EPs Contractor:	ZANJAN UREA FERTILIZER PROJECT	Owner:
Petrochemical Industries Design & Engineering Company (PIDEC) Project No. : 1231	Cover Sheet	ZANJAN Agricultural & Fertilizer Industries Co. Project No.: 214

REQUISITION FOR : REFRIGERATION UNIT	ALWAYS REFER TO REQ. NO.	Rev.
	REQ No.: **1231-DE-10-RE-REQ-330**	**02**
INQUIRY ■ PURCHASE ORDER ☐	**Page 1 of 22**	

This Requisition is issued to obtain quotation for supply and delivery of:

REFRIGERATION UNIT

as per this Requisition and its attachments.

Requisition Contents

1. Scope of Work
2. Scope of Supply
3. Requisition Notes
4. List of Attachments

DE	EXT	INQ	R
Eng. Phase	**Purpose of Distribution (POD)**	**Purpose of Issue (POI)**	**Owner's Action**

Rev.	Date	Description	Prepared by	Checked by	Approved by	Authorized by
02	21.07.2020	Issued For Inquiry (Partially revised)	M.Rahimi	F.Dianatkhah	F.Dianatkhah	A.Kazemi
01	07.07.2020	Issued For Inquiry (Partially revised)	M.Rahimi	F.Dianatkhah	F.Dianatkhah	A.Kazemi
00	06.06.2020	Issued For Inquiry	M.Rahimi	F.Dianatkhah	F.Dianatkhah	A.Kazemi

1. SCOPE OF WORK

Vendor's scope of work includes but not limited to the following items with requirements stated in the requisition and all its attachments.

1.1. GENERAL

Main Quotation	Options		
■	☐	1.1.1	Design & Engineering
■	☐	1.1.2	Fabrication /Manufacturing
■	☐	1.1.3	Documentation
■	☐	1.1.4	Assembly
■	☐	1.1.5	Shop test and inspection
■	☐	1.1.6	Painting
■	☐	1.1.7	Packing
■	☐	1.1.8	Marking
☐	■	1.1.9	Site supervision and start up services
☐	■	1.1.10	Training
■	☐	1.1.11	Mechanical guarantee
■	☐	1.1.12	Performance guarantee

1.2. OTHERS

■	☐	1.2.1	Shipping and Transportation According to Delivery Term
■	☐	1.2.2	HAZOP and SIL study
■	☐	1.2.3	Review of Purchaser's Drawings of Process Flow Diagram, Piping and Instrumentation Diagrams
■	☐	1.2.4	Export Customs Clearance
■	☐	1.2.5	Obtaining any Export License or other Official Authorization for Exportation
■	☐	1.2.6	All the required facilities within the battery limit which are necessary based on project requirements for safe and proper operation of package
■	☐	1.2.7	Coordination work with driver manufacturer
■	☐	1.2.8	As-built drawings
☐	☐		
☐	☐		
☐	☐		
☐	☐		
☐	☐		

2. SCOPE OF SUPPLY

Vendor's scope of supply shall include but not limited to the followings with all accessories and as required according to this requisition, its attachments and references:

2.1. GENERAL

Main Quotation	Options		
■	□	2.1.1	Items and quantities as stated in the material summary list. (point 2.3)
■	□	2.1.2	Installation / Mounting accessories
■	□	2.1.3	Spare parts for pre-commissioning and commissioning.
□	■	2.1.4	Spare parts for two years operation
□	■	2.1.5	Capital spare parts (if any)
□	■	2.1.6	Consumables for site erection
■	□	2.1.7	Flushing and first oil filling
■	□	2.1.8	Special erection and maintenance tools (if any)
■	□	2.1.9	Special calibration tools (if any)
■	□	2.1.10	Test equipment (during shop test)
■	□	2.1.11	Name Plate (s)
■	□	2.1.12	Documents as per the attached RFD (requirements for documents) form
■	□	2.1.13	Final vendor data book (quality dossier and mechanical book)

2.2. OTHERS

■	□	2.2.1	All components (mechanical, electrical, instrumentation, pipes and any accessory for safe start-up, running and shut-down) and other devices, which is not mentioned in para. 2.3 "Material Summary List" and "scope of article", but necessary for safe and smooth running of the package, shall be included in the scope of supply.
■	□	2.2.2	Anchor bolt design and supply (For all parts of package)
□	□		
□	□		
□	□		
□	□		
□	□		
□	□		
□	□		

2.3. MATERIAL SUMMARY LIST

below mentioned Refrigeration unit will be supplied completely with all the following accessories, attachment, instruments, control, electrics, and others to enable it to work smoothly and economically as package. These accessories, attachment, etc. shall include but not limit to the items listed in paragraph 2.3.1 and any requirements specified on requisition notes. Major items and quantities are as follows:

Sr. No.	Item No.	Item Description	QTY	Unit (m/kg/ set/ ...)
1	PU-5001	Ammonia Refrigeration unit	1	Set

In the following tables, items marked with “X” will be within vendor’s scope of supply. Those marked with “R” will be within Vendor’s scope of supply if Vendor requires them. Meanwhile, those marked with “S” are quoted separately by vendor and will be of Purchaser’s option. Price for items marked with (*) is broken down in Vendor’s proposal.

2.3.1 Scope of Articles

	Items	Required by Purchaser	Proposed by Vendor	Remarks
1	Screw compressor with capacity control	X *		
2	Main driver (electric motor) with its accessories	X *		
3	Coupling(s) and guard(s)	X		
4	Common baseplate	X		
5	Suction drum	X		
6	Suction strainer	X		
7	Condenser & Receiver	X		
8	Suction trap with level indicator, switch and heater	X		
9	Economizer	X		
10	Lube and injection oil system:	X *		
10.1	- Oil separator & oil reservoir	X		
10.2	- Main and standby oil pumps and related drivers	X		
10.3	- Oil cooler With TRV,TG and valve on cooling water lines	X		
10.4	- Oil filters (twin)	X		
10.5	- Oil heater	X		
11	All piping with its supports and all cabling within baseplate	X		
12	All controls and instrumentation within baseplate including junction box	X		
13	Local control panel and gauge board with annunciators , interlock circuits and signal output modules	X		

