Supply, Installation, and Commissioning to Upgrade Ph4 Atmospheric Drain Tank Pump (40MAL33AP001 /40MAL34AP001)

1. Introduction and Project Background

Samra Electric Power Company (SEPCO) is implementing upgrades to the Atmospheric Drain Tank (ADT) system at the Samra Power Plant to enhance reliability and prevent overflow during steam turbine startups. The existing pumps operate at approximately 86.5 m^3/h (~23.5 kg/s based on density of 977 kg/m^3), which has proven insufficient for peak condensate loads. To address this, SEPCO requires three (3) new horizontal centrifugal pumps: two (2) for installation with flow capacities of 28 kg/s and 34 kg/s, and one (1) as a strategic spare with flow capacity 45 kg/s.

This RFQ seeks proposals for the supply, testing, delivery, and installation/commissioning services. Vendors are required to show a clear understanding of pump-system interactions and to quantify the impacts on existing infrastructure through an analysis of system hydraulics, foundation needs, and electrical infrastructure considerations, and the importance of technical compliance, hydraulic performance.

2. Scope of Supply and Services

The total scope is for three (3) complete pump-motor assemblies and the turnkey installation of two units.

1. **Supply of Three (3) Pump-Motor Assemblies as attached Specification sheet:**
    - **Unit 1.1 (To be Installed):** Rated for 28 kg/s flow.
    - **Unit 1.2 (To be Installed):** Rated for 34 kg/s flow.
    - **Unit 1.3 (Spare):** Rated for 45 kg/s flow.
2. **On-Site Installation & Commissioning (For Units 1.1 & 1.2):**
    - Dismantling and removal of the two existing pumps.
    - **Execution of all required civil, mechanical, and electrical modifications.**
    - Supervision of commissioning, performance verification.

3. Vendor Requirements and Submittal Documents

Samara requires that bidders thoroughly analyze the integration of the proposed equipment into our existing facility.

3.1 Hydraulic and System Analysis

3.1.1 System Curve and Operating Point Analysis:

The vendor shall perform a comprehensive hydraulic analysis of the existing system under the new operating conditions to ensure the selected pump(s) will operate reliably and efficiently.

- **System Curves:** Calculated system head curves for all required flow conditions, clearly delineating static head and friction head components.
- **NPSH Analysis:** $NPSH_a$ calculations for the new flow rates, including a detailed line-by-line friction loss analysis from the supply source to the pump suction nozzle.
- **Operating Point Verification:** A plot of the pump performance curve overlaid on the system curve, demonstrating the guaranteed operating point falls within 70% to 110% of the pump's Best Efficiency Point (BEP).
- **Fluid Velocity Check:** A calculation confirming fluid velocities in all sections of the existing pipework will remain within acceptable engineering limits (e.g., ≤ 3 m/s for suction lines, ≤ 4.5 m/s for discharge lines, or as per ASME/API guidelines).
- **Justification:** A written justification for the pump selection, including an analysis of pump efficiency at the operating point and a comparison to alternative options.
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3.1.2 Piping and Nozzle Load Analysis:

The vendor shall confirm the existing piping infrastructure can accommodate the increased flow.

- **Nozzle Load Limits:** the maximum allowable external forces and moments (in N and N-m) on both suction and discharge nozzles for the proposed pumps, per API 610 Table 5 or an equivalent standard
- **Nozzle Orientation and Location:** Confirm the exact location and orientation of all nozzles on the GA drawing. For suction nozzles, follow best practices to avoid cavitation: ensure a straight run of at least 5 pipe diameters upstream and 2 diameters downstream of any flow disturbance where possible
- **Flange Specification:** Confirm that all nozzles are equipped with flanges conforming to **ASME B16.5** for the specified pressure class
- **Compliance Statement:** A declaration that, based on the provided piping layout, the vendor's pump can accommodate the resulting nozzle loads without requiring special piping arrangements or supports.

3.2 Infrastructure Impact Analysis

3.2.1 Electrical Analysis:

The vendor shall ensure full electrical compatibility with the existing infrastructure.

