MATERIAL REQUISITION FOR MULTIPHASE PUMP PACKAGE (20PU003)

PETROCIL ENGINEERS & CONSULTANTS PVT LTD

JO/APC-HC160-MR-M010057

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1.0 INTRODUCTION

The Humma, Arq, South Fuwaris Future Growth Project will be implemented to address capacity, reliability and operability challenges at SC-20 area. Currently, SC-20 acts as a gathering hub collecting from SC-20, SC-25 and SC-39 with plans to increase production through additional wells and new satellite sub-centers.

The main objective of the Humma, Arq, South Fuwaris Growth Project is to increase SC-20 handling capacity and construct new processing equipment at SC-23. Contractor will install Multiphase Pump (MPP) technology to collect and transfer all well fluids from SC-20 to SC-23 for separation and further tie-in to existing facility. Scope of work includes new trunk line from SC-20 to SC-23 for processing, including new trunk line from SC-23 to MGC. The project scope also includes new facilities installed by Contractor in SC-23 to handle SC-20 production. SC-20 is an existing facility inside partitioned zone in Saudi Arabia side, whereas SC-23 is an existing facility located in Kuwait side.

The following major equipment and systems shall be installed in SC-20 and SC-23 as part of this project:

At SC-20:

- Multiphase pumps package with VFD and E-Rooms
- Underground drain tank
- New trunk line between SC-20 and SC-23
- Instrument Air package
- Chemical Injection skids
- PCS, ESD and F&G systems
- Electrical equipment (Transformers, Switchgears, E-SCADA, IRP, UPS etc.)
- Power Control Room (PCR) with Transformers, bus ducts, MV and LV switch gears, Neutral Earthing Resistors (NER), AC and DC UPS, Battery banks, FACP, Distribution boards, Clean Agent System, HVAC, Lighting, Small power socket system, etc.
- Emergency Diesel Generator complete with load bank and day storage tank
- Tie-in works

At SC-23:

- 2 phase Production Separator
- Gas Scrubber
- Relocated Gas Scrubber from SC-20
- New trunkline between SC-23 and MGC
- PCS, ESD, F&G and IRP Panels
- Separate Gas and Liquid flow meters
- Chemical Injection skids
- Tie-in works

2.0 GENERAL

2.1 Purpose

This Material Requisition defines the minimum technical requirements for the Design, Manufacturing, Inspection, Testing, Preservation, Seaworthy packaging, Supply, Shipment and

Guarantee of API 676 3rd Edition Multiphase Pump Package along with its drivers, auxiliaries & accessories.

2.2 Definitions

Project	:	Humma, ARQ South Fuwaris Future Growth Project
Company /Owner	:	Wafra Joint Operations (WJO)
Contractor / Buyer	:	Alkhorayef Petroleum Company
Vendor	:	Manufacturer or Supplier of a particular equipment, package or materials.
Engineering Consultant	:	Petrocil Engineers & Consultants Private Ltd

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2.3 Order of Precedence

The following order of precedence shall be followed when using codes and standards.

- Project Specifications
- JO Standards/Specification and JO standard drawings
- KOC standards, Specifications, Recommended Practices and KOC standard Drawings
- Chevron Engineering Standards (CES)
- International Industry Standards

2.4 Applicable Documents

Applicable Specifications, Datasheets, Codes and Standards are listed in Clause 4.0 of this document.

It is VENDOR's responsibility to inform officially if any particular document listed / referenced in this material requisition (MR) and specifications is / are not in receipt. The absence of an official request of the missing document from VENDOR shall be construed that the VENDOR had received all concerned documents in this MR. Therefore, neither deviation nor waiver, relevant to any missing document will be accepted by BUYER. It is VENDOR's responsibility to be familiar with all the technical specifications and highlight any contradiction or inconsistency between BOM, specifications and datasheets.

All technical clarifications sought and confirmed by VENDOR during pre-order stage shall be made part of Purchase Order, whether reflected or not in specifications / data sheets attached with the material requisition.

2.5 Language

All correspondence, drawings, instructions, data sheets, and any other written information shall be in the English language.

2.6 Units of measurement

All units of measurement shall be in SI Units.