14	TUV approved SIL 3 PLC	X		
15	Materials for insulation within baseplate	X		
16	relief valves and/or pressure control valves	X		
17	Acoustic Enclosure (if needed): sound level should be less than 85 dBA at 1 m from package in any direction	X		
18	Spare parts			
18.1	Erection and commissioning	X		
18.2	Two years operation	X		
19	Special tools	X		
20	Mating flanges with bolts, nuts and gaskets (for special mating flange)	X		

Notes:

2.4. EXCLUSION

Following are excluded from vendor's scope of work:

1. Cabling between local control (electrical & instrumentation) panels, junction boxes and central control room, switchgear room locating outside the confines of the compressors battery limit.
2. Off-skid lighting, telephone, paging and fire alarm system design, layout and supply of material.
3. Off skid tray, ladder and supporting material.
4. Cable glands connected to motor and motor control stations related to purchaser cables.
5. Supply of minor materials of instrument erection & supporting such as erection consumables, cable lugs, steel plate, sunshades, auxiliary supports, 2” pipes, U-bolts, nut & bolts, screws, clamps, clips, plastic belts, insulating tape, fire proof sealing compound and so on.
6. Installation and commissioning work.
7. Mating flanges (except special type).
8. MCC (if any soft starter, VSD or DC-charger is required they should be supplied completely as a whole system with suitable separate panels by vendor and only their incoming feeder will be provided by purchaser).

3. REQUISITION NOTES

3.1 Vendor shall supply all items in the package as defined in the P&IDs considering the specified battery limits (as minimum requirements). For all items, the OVERALL RESPONSIBILITY as to their suitability and performance is in vendor's scope. Vendor shall ensure that all requirements of inspection, testing, drawing and documentation are followed by sub-vendor.

3.2 Any proposed change in the supplier's scope of supply shall be highlighted for purchaser approval.

3.3 Primary consideration in the design and construction of the unit must provide high efficiency, high reliability, safe operation and maximum life expectancy.

3.4 Package data sheet as well as all other attachments listed herein after shall be considered as integrated part of this material requisition. In case of any confliction between these documents, the matter shall be raised to purchaser for resolution before any further action.

3.5 Vendor's clarifications and exceptions from this requisition and the documents/drawings referred hereto shall be clearly stated in the quotation using the format shown below and subject to purchaser's approval. Any deviations or exceptions stated anywhere in the vendor's proposal except "Deviation List" shall not be accepted. Vendor's design and works excluding above-mentioned deviation and/or exception shall be deemed strictly in compliance with purchaser's requirements. Vendor's deviation and exception after placing the purchase order shall not be accepted in general.

No.	Spec. No. and Para. No.	Specification Requirement	Proposed Clarification, Exception & Deviation	Reason	Purchaser's Judgment

3.6 Environmental Conditions

Unless otherwise stated, all requirements shall be designed suitable for an outdoor location; particular consideration should be given to following:

- Rapid changes of temperature and pressure
- Condensation due to high humidity
- Air laden with dust and salt
- Exposure to direct sunlight
- Sand storm, thunder & lightning, and sea breeze

3.7 Unproven, prototype or “first off” equipment is not acceptable. Only proven equipment shall be used. Proven equipment is defined as equipment that has been in continuous operation elsewhere for a minimum two years trouble-free running experience in similar duty and environment to those specified for this project.

3.8 Noise level shall be limited to 85 dBA at one meter distance. If necessary, silencers/ acoustic insulations and/ or noise hood should be provided to meet the noise limit.

3.9 Materials of construction and corrosion allowance for all EQUIPMENT and machinery shall be for a design life of 25 years (except for heat exchanger tubes). However, minimum corrosion allowance shall be for carbon steel (including 0.5 Mo alloy steels) as per following:

- CS Pressure vessels and other applicable EQUIPMENT : 3 mm
- Low alloy Steel vessels and other applicable EQUIPMENT : 1.5 mm
- Storage tanks : 1.5 mm
- Piping : 1.5 mm
- Removable parts or internals (on each side in contact with operating fluid) : 0.75 mm

No copper or copper alloy are permitted.

3.10 SI metric system of measurement including °C and bar are used in the design except for pipe, pipefittings and flanges sizes, pipe threading, nozzle dimensions and flange ratings. (See 1231-BE-00-PR-ESS-003 “Engineering standard specification for units of measurement” - attached to requisition).

3.11 Filled out and signed letter of conformity shall be submitted by vendor.

3.12 Every connection and item shall be flanged to allow easy and safe maintenance; day to day operation and maintenance operation should be conducted in an easy and safe way; this is a must that vendor must follow during design

3.13 Connecting flanges at package battery limit shall be located at the edge of the skid.

3.14 All valves and controlling devices shall be within easy reach for convenient and quick attention by operators.

3.15 Vendor will supply all piping supports, insulation supports (If necessary), guides and electrical / instrumental cables as required by good engineering practice for package construction.

3.16 No threaded connections are allowed on process side.

3.17 The packages shall be designed, engineered so that the units can operate for two years without major overhaul and/or inspection, except for short periods and/or for minor repairs.

3.18 INSTRUMENTATION

3.18.1 General

1. The control and monitoring of the overall Plant is performed by a Foundation™ fieldbus control system (FCS). Plant safety protection is performed by a SIL 3 PLC-based emergency shutdown system (ESD).

2. Vendor shall design and supply all the instrumentation necessary for the safe and efficient operation of the package units to fulfill the process requirements specified in this requisition. This includes, but not limited to all the instruments and control required for safe and satisfactory start up, control and shut down of the package units.

3. Multi-core cabling between packages field junction boxes/local panels and marshalling cabinets in central auxiliary room is excluded from vendor scope of supply.

4. All instruments in hazardous area shall be of intrinsically safe (IS) type. Using of explosion proof devices are only acceptable if IS type is not commercially available.

5. Signals from/to MCC's shall be considered as non-IS.

6. All panels, enclosures and junction boxes shall be explosion protected according to their area classification.

7. All field mounted instruments, enclosures and junction boxes shall be protected to IP-65.

8. SIL STUDY shall be performed by vendor for packages based on IEC- 61508 and ESD loops shall be classified accordingly. Necessary provisions to meet the results of SIL study shall be considered for PLC and instruments.

9. The process override or maintenance override switches shall be shown on relating diagram (if required) and the required facilities shall be foreseen as per Vendor's common practice.

10. The available power supply in the field and in the control room is 110 V AC +10%, 50 Hz + 5% UPS (redundant feeders in control room).

11. Vendor shall specify his grounding requirements, instrument air and power consumption on 230 V AC, 110 V AC (UPS) power in bidding stage.