- **Power Calculations:** Final motor size (kW), Full Load Amps (FLA), and Locked Rotor Amps (LRA) for the proposed pump(s), including service factor justification.
- **Circuit Compatibility:** Explicit confirmation that the FLA of the new motor(s) does not exceed the capacity of the existing 52.8 A circuit.
- **Cable:** Specify the required cable size (mm^2) based on the motor's FLA and a presumed cable run of [105 m length, multicore cables, G4010A].
- **Protection Sizing** :Provide recommended settings for the Motor Protection Circuit Breaker (MPCB) or thermal overload relay.
- **Starting Method:** Analysis of starting current and a recommended starting method (e.g., Direct-On-Line, Star-Delta, Soft Starter) to ensure compatibility with the existing Motor Control Centre (MCC).
- **Deviation Clause:** Major Technical Deviation: If the selected pump requires a motor larger than the 30 kW baseline or exceeds the 52.8A circuit capacity, the vendor must declare this. The proposal must include a fixed price for the complete scope of necessary electrical upgrades (e.g., new feeders, MCC bucket replacement, relay coordination study).

3.2.2 Foundation and Structural Analysis:

The vendor shall provide all necessary data to assess the impact on the existing foundation.

- **General Arrangement (GA) Drawings:** For all proposed pump skids, clearly indicating:
  - Overall baseplate dimensions and footprint.
  - Operating weight (wet, static) and dynamic service weight.
  - Center of gravity.
  - Anchor bolt locations, size, grade, and required embedment depth.
  - Foundation Load Vectors: A table specifying the magnitude and direction of all operating and seismic (if applicable) forces and moments at each anchor bolt location.
- **Foundation Modification**: confirm the proposed pump can be installed on the existing foundation with modifications limited to drilling new anchor bolt holes. If the dynamic loads or weight require a more extensive foundation redesign (e.g., cutting, re-pouring, or strengthening), this must be declared as a major technical deviation, and a fixed-price proposal for the redesign and modification must be included.
- **Grouting Specification:** Recommend a specific non-shrink grout material brand/type and specify the required installation thickness and technique.

4.0 Scope of Installation, Commissioning, and Site Services

The Vendor/Supplier shall provide a complete turnkey solution for the supply, installation, and commissioning of the pump systems. This includes all necessary civil, electrical, mechanical, and instrumentation work to ensure the new pumps are fully operational and integrated into the existing plant infrastructure. All work shall be performed by qualified personnel in accordance with applicable standards (e.g., API 686 for machinery installation).

4.1 Civil and Foundation Modification Services

- **Structural Assessment & Design:** evaluate the existing foundation's capacity and provide design drawings for any required modifications or enlargement.
- **Construction Services:** Execute all civil works, including but not limited to: excavation, supply and installation of additional rebar, setting of new anchor bolts, supply and placement of concrete with the specified strength, and application of non-shrink grout for final leveling and load transfer.

4.2 Electrical Installation Services

- **Cable Supply & Installation:** If the existing cables are inadequate for the new motor's Full Load Current (FLA), the Vendor shall **supply and install** new power and control cables of the correct size and type for a run of [105 m length, multicore cables, G4010A]. *(Note: If SEPCO provides the cable from stock, the cost of materials will be excluded, but the labour cost for installation remains within the Vendor's scope).*
- **Circuit Protection Upgrade:** Replacement of any existing circuit breakers, MPCBs, or fuses that do not meet the new motor's protection requirements (including starting current).
- **Starter/VFD Installation:** Supply, installation, and programming of any required soft starter or Variable Frequency Drive (VFD), including harmonic mitigation if necessary.
- **Termination & Testing:** Termination of all cables at the MCC and motor, followed by megger testing, continuity checks, and functional testing of all protection circuits.

4.3 Mechanical Installation and Piping Services

- **Pump Setting:** Precisely set the pump baseplate on the foundation using the provided anchor bolts and grout. Final leveling shall be within 0.2 mm/m.
- **Piping Modifications:** Fabricate and install all necessary new suction and discharge spools, flanges (ASME B16.5), and fittings to connect the new pump to the existing piping. This includes cutting, welding, bolting, and pressure testing of new connections.
- **Precision Alignment:** Perform laser shaft alignment between the motor and pump to within tolerances specified in API 686 (< 0.05 mm offset and angularity). Final alignment shall be confirmed with the coupling assembled and all pipe connections made.
- **Vibration Isolation:** Supply and install vibration isolation pads or mounts if required by the design.