3.0 SCOPE OF SUPPLY

3.1 Equipment List

The items to be supplied are listed below;

Item no.	Tag No.	Service Name	UOM	Total Qty.
1.	20P003 A/B/C	Multiphase Pump Package (Skid)	No.	3

3.2 Supply Items and Battery Limits

The Vendor shall supply Multiphase Pump Package in compliance with Technical Specification for Multiphase Pump Package (JO/APC-HC160-SP-M010039) and other documents referenced in Cl 4.0 of this Material Request. Vendor shall be responsible for sizing, design, materials, fabrication, inspection, non-destructive examination, shop testing, documentation and preparation for shipment of the Multiphase Pump Package.

Vendor's scope of supply shall include, but not be limited to the following:

- Rotary Screw MPP in accordance with API 676 3rd edition with electrical motor and VFD Variable Frequency Driver.
- Motor provided with multifunctional meter in the switchgear, VSD provided with necessary outputs as required to interface with ESCADA and PCS for various control/monitoring.
- Lube oil system and Seal oil system for multiphase operation in conformance with API 614.
- Double acting mechanical seal meeting the intent of API 682.
- Flexible Coupling designed in accordance with API 671, 5th Edition.
- Package Equipment Control system (PECS) (including 2x laptop and PLC software) for control, monitoring and shutdown of package electrical drives, pumps, Lube oil / Seal oil system, VSD, valves and instruments.
- Containerized and temperature controlled electrical room to house MPP's VSD and package control systems (PLC, MMS, HMI etc.).
- All skid piping including interconnecting piping between the pump skid and auxiliary skids, valves (including relief valves), Special items and piping appurtenances, pipe supports, vents / drains etc.
- All necessary instruments and controls such as level gauge, level transmitter, flow transmitter, pressure gauge, pressure transmitter, PSV, temperature Gauge, Temperature Transmitter, Control / ESD Valves, pump running feedback and auto start facility etc.
- Condition monitoring system and sensors according to project standard and API 670.
- Drawings and documentation as detailed on Vendor Drawing and Data Commitment Form including Installation, Operation and Maintenance Manuals, Manufacturing Record Books and Dispatch Dossiers.
- Commissioning Spares, One-year and Two-year Normal Operation Spares list.
- External & internal coating of skid piping as applicable.
- Access platform for Valves and Instruments as applicable.
- Preservation and protection for shipment and storage at site. Vendor shall provide a detailed preservation procedure covering preservation of materials, temporary facilities, checks / maintenance for the complete life cycle from delivery through transportation to site, storage at site, installation at site (unpacked), transportation to site, installation and storage at site in accordance with preservation specification.
- Any special tools required for installation, field-testing, operation and maintenance.
- Special lifting devices required for transportation, and installation. Vendor shall supply the lifting equipment complete with all necessary slings (of correct length), pins, shackles, turn-buckles together with the required documentation. Lifting equipment shall be suitable for use during transportation of the package from the Vendor's work to the WJO site and for installation of package. Lifting equipment shall be fully certified for use in Europe,

Kuwait and Saudi Arabia.

- Lubricants and mechanical seal barrier oil for first fill.

Vendor Battery Limits for the scope of supply shall be as marked in "P&ID for Multiphase Pump Suction /Discharge /Manifold -SC20" document number JO/APC-HC160-PI -11005 and "PFD for Multiphase Pumps" document number JO/APC-HC160-PF-10001.

3.3 Inspection, Testing and Certification

Inspection and testing shall be fully in compliance with the Inspection and Testing requirements specified in the attached specifications, datasheets and applicable codes. VENDOR shall prepare a detailed Inspection and test plan in compliance with project QA/QC specification KOC-Q-014 (Rev 2) including requirements specified in the attached datasheets and applicable codes.

Material certificates per EN 10204 Type 3.2 or equivalent shall be provided for pressure containing parts.

3.4 Special tools

The supply includes all the special tools, Spreader bars and templates necessary for installation and maintenance. The Vendor shall submit the relevant list with his bid.

3.5 Spare parts

Vendor shall include in the supply all the spare parts necessary for pre-commissioning and commissioning. The relevant list must be included in the Vendor's bid.

In addition, the Vendor shall provide the list of:

i. Recommended operational spare parts for 1 and 2 years operation
ii. Insurance Spares
iii. Lubricants Schedule

3.6 Site assistance

The Vendor shall provide site assistance and supervision during installation & commissioning as required by the commercial part of this enquiry. Also Vendor shall provide optional price for training of Company personnel at site.