12. Air supply to pneumatic instruments will be from the outside of package battery limits. Instrument air distribution inside the package units is in vendor scope of work.

13. All instruments and control systems shall be calibrated/ configured, programmed and debugged completely before delivery to minimize field works. PLC system and related equipment, barriers, power distributions etc. as well as cabinets, local panels shall be shop fabricated and wired up to the terminals, ready for installation and interconnection at site.

14. Vendor shall recommend spare parts for commissioning and two-year operation.

15. All instruments and devices shall be supplied with nameplates indicating tag no., type, model no., serial no., range, type of protection, certifying authority, etc.

16. For instruments selection and control / safety systems design, please refer to “Engineering Standard Specification for Package Instrumentation.” Document no. 1231-DE-00-IN-ESS-603

17. For electrical interface with MCC's, the reference is “Ins/Elec Connection Details” document no. 1231-DE-00-IN-SKT-007

3.18.2 Control system

1. A PLC, and a lap-top as engineering / operation interface, shall be dedicated to each package unit to perform monitoring, control and safety.

2. Vendor shall use type C of control system block diagram (Refer to “ESS for instrumentation of package units”).

3. If PLC's are used for shutdown of the packages, they shall be fully redundant (CPU, bus, communication modules, power supply, I/O cards, etc). PLC shall be TUV approved for SIL3.

4. Galvanic isolator barriers (with HART feature for analog signals) shall be used.

5. The PLC's shall have the capabilities to integrate and work with the main instrumentation and control and shall have the communication capabilities to exchange data from and to other external PLC based control equipment, (such as MMS) and FCS.

6. Each PLC system shall communicate with Plant FCS by redundant bi-directional Modbus TCP/IP based on Ethernet (with proper Firewall in order to reach a suitable cyber security). FCS will act as the master. Coordination with FCS vendor has to be carried out.

7. The PLC's shall be provided with all required system software including application/utility programs, engineering/configuration tools, self-checking and self-diagnostic fault detection capabilities.

8. Vendor shall supply one PC stations (desktop computers) for the package unit.

9. The required shutdown, start-up and inter-lock diagrams based on IEC 61131 shall be provided and implemented in packages PLC's by Vendor.

10. The system logic shall be `fail safe'. All instruments shall be considered for fail to safe action upon loss of instrument air or electrical power. The input contacts to alarm, interlock and emergency shutdown system shall be close (make contact) during normal operation and open on alarm or trip. The solenoids shall be energized during normal operation and de-energized to trip.

11. The status of all switches in normal operating conditions shall be logic high “1”.

12. Comprehensive system status information shall be available on standard displays. The PLC shall be capable of on-line replacement of any faulty module without requiring system shutdown.

13. Sensors for shutdown shall be separated from sensors provided for closed loop control and measurement.

14. PLC control systems shall be synchronized with Plant FCS.

15. Provision shall be made to facilitate Machine Monitoring interface to Machine Condition Monitoring.

16. All the system hardware (including monitoring, control, protection, communications, communication with FCS, etc.) complete with all software (including application software) installed and loaded on the corresponding hardware, are subject to Factory Acceptance Test (FAT). FAT procedure shall be prepared by Vendor, approved by Owner and used as the guideline for performing FAT. Owner reserves the right to modify Vendor's standard procedure.

17. When Factory Acceptance Test (FAT) is over, the following features shall be available for future expansion:

    - a minimum of 20% installed spare breakers/fuses,
    - a minimum of 20% installed spare cores/pairs/triples terminals,
    - a minimum of 20% installed input/output spare points,
    - a minimum of 10% free space in cabinets,
    - 40% spare capacity for communication buses
    - 50% spare capacity for memory
    - 30% spare capacity for power supplies
    - 30% spare capacity for process controller unit

3.18.3 Field Instruments

1. Design and supply of all package instruments, including process/air tubing and cabling up to junction boxes are within Vendor's scope of supply.

2. All instruments shall be cabled up to the relevant junction boxes/local panels at packages battery limits. Junction boxes, local panels and all cable glands shall be in vendor's scope of supply.

3. All instruments installation materials including fittings, isolation and drain valves, manifolds, junction boxes, cable trays, glands, instrument support, etc. are in vendor's scope of supply.

4. Vendor shall provide 4-20 mA, HART transmitters with integral indicator and potential free contacts switches.

5. Solenoid valves shall be IS with 24 VDC voltage rating.
6. All limit switches for automatic valves shall be proximity (NUMOR) type and intrinsically safe.
7. All instrument/automatic valves wetted parts and process/air tubing materials shall be S.S. 316 as minimum, other materials as per process conditions.
8. All cable entries shall be M20X1.5 with explosion-proof cable glands.
9. Isolating valves shall be provided for all instruments. Multi-port gauge valves for pressure switches and gauges and 5-valve manifold for DP transmitters shall be considered.
10. Separate IE/PE earth bar shall be considered inside the panels.

3.19 ELECTRICA

3.19.1 The electric motors shall be selected, sized and supplied as per specification for electric motors as attached: Material standard specification for low voltage induction electric motors : 1231-DE-01-EL-MSS-521 and Material standard specification for medium voltage induction electric motors: 1231-DE-01-EL-MSS-522.

3.19.2 Electrical Installation / Electrical design within the package battery limit shall be as per project specification “Material standard specification for electrical equipment as part of package” No. 1231-DE-01-EL-MSS-524.

3.19.3 Control and power electrical panel board design and preparation as per the project specification No. 1231-DE-01-MSS-508 (Material Standard Specification For Electrical Panel Boards).

3.19.4 Motors shall be sized taking into consideration of the followings:

a. Motors shall be capable to operate continuously at rated horsepower for the specified altitude and ambient temperature and other conditions of SITE.

b. Motors driving centrifugal pumps shall have output power rating at least equal to the following percentage of pump design point brake hose power:

Motor Rating KW	Percent of Pump BKW
18.5 and Less	125%
22 to 55	115%
75 and Above	110%

3.19.5 All the electric motors shall have insulation class “F” and temperature rise of electric motors shall be limited to class “B” considering 48°C as ambient temperature.

3.19.6 Vendor shall complete and submit the purchaser electrical motor data sheets attached to the requisition for each motor separately. This data sheet is typical and shall be copied by vendor and filled out completely for all motors.
Note that manufacturer shall fill out “purchaser requirement” part of data sheet

completely.