4.4 Commissioning and Site Acceptance Testing (SAT)

- **Mechanical Running Test:** A continuous **4-hour operational test** at the normal operation flow. The test shall include continuous monitoring and recording of:
  - Vibration levels on all pump and motor bearings (as per ISO 20816).
  - Bearing temperatures.
  - Mechanical seal leakage performance.
- **Performance (Site Acceptance) Test:** A formal test to verify hydraulic performance. The Vendor shall **conduct tests at Normal Operation Flow**
  - **Flow Measurement:** where permanent flow meters are not available, the Vendor shall provide, install, and calibrate a clamp-on ultrasonic flow meter. The cost for this temporary arrangement must be included in the offer.

5. Certification & Documentation

- **Material & Certification Dossier:** Material Test Certificates (MTCs) to EN 10204 3.1 are required for all pressure-containing parts (casing, covers) and major wetted components (impeller, shaft).

- **Dossier:** The final dossier shall include all approved test reports, certificates, "As-Built" drawings, and Installation, Operation, and Maintenance (IOM) Manuals.
- **Pre-FAT Requirements:** Submit detailed test procedures, datasheets, and performance curves for SEPCO approval at least 4 weeks prior to FAT. No deviations allowed without written approval.
- **Factory Acceptance Testing (FAT):** Mandatory string test with actual delivery motor. Witnessed by SEPCO representatives.
    - **Hydraulic Performance Test:** Conduct per ISO 9906:2012 Grade 2B for hydraulic performance, ***with additional requirements***:
        - At nominal speed (Must match guaranteed speed within ±1% , and with actual delivery motor. Both raw data from the actual test speed and data corrected to the synchronous speed must be provided.
        - Measure head, flow, power, efficiency, $NPSH_3$ at 5 points minimum (MCF, 70% BEP, BEP, 110% BEP, 120% BEP).
    - **Vibration Testing:** Per ISO 20816-1 and ISO 20816-3, at (MCF, BEP, 120% BEP). with continuous monitoring for a minimum of (4 hours at BEP/rated point) and (1 hours At MCF and 120% BEP). **on all pump and motor bearing housings (horizontal, vertical, axial)**, For all measurements, both **overall broadband vibration velocity (mm/s RMS)** and **frequency spectrum analysis** (FFT) must be captured and reported.
    - **Bearing Temperature Testing:** Continuous monitoring for a 4-hour runtime after stabilization (with temperature stable within ±2°C for 15 minutes). A temperature vs. time graph should be provided for each bearing. The following limits must be adhered to: Bearing temperature rise should not exceed 40°C above ambient, the absolute bearing temperature must remain below 80°C, and the motor winding temperature should comply with the limits specified for each motor class.
    - **Noise Testing:** Per ISO 3744, Multi-Point Noise Testing at MCF, BEP, and 120% BEP. measuring from a distance of 1 meter from the pump casing. The report must include the background noise level and confirm that the overall noise level is below 85 dBA.
    - **Mechanical Seal Testing:** Visual inspection for any visible leakage throughout the test. The report must confirm zero visible leakage.
    - **Hydrostatic Testing:** Per ISO 5199/EN 12162, the test must last a minimum of 30 minutes at 1.5 times the design pressure. Document leak detection (both visual

and sensor) with photographic evidence, and monitor pressure stability (every 5 minutes, with no drop exceeding 5%). Provide a comprehensive log of pressure readings, leak inspections.

- **Retests required for non-compliance; costs borne by supplier.**

- **Witness Testing Requirements**
  - SEPCO reserves the right to witness all FAT procedures
  - The Vendor should provide SEPCO with a preliminary test schedule a minimum of six (6) weeks prior to the proposed test dates.
  - A formal written invitation, confirming the exact date, time, and location of the test, must be sent to SEPCO's designated representative no less than three (3) weeks in advance.
  - Full Access to all test facilities, the equipment under test, and all measurement devices.
  - The vendor shall be responsible for the **full costs** for **two (2) of SEPCO's representatives** to witness the tests. This includes:
    - Economy class round-trip flight tickets.
    - Hotel accommodation (minimum 4-star standard).
    - Local transportation (to/from the airport and test facility).
    - A reasonable per diem for meals and incidental expenses.
    - Visa processing fees (if applicable).