3.7 Vendor documentation

The Vendor shall fully comply with all the Technical specifications as listed under Cl 4.0 of this document. Any clarifications/conflicts of information shall be brought to the notice of the Contractor and clarified prior to the start of material purchase/manufacturing. Review of Vendor's document by Contractor / Company shall in no way relieve Vendor from the responsibility of compliance to the applicable Codes, Standards and Specification.

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The documents to be submitted by Vendor, as a minimum requirement, are indicated in in the below table:

Sl. No.	Description	With Bid	During Manufacturing		With Dossier
			Copies No.	Review Class	
1.	Quality Management System Certification	1E		I	O+E+3C
2.	Quality Manual		1E	I	O+E+3C
3.	Health Safety & Environment System Certification	1E		I	O+E+3C
4.	API 5L, ASME Monogram / Licence Certificate	1E		I	O+E+3C

Sl. No.	Description	With Bid	During Manufacturing		With Dossier
			Copies No.	Review Class	
5.	Sub-Vendor Data Register		1E	A	O+E+3C
6.	Deviation List (s)	1E		A	O+E+3C
7.	Vendor Documents List & Schedule		1E	A	O+E+3C
8.	Manufacturer Record Book Index (MRB)		1E	A	O+E+3C
9.	Manufacturing Schedule		1E	A	O+E+3C
10.	Manufacturing Progress Reports		1E	I	O+E+3C
11.	Multiphase Pump Package Data sheet.	1E	1E	A	O+E+3C
12.	Electric Motor Data sheet.	1E	1E	A	O+E+3C
13.	Manufacturer Drawings		1E	A	O+E+3C
14.	Multiphase pump skid outline & General Arrangement Drawing including foundation & nozzle loads.	1E	1E	A	O+E+3C
15.	Part list & cross section drawings.	1E	1E	A	O+E+3C
16.	Multiphase Pump performance curves.	1E	1E	A	O+E+3C
17.	Motor performance curves.	1E	1E	A	O+E+3C
18.	P & ID Diagrams.	1E	1E	A	O+E+3C
19.	Driver outline Drawing.	1E	1E	A	O+E+3C
20.	Driver Arrangement drawing.	1E	1E	A	O+E+3C
21.	Utility consumption list.	1E	1E	A	O+E+3C
22.	Electric Load List.	1E	1E	A	O+E+3C
23.	Instrument Index and I/O list.	1E	1E	A	O+E+3C
24.	Instrumentation Data sheets.		1E	A	O+E+3C
25.	Instrumentation & electrical wiring diagrams.		1E	A	O+E+3C
26.	Electrical Interconnection diagram.		1E	A	O+E+3C
27.	Instrument Location/Cable tray layout.		1E	A	O+E+3C
28.	Instrument hook-up diagrams.		1E	A	O+E+3C
29.	Cable Schedule.		1E	A	O+E+3C
30.	Logic Diagrams and Control Narratives/Philosophy.		1E	A	O+E+3C
31.	Loop Diagrams		1E	A	O+E+3C
32.	Local control panel arrangement drawing.		1E	A	O+E+3C
33.	Instrument calibration report.		1E	A	O+E+3C
34.	Cause & effect diagram.		1E	A	O+E+3C
35.	Material Test Certificates		1E	A	O+E+3C
36.	Quality Plan and Inspection Test Plan		1E	A	O+E+3C
37.	Manufacturing / Testing Procedures		1E	A	O+E+3C
38.	NDT Procedures		1E	A	O+E+3C
39.	Painting /Coating Procedures		1E	A	O+E+3C
40.	NDT, Welder, Applicator Qualification Records		1E	A	O+E+3C
41.	Welding Book including Welding Procedure		1E	A	O+E+3C