3.19.7 Motor rating (nameplate rating at 48°C) shall be suitable for continuous operation at full load at specified site condition. Also motors shall be suitably sized so as to deliver required out put under frequency variations between 5 % and +2 %, coincidental with voltage variation of ±5%.

3.19.8 Test and inspection of electric motors shall be performed by motor vendor as per scope of inspection forms attached to the requisition.

3.19.9 Electric motors shall be suitable for direct on-line starting and for re-acceleration with any voltage between 80% and 100% of the rated voltage at terminals of the motor. So if there should be any Soft Starter, VSD panel, charger ... please specify and be noted that they will be in vendor scope of supply

3.19.10 Supply of cable trays, ladders, conduits, installation and fixing materials required for proper installation of the electrical equipment on skid c/w related drawings is in the vendor scope.
These items should be installed on the skid before shipment, by vendor.

3.19.11 Vendor shall provide cable list based on cables type lengths, source and destination points together with, voltage and tag no's. The special cable is in vendor scope of supply.

3.19.12 Supply of cable glands for purchaser cables will be by purchaser. Size of cables and cable gland threads will be specified during detail engineering stage. Cable glands entry shall be with ISO metric threads and 1.5mm pitch. Vendor shall confirm terminal boxes of motors, oil heaters and control/ammeter stations (size of thread and entry and terminals) are suitable for termination of power and control cable(s) directly. Supply of interconnecting cables between on skid mounted electrical equipment will be by vendor.

3.19.13 Each skid shall be equipped with at least two earth bosses at opposite sides. In addition to this, electric motor shall be equipped with earth terminal. Earth continuity of all on skid electrical equipment, instrumentation and metallic part to the skid is in vendor scope of work and supply. Earthing points shall be shown either in equipment layout or in general arrangement drawing. Purchaser will only connect the skids to plant earth grids at these points.

3.19.14 All electrical equipment including motor should be according to sub-vendor list of requisition.

3.19.15 The "High" and "High-High" contacts of the oil heaters-if any- will be connected to FCS by Purchaser. Dry contacts must be provided on heaters for this purpose by Vendor. These contacts must be isolated (and suitably separated) from power terminals.

Note that start/stop push buttons shall be installed on the package local control panel. If it is a separate push button stations, it will be provided by purchaser.

3.19.16 When there is a local control panel on which the start/stop push buttons of auxiliary loads are located that will be connected to UCP/FCS, ammeters shall be fitted to this

panel for motors 4KW and above and they will be fed directly from MCC. The ammeter will be operated from a 1A secondary winding current transformer.
And the Ammeter shall not be located in Field Push Button Panel if the panels is not Exd type.
But when there should be any LCS which shall be connected directly to the MCC, it will be provided by purchaser.

In case of existing any UCP/PLC, all motors and heaters (main motors and auxiliaries) shall be controlled via a Local Control Panel which is in vendor scope of supply. No separate LCS will be supplied by purchaser for this requisition. All control signals-commands and indications- will be sent from this vendor local control panel to the UCP and then will be transferred to MCC from UCP based on agreement between electrical and instrument department. The only direct connection between MCC and loads will be their power and Ammeter cables.

3.19.17 All electrical consumers of the package shall be summarized in a consumer list, showing consumer tag number, description, rated power, absorbed power (considering coincidence factor) and voltage.

3.19.18 Design and supply of on-skid electrical heat tracing (if required) shall be provided by vendor.

3.19.19 Electrical Area Classification of equipment shall be suitable for hazardous area with gas group IIC, and temperature class T3.

3.19.20 Preparation of the following drawings / document in addition to the drawings and documents specified in RFD forms attached to the requisition:
a) Fixing and installation details for all electrical works, such as cabling and lighting system.
b) Logic diagram for offered systems, if applicable.
c) Control, schematic and wiring diagram for all motors, control panels, control stations and electrical consumers, motor control units, switches & ammeters.
d) List of all electrical consumers within the package. (a preliminary consumer list shall be given with quotation).
e) General arrangement drawing of electrical equipment showing connection & tie in points of earthing, electrical and control cables.
f) List of material take-off for lighting system equipment, installation and fixing materials, control stations and switches- if applicable.
g) Catalogue information for all electrical system, equipment and materials.

3.19.21 Only 6000VAC and 400VAC, 3phase line to line could be provided for loads. Any further power voltages (like: 24V, 110V Dc voltages, UPS voltages,…) shall be foreseen by vendor and respective DC-charger to feed DC oil pump is in vendor scope.

3.19.22 Design, Engineering, preparation of drawings and supply of air craft warning lights for the package unit shall be as per the project specification No. 1231-DE-00-EL-MSS-520.
Design and supply of control panel(s), cabling between control panel(s) and lights and all installation material for air craft warning lights will be by vendor. Battery limit for air craft warning lights system will be this control panel. Purchaser will provide a 230V,

50HZ single phase feeder for each air craft warning lights control panel.

3.20 Mechanical

3.20.1. General

3.20.1.1. Design, fabrication and material selection of all pressure containing equipment e.g. Shell & Tube Heat Exchangers, pressure vessels etc. shall be according to following editions of the reference codes and standards:

- ASME BPVC Sec. VIII Div. 1 & 2 _ 2017 edition
- ASME BPVC Sec. IX _ 2017 edition
- ASME BPVC Sec. I _ 2017 edition
- ASME BPVC Sec. II _ 2017 edition
- ASME BPVC Sec. V _ 2017 edition
- TEMA 9th edition
- API 660 _ latest edition
- ASME B 16.5 _ compatible with ASME 2017
- ASME B 16.47_ compatible with ASME 2017
- ASTM Standard _ compatible with ASME 2017
- AWS Standard _ latest edition
- UBC 1997
- ANSI/ASCE7 _ 2010
- “Engineering standard specification for shell and tube heat exchanges” specification no. “1231-BE-00-HM-ESS-286”.
- HEI for surface condenser _ Latest edition

3.20.1.2. The gaskets used for hydrotest shall be of the same type as those used for operation. Supply of blind, bolts and gaskets for test are in vendor’s responsibility.

3.20.1.3. All required repair work shall be reported to the purchaser, and repair work will only proceed after approval by the purchaser. The repaired weld shall be subjected, as a minimum requirement to the same testing and inspection requirements as the original weld. If during final inspection additional defects are discovered, the total weld seam or area shall be examined. If second repair is necessary, purchaser’s permission must be obtained prior to proceeding with the repairs.