Attachment

1- Specifications Compliance Sheet
2- Price Schedule
3- Foundation Drawing
4- General Arrangement
5- Atmospheric flash Tank Drawing
6- System PI&D
7- System ISOMETRIC Drawing
8- Pump Wiring Diagrams
9- Pump Routing Cables
10- Site Photos

شركة السمرا لتوليد الكهرباء
العطاءات
دائرة المشتريات

Item No	Description of Item	Unit	Quantity	Unit price EXW JOD	Costs for the delivery of the Goods to their final destination JOD	Total Price JOD
1	Supply and delivery of a pump with motor for three pumps,					
1.1	Flow 28 kg/s (to be installed)	each	1			
1.2	Flow 34 kg/s (to be installed)	each	1			
1.2	Flow 45 kg/s (as spare)	each	1			
2	On-site installation cost includes all necessary civil, electrical/control, and mechanical works required for the installation of 2 pumps, such as:					
2.1	Civil Foundation modification if the existing foundations require enlargement, may include but is not necessarily limited to the following: excavation work, Supply and installation of additional rebar, anchor bolts, Supply and place concrete of the appropriate strength and characteristics, Supply and apply the appropriate grout material to ensure a seamless transition and load transfer.	each	2			
2.2	Replacement of existing electric power cable, if needed, as per the following details:					
2.2.1	Cost of cable: The supply of cables will depend on the motor rating of the new pump. If the existing cable does not meet the required qualifications of the new motor, your offer should specify the cable size and provide the price for supplying it. If the cable size is available in SEPCO's stock, it will be provided, and the cost of the cable will be excluded from the offer. Otherwise, the supplier will need to supply the cable.	each	2			
2.2.2	Cost of replacing the cables: This is within the supplier's scope, regardless of whether the cable is provided by the supplier or SEPCO.	each	2			
2.3	Replacement of circuit breaker to match meet the required qualifications of the new motor, if needed	each	2			
2.4	Connection with the existing instrument protection and system configuration	each	2			
2.5	the fabrication of new suction and discharge flanges, if required, as well as the mechanical installation of the pump according to best practices and standards (e.g., API 686) includes the following: Fabrication of New Suction and Discharge Flanges, Removal and Replacement of Existing Fittings, Welding/Bolting the Fabricated Flanged Connections, Fix the pump and motor onto the base plate, ensuring proper alignment and positioning, Align the pump and motor axes and assemble the flexible coupling and torque meter as required, Set the base frame, align it, and secure it to the foundation using anchor bolts.	each	2			
3	The commissioning services cost includes: * Four hour Mechanical Running Test to monitor vibration,and bearing temperatures, check the mechanical seal performance	each	2			
	** Option: Site Acceptance Test of three (3) test points (rated flow, normal flow, and MCF) Where no permanent flow instruments available at site, Vendor/Supplier shall make necessary arrangements (such as clamp type ultrasonic flow meters to avoid modifications at site).	each	2			

4	Certifications 1- Hydraulic performance test Acceptance standard: ISO 9906 class 2B 2- Vibration and noise levels test: Acceptance criteria acc. to norm selected for performance test 3- Bearing temperatures and mechanical seal performance shall be recorded during the performance testing. 4- Hydrostatic Testing 5- MTC for pressure containing parts, impellers, shafts, and other wetted components shall be provided in accordance with EN 10204,3.1	each	3			
5 *Option	The FAT witnessed test cost should include flight tickets and full accommodation (hotel, meals, and local transportation)	person	2			
					Total Cost	0

A lumpsum cost offer will not be accepted.

Notes
We reserve the right to exclude certain phases that can be executed internally by Samra or eliminate them based on cost and benefits.
we request that you utilize the standardized price schedule form provided, which includes all applicable line items and pricing.
we require that you complete the compliance sheet provided, detailing how your technical proposal meets or surpasses the functional requirements specified in our specifications. If there are any deviations from our requirements, please include comments explaining the deviations for each item that does not comply.
Please note that any submission which does not include both the above-mentioned documents completed as requested will be considered non-compliant and disqualified from further consideration for this tender.