Sl. No.	Description	With Bid	During Manufacturing		With Dossier
			Copies No.	Review Class	
	Specification (WPS), Procedure Qualification Record (PQR)				
42.	Repair Procedures		1E	A	O+E+3C
43.	Inspection and Testing Reports		1E	A	O+E+3C
44.	NDT Reports		1E	A	O+E+3C
45.	Painting /Coating Reports		1E	A	O+E+3C
46.	Pressure Test Reports /Certificates		1E	A	O+E+3C
47.	Torsional Analysis report.		1E	A	O+E+3C
48.	Nameplate Details.		1E	A	O+E+3C
49.	Shaft coupling assembly drawing & bill of materials.		1E	A	O+E+3C
50.	Lube oil system component drawings and data.		1E	A	O+E+3C
51.	Acoustic & mechanical analysis report.		1E	A	O+E+3C
52.	As built dimensions and data.		1E	A	O+E+3C
53.	Mechanical run test certificate.		1E	A	O+E+3C
54.	Factory acceptance test report		1E	A	O+E+3C
55.	Site acceptance test report		1E	A	O+E+3C
56.	As built data sheets.		1E	A	O+E+3C
57.	Alarm & trip list.		1E	A	O+E+3C
58.	Lubrication schedule.		1E	A	O+E+3C
59.	Code stamping certificates		1E	I	O+E+3C
60.	Manufacturer Record Book (MRB)		1E	A	O+E+3C
61.	Operation Maintenance Manuals		1E	I	O+E+3C
62.	Instruction for Commissioning		1E	I	O+E+3C
63.	Material Safety Datasheets		1E	I	O+E+3C
64.	List of spare parts for Start-Up & Commissioning		1E	I	O+E+3C
65.	Commissioning Spares, One year and Two year normal Operation Spares		1E	I	O+E+3C
66.	Recommended Capital spares.		1E	I	O+E+3C
67.	List of special tools for maintenance and handling		1E	I	O+E+3C
68.	Dimensions and total weights		1E	I	O+E+3C
69.	Preservation, Packing & Shipping Procedure		1E	I	O+E+3C
70.	Lifting Philosophy		1E	I	O+E+3C
71.	Shipping Documents		1E	I	O+E+3C

O –Original, E-Electronic File, C –Paper Print

Vendor shall follow the Contractor's Document Numbering System in all documents prepared and submitted for the project. The Contractor's Document Numbering System will be provided to the successful bidder.

The Vendor shall prepare the As-built revision for each individual document (drawing, specification, procedure, data sheet, etc.) modified during the field installation stage. The Vendor shall provide an Operating & Maintenance Manual for the supplied equipment / materials.

The Vendor shall prepare and submit a Manufacturer Record Book (MRB), which shall consist of a compilation of quality control documentation (by the Vendor and his Sub-Vendors) showing the test history of the as-supplied equipment.

3.8 Exclusions

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- Area Lighting.
- Pump Shelter
- Pump skid lighting
- Foundation design. (Vibration Study for pump skid by Vendor)
- Civil crash barriers

3.9 Packing and Preservation

The packing of equipment shall be suitable for the mode of transportation, preservation from environmental corrosion, project site conditions, envisaged during outdoor storage for a period of minimum 12 months. The preservation record labels must be constructed with non-perishable materials to ensure readability after 18 months minimum.

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Vendor shall develop the preservation maintenance requirements (PMR) for the specified type of equipment supplied (to be approved as part of Vendor/Supplier Document Requirement List) The documentation shall identity and describe preservation requirements for both initial preservation and any additional preservation required including inspection and re-preservation requirements for long-term storage.

Vendor shall perform or coordinate the preservation preparation and maintenance until the point of delivery in accordance with the approved PMR.

COMPANY / BUYER or its authorized representative shall approve all works before shipment. Any material or work not found in accordance with the specifications shall be replaced or corrected at the VENDOR's expense.

3.10 Approved Vendor List

All components and constituents of the package shall be sourced from COMPANY approved Vendors List. VENDOR shall liaise with BUYER for approved list of VENDORs.

The VENDOR shall be responsible for coordination of all the Sub-Vendors and for overall guarantees relating to mechanical and electrical compatibility and performance of all the equipment, including the control philosophy of the overall system. It is the responsibility of the package VENDOR to invoke all applicable Project specifications on each Sub-Vendor.

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4.0 LIST OF TECHNICAL ATTACHMENTS

The following Technical Documents constitutes the Material Requisition.

Attachment No.	Document No.	Title / Description	Rev.