3.20.1.4. When full radiography is required, any non-radiographable welds shall be inspected by magnetic particle and / or ultrasonic methods.

3.20.1.5. Radiographic / ultrasonic examination and / or other non-destructive tests before / after PWHT and during welding / edge preparation shall be strictly conducted by vendor in accordance with Engineering Specification attached to requisition and relevant ASME code. Also MT/PT examination to be done after final PWHT.

3.20.1.6. Equipment normally operated under vacuum shall be designed for full vacuum and for the highest pressure it can experience in case of vacuum failure. Hydro-test of

such equipment must be performed as requested in paragraph UG-99 of ASME code, Sec. VIII, Div.1.

3.20.1.7. Nozzle loads shall be according to "Engineering Standard Specification for Nozzle Loads on Static Equipment attached to requisition (1231-GN-00-PV-ESS-242).

3.20.1.8. Filters and silencers shall be designed, fabricated, tested and inspected in accordance with vendor standard. Pressurized bodies must be designed, fabricated, tested and inspected based on ASME code by the way. Various elements shall be standardized as far as possible. Uniform sizing and selection shall be done for various parts to reduce inventory of spares, better interchangeability and ease of maintenance.

3.20.1.9. All parts must be perfectly dried and sealed after final hydrotest and nitrogen filled prior to shipment providing with valve, nitrogen bottle etc.

3.20.1.10. Environmental loads such as Wind and Seismic loads must be considered in design of all parts and supporting elements. The most stringent load combination / load case will govern.

3.20.2. Shell and Tube Heat Exchanger

3.20.2.1. Vendor shall follow attached "Engineering Standard Specification for Shell and Tube Heat Exchangers" to the requisition (1231-BE-00-HM-ESS-286).

3.20.2.2. Girth joint gaskets shall be solid metal type, spiral wound metal non-asbestos (graphite) filled type, double-jacketed metal non-asbestos (graphite) filled type, Kammprofile type.

3.20.2.3. Tube-sheets shall be designed based on ASME Code. Under specified design conditions and vendor shall submit appropriate design: Design by rule / Design by analysis.

3.20.2.4. Tube-sheets shall be fabricated from forged material.

3.20.2.5. For shell and tube HE, tubesheets shall be designed according to ASME Code. All ASME requirements for pressure parts just same as vessels must be fulfilled. TEMA requirements must be strictly followed in all aspects of the job. Girth joint gaskets shall be solid metal type, spiral wound with non-asbestos (graphite) filler, double-jacketed metal non-asbestos (graphite) filled type, Kammprofile type whichever applicable considering design pressure.

3.20.2.6. For plate type HE, all requirements of API 662 must be fully considered by the manufacturer in all steps of the job.

3.20.2.7. Vendor shall design Expansion Joints according to ASME Section VIII, Division1, "Appendix 5" and "Appendix 26". FEA reports (Design by Analysis) shall be based on ASME code (Section VIII, Division2, Part5) and TEMA 9th Edition. Also be noted that designed expansion joint cycles (at least 1000 cycles) shall cover life time of surface condenser.

3.20.3. Pressure vessels

All pressure vessels within the package boundary must be designed, fabricated, tested and inspected based on operating conditions and for safe operation of at least 20 years. ASME requirements as well as Engineering Specifications and Standard Drawings must be the only references to comply with. Any deviation and alternatives could be applied just after client approval is granted.

3.21 Piping

3.21.1 Design and supply of all piping material within package skids with the inlet strainers (main & temporary) and outlet special check valves on main streams, is in vendor scope of supply. Also design of interconnection piping as per battery limit shown on relevant P & ID is in vendor scope of supply.

3.21.2 All piping system shall be terminated at package B.L. (edge of skid), with an ANSI flange and should be anchored at this point. For flange equal or smaller than 24", ANSI B16.5 and for flange equal or greater than 26", B16.47 Series B shall be used. In any case the flange does not conform to purchaser spec. the mating flanges, gasket and bolts shall be supplied by vendor. Also all internal flanges should be according to ANSI standard.

3.21.3 The design, fabrication, and testing of piping material shall be as per ANSI B31.3.

3.21.4 All main and auxiliary piping shall be laid out in neat fashion to allow adequate clearances for operation and maintenance (Min 900 mm), and head rooms (Min 2200 mm) for working personnel. Design shall allow maintenance of parts without dismantling piping or supports.

3.21.5 RTJ flanges shall be considered by vendor for rating 900# and above at B.L.

3.21.6 Short radius elbow, plate flanges and nonstandard fittings, not covered in ANSI B16.5, 16.47-B, B16.11, and B16.9 shall be avoided.

3.21.7 Piping shall be terminated at the coordinates specified in the drawings and as approved by the purchaser.

3.21.8 All main operating valves, control valves, motor operated valves, etc. shall be located in an accessible way, from platform or grade.

3.21.9 Asbestos gaskets shall not be used.

3.21.10 All utility pipe lines such as CWR, CWS, LPS will be provided at battery limit as the single point headers, vendor to distribute of the headers for the package.

3.21.11 Carbon steel pipes used for process and/ or steam lines shall be manufactured by open hearth, electric furnace or basic oxygen process.

3.21.12 In general connections, piping, valves and fittings of 1 ¼", 2 ½", 3 ½", 5", 7", 9", 22", and 26" shall not be used. In case their use is unavoidable, vendor shall provide reducers with bigger size other than listed above at purchaser's battery limit connection.

3.21.13 Pipe sizes smaller than 1/2" shall not be used except for instrumentation and analysis.

3.21.14 Corrosion allowance shall be added to the calculated thickness consistent with the design service conditions.

3.21.15 Piping shall be supported such that pipes have no rotation/ movements at battery limit.

3.21.16 Any special supports such as springs, expansion joints, ... inside the package, are in the vendor's scope of supply and related data sheets or vendor drawings must be delivered to Purchaser.

3.22 Structural (Foundation Design)

02

3.22.1 Loading diagram (static & dynamic) of equipment and general arrangement of FDN shall be prepared by vendor according to ACI351.3R.

3.22.2 Design and supply of all type of anchor bolts and/ or expansion bolts necessary for installation of the whole package, including main items or its all auxiliary parts and units, shall be done by Vendor. Meanwhile, project engineering standard specification for anchor bolt, document No. "1231-DE-00-ST-ESS-746", is attached to this requisition just as a guideline". Vendor shall submit Anchor bolts detail (size and location).

