2022 | Basic Power System Design Criteria |
| SAES-P-103 | | | 03/27/2022 | UPS and DC Systems |
| SAES-P-104 | | | 12/29/2021 | Wiring Methods and Materials |
| SAES-P-111 | | | 11/09/2021 | Grounding |
| SAES-P-128 | | | 02/28/2022 | Off-grid Solar Photovoltaic (PV) System with Battery Storage |
| SAUDI ARAMCO ENGINEERING PROCEDURES | | | | |

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| DOCUMENT | SHT. | REV. | ISSUE DATE | TITLE |
|--|------|------|------------|---|
| SAEP-31 | | | 03/16/2023 | Corporate Equipment and Spare Parts Data Requirements and Responsibilities |
| SAEP-302 | | | 03/15/2023 | Waiver of a Mandatory Saudi Aramco Engineering Requirement |
| SAEP-350 | | | 03/22/2021 | Regular Maintenance and Testing for Industrial Stationary Batteries |
| SAEP-385 | | | 02/25/2021 | Preservation of Project Materials and Equipment |
| SAEP-1142 | | | 04/17/2022 | Qualification of non-Saudi Aramco NDT Personnel |
| SAEP-1151 | | | 01/12/2021 | Inspection Requirements for Contractor Procured Materials and Equipment |
| SAUDI ARAMCO STANDARD DRAWINGS | | | | |
| AA-036322 | 001 | 08 | 12/2020 | Anchor Bolt Details, Inch and Metric Sizes |
| DD-950022 | 008 | 00 | - | Ground Connections Details Structural Steel to Ground Grid |
| SAUDI ARAMCO INSPECTION FORMS | | | | |
| 175-000003 | | | 09/2021 | Detailed Instructions of Inspection and Testing Requirements |
| NON-MATERIAL REQUIREMENT FORMS | | | | |
| SA-7930-1 | | 00 | 10/21/2025 | Non-Material Requirements for Stationary Battery |
| SA-7930-2 | | 00 | 10/21/2025 | Non-Material Requirements for LV Panelboards |
| SA-7930-3 | | 00 | 10/21/2025 | Non-Material Requirements for Solar System |
| WPECC-SDS-0001 | | | | Supplier Document Schedule |
| SAUDI ARAMCO PACKING SPECIFICATIONS | | | | |
| MS 8314-00 | | | 05/2005 | General Packing Specification for Containerizable, Air Shipment, and Overland Transport Cargo |
| MS 8314-02 | | | 05/2005 | General Packing Specification for Break Bulk Cargo |
| MS 8314-04 | | | 05/2005 | Wooden Crate Packing Specification |
| MS 8314-10 | | | 05/2005 | General Packing Specification for Spare Parts |
| MS 8444-14 | | | 05/2005 | Additional Packing, Packaging and/or Marking Requirements |

**BILL OF MATERIALS - SOLAR POWER SYSTEM
AY-1L PIPELINE SECTION - 7**

REFERENCE MR [SA.AYPP-MTA-009](#)

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| MR L/I | 9COM | LOI | PLANT No.: | PIPELINE | LOCATION | MATL / EQPT TYPE | SOLAR CHARGER CONTROLLER TAG NUMBER | RATING | ELECTRICAL ONE-LINE DIAGRAM | STATIONARY STORAGE BATTERIES TAG NUMBER | COMPONENTS DATA SCHEDULE | | POWER PANEL TAG NO. | DATA SCHEDULE OF POWER PANEL | SOLAR SIZING CALCULATION | TOTAL MR QTY | | Remarks |
|--------|------------|-----|------------|----------------|---------------------|----------------------|-------------------------------------|--|-----------------------------|---|--|------------------------------|--|------------------------------|--------------------------|--------------|------|---------|
| | | | | | | | | | | | CHARGE REGULATOR | STATIONARY STORAGE BATTERIES | | | | QTY | UNIT | |
| 1.1 | 6000001239 | NI | K18 | AY-1L PIPELINE | MLIV - 1 @KM. 3.40 | SOLAR (PHOTOVOLTAIC) | K18-(SP-001)-BC-0001 | 24 VDC 400 AMP 1400 AH (4 SETS) @ C5 | VA-077561.001 | K18-(SP-001)-SB-0001 | VENDOR TO PROVIDE DATA SHEET OR PRODUCT CATALOG FOR CHARGER CONTROLLER | VE-077568 | K18-(SP-001)-PP-0001 | VE - 077567.001 | VE-200705 | 1 | SET | |
| 1.2 | 6000001239 | NI | K18 | AY-1L PIPELINE | MLIV - 2 @KM. 19.40 | SOLAR (PHOTOVOLTAIC) | K18-(SP-002)-BC-0001 | 24 VDC 30 AMP 325 AH (1 SET) @ C5 | VA-077546.001 | K18-(SP-002)-SB-0001 | VENDOR TO PROVIDE DATA SHEET OR PRODUCT CATALOG FOR CHARGER CONTROLLER | VE-077553 | K18-(SP-002)-PP-0001 | VE - 077552.001 | VE-200705 | 1 | SET | |
| 1.3 | 6000001239 | NI | K18 | AY-1L PIPELINE | MLIV - 3 @KM. 34.00 | SOLAR (PHOTOVOLTAIC) | K18-(SP-003)-BC-0001 | 24 VDC 400 AMP 1400 AH (4 SETS) @ C5 | VA-077576.001 | K18-(SP-003)-SB-0001 | VENDOR TO PROVIDE DATA SHEET OR PRODUCT CATALOG FOR CHARGER CONTROLLER | VE-077583 | E31-E31-SOLAR-PP-003 E31-E31-SOLAR-PP-004 | VE-077582.001 | VE-200705 | 1 | SET | |