Attachment No.	Document No.	Title / Description	Rev.
PROJECT SPECIFICATIONS			
1	JO/APC-HC160-DB-M010038	Mechanical Design Basis	
2	JO/APC-HC160-DB-C010287	Civil and Structural Design Basis	
3	JO/APC-HC160-SP-M010039	Technical Specification for Multiphase Pump Package	
4	JO/APC-HC160-DS-M110046	Datasheet for Multiphase Pump Package	
5	JO/APC-HC160-DB-D010001	Process Design Basis and Description	
6	JO/APC-HC160-PI -11005	P&ID for Multiphase Pump Suction/Discharge/Manifold -SC20	
7	JO/APC-HC160-PF-10001	PFD for Multiphase Pumps	
8	JO/APC-HC160-DB-P010072	Piping Design Basis	
9	JO/APC-HC160-SP-P010073	Piping Material Specification	
10	JO/APC-HC160-SP-P010074	Specification For Painting	
11	JO/APC-HC160-SP-P010075	Valve Material Specification	
12	JO/APC-HC160-DS-P010077	Data Sheets For Ball Valve	
13	JO/APC-HC160-DS-P010325	Data Sheets For Gate Valves	
14	JO/APC-HC160-DS-P010326	Data Sheets For Check Valves	
15	JO/APC-HC160-DS-P010327	Data Sheets For Globe Valves	
18	JO/APC-HC160-DB-E010202	Electrical Design Basis	
19	JO/APC-HC160-DS-E010226	Datasheet for Motors	
20	JO/APC-HC160-SP-E010161	Specification for Motors	
21	JO/APC-HC160-DS-E010144	Datasheet for VFD	
22	JO/APC-HC160-SP-E010162	Specification for VFD	
23	JO/APC-HC160-DB-K010215	Instrumentation & Control Design Basis	
24	JO/APC-HC160-SP-K010216	Specification For Fire Alarm Control Panel	
25	JO/APC-HC160-SP-K010218	Specification For Packaged Instruments (Including PLC)	
26	JO/APC-HC160-SP-K010219	Specification For Instrument And F&G Cables	
27	JO/APC-HC160-SC-H010031	Hazardous Area Classification Schedule	
28	JO/APC-HC160-SP-110035	Technical Specification of Clean Agent System	
29	JO/APC-HC160-RP-G010330	Technical Specification for HVAC	
30	JO/APC-HC160-SP-C110322	Specification for New Power Control Room	
31	JO/APC-HC160-SP-010147	Specification for Cables	
32	JO/APC-HC160-DS-E010131	Datasheet for Cables	
33	JO/APC-HC160-CS-41012	Control System Architecture Drawings – SC-20	
34	Contract technical specification Scope of work Appendix 7	Clause 7 & 8 of Appendix-7 Quality Assurance/ Quality Control	
35	Appendix11	List of Approved Manufacturers & Vendors	
JO SPECIFICATIONS			
37	JOSOP 402	Lifting and Rigging Standard	1.3

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Attachment No.	Document No.	Title / Description	Rev.
38	JOS-00-01	Plant Design Data	1
39	JOS-02-01	Piping – Selection and Design.	6
40	JOS-02-05	Internal Coatings	2
41	SID-SU-5106	Safety in Design	5
KOC STANDARDS			
42	KOC-E-001	KOC Standard for High Voltage Induction Motors	3
43	KOC-E-010	KOC Standard for Low Voltage Induction Motors	1
44	KOC-G-004	KOC Standard for Packing Marking and Documentation	1
45	KOC-G-007	KOC standard for Basic Design Data.	5
46	KOC-G-009	KOC Standard for Spare Parts and Maintenance Data	1
47	KOC-G-012	KOC Standard for Plant Equipment Identification, Nameplates and Pipeline Markers	1
48	KOC-I-001	KOC Standard For Instrumentation and Control System Design	3
49	KOC-I-004	KOC Standard for Shutdown Systems	3
50	KOC-MP-027 Part 1	KOC Standard for Pressure Relief Devices: Design and Materials (Supersedes Clause 6.0 of 015-JH-1903 and Section 9 of KOC 381/029)	1
51	KOC-MP-027 Part 2	KOC Recommended Practice for Pressure Relief Devices: Sizing, Selection, Twinning and Installation	1
52	KOC-P-001	KOC Standard for Painting and Coating of External Metal Surfaces	5
53	KOC-Q-014	KOC Standard for Project QA / QC General Requirements	2
54	KOC-L-030	KOC Standard for Plant and Equipment Noise Control	1
55	015-JH-1909	Instrumentation for Packaged Equipment	1
56	015-JH-1903	General Instruments	1
57	KOC-ME-006 Part 3	KOC Standard for Positive Displacement Pumps - Rotary	1
58	KOC-Q-015	KOC Standard for Positive Material Identification (PMI)	1
59	KOC-MV-001	KOC Standard for Pressure Vessels	1