3.22.3 Design and supply of all necessary anchor bolts/expansion bolts shall be in such a way that it would make no delay in civil work for construction of the foundations for main equipment and auxiliary items which are in vendor's scope.

3.22.4 Vendor shall prepare a separate document containing list of all necessary anchor bolts/expansion bolts indicating type, quantities, material of construction, and necessary detail sketches. Such document shall be issued and submitted to purchaser in early stage of the work.

3.22.5 No increase in allowable stress shall be taken, when wind or earthquake (or other similar loads which increase in allowable stresses are allowed) are considered.

3.22.6 Anchor bolts shall be galvanized, in case of galvanizing is prohibited, anchor bolts diameter determined by calculation, shall be increased by 3 mm as corrosion allowance.

3.22.7 Providing the grout is in vendor scope of supply. Vendor should define grout specification (preferably cement base type shall be used), or choose grout type based on “Engineering Standard Specification for Grouting”, document No.: “1231-DE-00-ST-ESS-748”.

3.22.8 Following information shall be prepared by vendor:

1. Compressor rotor weight
2. Compressor operating speeds
3. Compressor critical speeds
4. Compressor unbalanced mass eccentricity
5. Location of C.G of package
6. Permissible amplitude
7. Total weight including all items in the package and baseplate weight
8. Seismic and wind loads on foundation

3.22.9 Vendor shall specify any recommendation regarding required torque for tightening of anchor bolts. Whenever there is a no recommendation from the manufacturer, Table A-1 in Appendix A of API 686 will be considered as applicable guide.

3.22.10 Anchor bolts shall comply with API 686 and ACI 351.Two nuts shall be used for anchor bolts.

3.23 SPARE PARTS

3.23.1 Vendor shall quote recommended spare parts lists (priced list) separately for Commissioning, Start-Up and 2-Years Operation as per his experience and standard.

3.23.2 After placing the order, vendor shall complete Spare Part Interchangeability Record form (SPIR) and submit it at the kick-off meeting

3.24 INSPECTION, TESTING AND EXPEDITING

3.24.1 Inspection and testing of all equipment shall be as specified in equipment data sheets, specified codes, enclosed specifications and "Scope of Inspection" of the equipment, attached to this requisition.

3.24.2 Purchaser shall have access to all vendor and sub-vendor plants, where work on or testing of the equipment is in progress.

3.24.3 Vendor shall furnish a bar chart covering important production and procurement activities giving the current position of the job (monthly).

3.24.4 Vendor shall provide the provisional test schedule and notify to purchaser period of test to restrict any interference.

3.25 SPECIAL TOOLS

Special tools required for assembling, dismantling, testing and calibration during erection, commissioning, operation and maintenance proposed and shall be provided by vendor.

3.26 ENGINEERING DOCUMENTS

Vendor shall supply all of the documents according to attached requirements for documents (RFD) forms (attachment 3).
Vendor's drawings which are specifically prepared for this project shall be numbered according to Purchaser's Numbering Procedure specified in "Vendor Document Management procedure" (i.e., attachment 8).

3.27 PAINTING

Painting of all equipment and steel surfaces for all items in confines of package battery limit will be as per purchaser painting specification (1231-BE-00-PI-ESS-002).

3.28 SUPERVISION

Vendor to quote daily rate base of supervision as optionally

3.29 ENGINEERING COORDINATION

Vendor shall coordinate for engineering coordination for the complete package

3.30 GUARANTEE

Vendor is responsible for total guarantee of package (material, design, performance and noise level).
Vendor shall give guarantee for performances, thermal and mechanical design of all items within his scope of supply, for the use of materials specified as well as against any defect in design, defective material, poor workmanship, failure from normal usage, duly inspected and accepted by Purchaser or his designated representative.

3.31 PACKING LIST AND TAGGING

Vendor shall submit the master and detailed (break down) packing list, and shall attach tags to all materials / parts, in order to enable to perform correct / easy identification and quantity inspection at both vendor's shop and job site.
If the packing list is not detailed enough for site receiving inspection, vendor is responsible to send any shortage materials / parts at his cost as soon as a notice from the job site is issued. Any mis-indication on the packing list is considered as vendor's responsibility.

4. LIST OF ATTACHMENTS

Att. No.	Description	Document No.	Rev.	No. of Pages
1	Bid Technical Check List	--------	02	1
2	Letter of Conformity (Technical)	--------	02	1
3	Requirement For Documents (RFD)	1231-DE-10-RE-RFD-330	02	9
4	Specific List of Spare Parts	--------	02	5
5	List of spare parts	--------	02	2
6	Spare Parts List and Interchangeability Record (SPIR) – 1/2, 2/2	--------	02	2
7	Scope of Inspection for Refrigeration Unit	1231-DE-10-QC-SOI-330	01	10
8	Vendor Document Management Procedure	1231-DE-00-DC-PCJ-001	01	32
9	Shop Inspection Procedure	1231-DE-00-QC-PCJ-001	01	21
10	Project HSE Requirements Manual	1231-DE-00-QA-MNL-002	00	14
11	Project Numbering procedure	1231-GN-00-PM-PCJ-002	00	23
12	**Data Sheets**			
12.1	Datasheet for PU-5001 Ammonia refrigeration unit	1231-BE-50-PR-DSH-002	00	5
12.2	Data sheet for Low Voltage electric motors	--------	00	3
12.3	Data sheet for Medium Voltage electric motors	--------	00	3
13	**Specification**			
13.1	Engineering Standard Specification for Ambient and Site Condition	1231-BE-00-PR-ESS-001	01	7
13.2	Engineering Standard Specification for utility data	1231-BE-00-PR-ESS-002	01	12
13.3	Engineering Standard Specification for units of Measurement	1231-BE-00-PR-ESS-003	01	6
13.4	Engineering Standard Specification for Rotary compressors	1231-BE-00-RE-ESS-303	01	21
13.5	Engineering Standard Specification for lubrication, shaft sealing and control oil system	1231-BE-00-RE-ESS-317	02	27
13.6	Engineering Standard Specification for Package Instrumentation	1231-DE-00-IN-ESS-603	01	44
13.7	Material Standard Specification for Emergency Shutdown System	1231-DE-00-IN-MSS-602	01	33
13.8	Material Standard Specification for Programmable Logic Controllers	1231-DE-00-IN-MSS-673	01	31
13.9	Engineering Standard Specification for Painting	1231-DE-00-PI-ESS-406	01	42
13.10	Material Standard Specification for Piping Material Specification	1231-DE-00-PI-MSS-401	00	234
13.11	Material Standard Specification for Low Voltage Induction Electric Motors	1231-DE-00-EL-MSS-521	01	14
13.12	Material Standard Specification for Medium Voltage Induction Electric Motors	1231-DE-00-EL-MSS-522	01	20
13.13	Material Standard Specification for Electrical Equipment as Part of Package	1231-DE-00-EL-MSS-524	01	17
13.14	Material Standard Specification for Electrical panel boards	1231-DE-00-EL-MSS-508	01	17
13.15	Material Standard Specification For M.V Switchgears	1231-DE-00-EL-MSS-502	01	25
13.16	Material Standard Specification For L.V Switchgears	1231-DE-00-EL-MSS-503	01	24
13.17	Material Standard Specification for Local Control Stations	1231-DE-00-EL-MSS-528	01	13

Att. No.	Description	Document No.	Rev.	No. of Pages
13.18	Engineering Standard Specification for Grouting	1231-DE-00-ST-ESS-748	01	11
13.19	Engineering Standard Specification for Anchor Bolts	1231-DE-00-ST-ESS-746	01	36
13.20	Engineering standard specification for shell and tube heat exchangers	1231-DE-00-HM-ESS-286	01	31
13.21	Piping Allowable Nozzle Loads for Static Equipment	1231-DE-00-PI-LST-402	00	4
13.22	Engineering standard Specification for Pressure Vessels	1231-DE-00-PV-ESS-241	01	26
14	**Drawings**	-		
14.1	P&ID for Ammonia storage tank and refrigeration package	1231-DE-50-PR-PID-501	00	1
14.2	Instrument/Electrical Connection Details	1231-DE-00-IN-SKT-007	01	17
14.3	Standard drawing for shell and tube heat exchangers	1231-DE-00-HM-SDG-285	00	49
14.4	Standard drawing for pressure vessels	1231-DE-00-PV-SDG-243	00	68

		Attachment No. : 01
EPs Contractor:  **Petrochemical Industries Design & Engineering Company (PIDEC)** **Project No. : 1231**	**ZANJAN UREA FERTILIZER PROJECT** **Bid Technical Check List**	**Owner:**  **Project No.: 214**
REQUISITION FOR : REFRIGERATION UNIT	ALWAYS REFER TO REQ. NO.	Rev.
	REQ No.: **1231-DE-10-RE-REQ-330**	**02**
	Page 1 of 1	

Attention: THIS SHEET HAS TO BE RETURNED WITH THE QUOTATION.

		Yes	No	Not Applicable
1	**HAVE YOU INCLUDED IN YOUR QUOTATION :**			
1.1	Letter Of Conformity (Technical)	☐	☐	☐
1.2	List Of Inconsistencies	☐	☐	☐
1.3	Spare Part List	☐	☐	☐
1.4	Special Tools	☐	☐	☐
1.5	Manufacturing And Delivery Schedule	☐	☐	☐
1.6	Sub-Vendor List	☐	☐	☐
1.7	Quality Assurance Manual (or Certificate)	☐	☐	☐
1.8	Reference List	☐	☐	☐
2	**HAVE YOU STUDIED ,TAKEN INTO ACCOUNT AND WILL YOU FOLLOW INSTRUCTIONS STATED IN THE REQUISITION NOTES REGARDING:**			
2.1	English Language	☐	☐	☐
2.2	Units of Measurement	☐	☐	☐
2.3	Name Plate	☐	☐	☐
2.4	Ambient and Site Condition	☐	☐	☐
2.5	Progress Reporting	☐	☐	☐
2.6	Inspection Requirements	☐	☐	☐
2.7	Partial Delivery Conditions	☐	☐	☐
2.8	Document Requirements	☐	☐	☐
2.9	Purchaser's Document Numbering Procedure	☐	☐	☐
2.10	Quality Dossier	☐	☐	☐
2.11	Final Vendor Data Book Preparation	☐	☐	☐
2.12	Final Document Delivery	☐	☐	☐
2.13	Filling The SPIR Form	☐	☐	☐
2.14	Master and Detailed Packing List	☐	☐	☐
2.15	Overall Responsibility	☐	☐	☐
2.16	Fabrication Start	☐	☐	☐

Vendor Name ,Date, Signature
(VENDOR)

		Attachment No. : 02
EPs Contractor: Petrochemical Industries Design & Engineering Company (PIDEC) **Project No. : 1231**	**ZANJAN UREA FERTILIZER PROJECT** **Letter of Conformity**	**Owner:** ZANJAN Agricultural & Fertilizer Industries Co. **Project No.: 214**
REQUISITION FOR : **REFRIGERATION UNIT**	ALWAYS REFER TO REQ. NO.	Rev.
	REQ No.: **1231-DE-10-RE-REQ-330**	**02**
	Page 1 of 1	

TO : **TexTrade Maschinen-Handels GmbH (TTM)**

FROM: **.....**
(**VENDOR**)

Herewith we confirm that our quotation .....in response to
(**QUOTATION**)

your inquiry……..... dated .....is fully in
(PURCHASER INQUIRY) (DATE)

accordance with the conditions as stated therein and we confirm that all **Technical** requirements as stipulated in the above mentioned inquiry documents, have been adhered to, except deviations stated as per following notes.

☐ No Deviation

☐ Deviation (Refer to Letter No. ……)

Date, Signature

(VENDOR)

NOTES:

1) Deviations shall be listed separately with brief explanations.

2) If no deviation exists, vendor shall specify by writing “No Deviation”.

REQUIREMENT FOR DOCUMENTS (RFD)

OF

REFRIGERATION UNIT

Code	Document Title	With Bid		After Order award		Notes
		Copy	CD	Purpose of issue: I=Information R= Review A= Approval	No. of week for Issuing	
SCHEDULING DOCUMENTS						
PN01	Engineering, procurement , Manufacturing and production schedule	2		R		2
PN02	Drawing/ Document schedule			R		1,2
PN03	Sub-order schedule			R		2
PN04	Periodical status report			R		3

Notes:

1- The scope and extend of vendor reporting and scheduling document shall be set forth and agreed with purchaser.
2- Updated schedule shall be attached to periodical reports.
3- Periodical reports shall be furnished as outlined in project specific procedure for vendor reporting and expediting.

QUALITY DOCUMENTS						
QC01	Quality management system manual	1	1			
QC02	Inspection & test plan			A	4	
QC03	Inspection and test procedures (Hydro test, NDT, PWHT, Paint, etc.)			A	4	
QC04	Vendor quality control records (Test reports, VT, DT, etc.)			R		2
QC05	Material Certificate			R		2
QC06	Welding procedures and NDT personnel Certificates (WPS,PQR, Weld /NDT map, if applicable)			A	4	
QC07	Welder qualification records (if applicable)			R		2
QC08	Inspection Release Notes and Inspection Certificate			R		2
QC09	NDT records (if any)			R		2
QC10	PWHT records and Hardness test reports (if any)			R		2
QC11	Alloy verification / PMI records / Ferrite check (if any)			R		2

Notes:
1-Above mentioned documents also to be included in sub-supplier or sub-contractor if applicable.
2-To be issued in Fabrication process and shall be endorsed by inspector in workshop before shipment.

1.EXPORT DOCUMENTS						
1.General Documents						
PQ01	Bill of Lading (Draft)			A		2
PQ02	Certificate Of Origin (Draft)			A		2
PQ03	Master Packing List			A		2
PQ04	Detailed Packing List			A		2
PQ05	Commercial Invoice			A		2
PQ06	Material Handling Procedure (If applicable)			R		2
PQ07	Material Storage Procedure (If applicable)			R		2
PQ08	List of Sub-supplier			A		2
PQ09	Drawing for Oversize/Overweight Packages (If applicable)			R		3
PQ10	Transportation Drawing(If applicable)			R		3
PQ11	Handling, Transport Protective Measures at Site (If applicable)			R		3

Code	Document Title	With Bid		After Order award		Note
		Copy	CD	Purpose of issue: I=Information R= Review A= Approval	No. of week for Issuing	
2.Shipping Documents						
PQ01	**Bill of Lading (Original)**			**R**		**4**
PQ02	**Certificate Of Origin (Original)**			**A**		**4**
PQ03	**Master Packing List (Original)**			**A**		**4**
PQ04	**Detailed Packing List (Original)**			**A**		**4**
PQ05	**Commercial Invoice (Original)**			**I**		**4**
PQ00	**Inspection Certificate / Release Note**			**I**		**4**

Notes:

1-To be issued periodically.
2-To be issued before shipment.
3-Need not to be approved by Purchaser.
4-Original should be sent by postal courier services (TNT/DHL).

	SAFETY DOCUMENTS					
SA01	**HSE (Health, Safety and Environmental) Plan**	**3**	**1**	**I**	**1**	**1**
SA02	**Material Safety Data Sheet (MSDS)**			**R**	**8**	**2**
SA03	**Safety Manual**			**R**	**8**	**3**
SA04	**HAZOP Study Report**			**A**	**12**	**4**
SA05	**HAZOP Action close out Sheets**			**A**	**16**	**4**
SA06	**SIL Assignment Report**			**A**	**12**	**5**
SA07	**SIL Verification Report**			**A**	**24**	**5**

Notes:

1- The HSE Plan shall be provided for those manufacturers that our personnel may perform audit or inspection in their workshops. The HSE Plan should include an establishment of the HSE Management system; implementation of the HSE policy, and achievement of the HSE objectives effectively.
2- MSDS shall be provided for all potentially dangerous materials such as: Chemicals, Catalysts, Lubrication Oil, Foam, Portable extinguishers (all types),Gases (CO2, Clean Agent, …), Paint, Solvent, Insulation material (PU, mineral wool, …), Perlite, Electrode, Resin, Coating material, Lining material (rubber, epoxy, …), Ionization heat detectors (including radioactive source), Nuclear Level elements (including radioactive source), All radioactive sources, All Laser sources.
3- The Safety Manual shall be provided for all items that may be harmful to human health or safety. Guidelines should be provided for safety measures, safety precautions, behavior in case of incidents and first aid.
4- For those package items that P&ID preparation or development to be in Vendor's scope of work.(e.g. Compressors, Turbine, Reformer, Heater, ...)
5- For those package items that considering or development of safety instrumented function loops (emergency shutdown system (ESD), safety shutdown systems, interlock systems, emergency trip systems) to be in Vendor's scope of work (e.g. machine monitoring systems, burner managements systems, ...)

	TECHNICAL DOCUMENTS					
T1	Installation Manual (including alignment data/drawings)			**A**		Note 1
T2	Operation Manual			**A**		Note 1
T3	Maintenance Manual			**A**		Note 1
T4	Technical data Manual			**A**		Note 1
SPARE PARTS LISTS						
T5	Spare Parts list for erection, pre-commissioning, commissioning and start-up			**A**		
T6	Spare Parts list for 2 years of operation			**A**		
T7	Capital Spare parts			**A**		

T8	List of special tools and devices			**A**		
TECHNICAL DOCUMENTS (COMPRESSOR)						
T1	General Index			**A**		
T2	P & I diagram with supply limit and connections			**A**		
T3	Filled-in data sheets (proposal/as-built) for Compressor, Gear, Noise, Coupling, control valves, etc.			**A**		
T4	Performance curve for operating conditions			**A**		
T5	Start-stop sequences including data on operating restrictions to protect equipment during start-up operation and shutdown			**A**		
T6	Utility consumption list			**A**		
T7	Lubricant list including type and consumption			**A**		
T8	Estimated/ exact weight (machine/ rotor), dimension and max. maintenance weight (proposal/as-built)			**A**		
T9	Part list and bill of material for package			**A**		
T10	List of exceptions to API-619, and other purchase specifications			**A**		
T11	Vendors standard surface preparation and painting specifications			**A**		
T12	Catalogue and Brochure			**I**		
T13	Technical data and reference list			**A**		
T14	Statement of manufacturer's testing capabilities			**A**		
T15	Unpriced copies of sub-order(s) (main parts)			**A**		
T16	Shipping weights and dimensions (estimated/as-built)			**A**		Note 1
T17	Weather protection and winterization required at job site			**A**		
	CALCULATIONS:					
T18	Mechanical design calculations/ analysis			**A**		
T19	Lateral analysis report			**R**		
T20	Torsional Vibration report			**R**		
T21	Vibration analysis report			**R**		
T22	Thermal design calculation			**A**		
T23	Anchor bolt detail (Material/size/calculation)			**A**		
T24	Foundation load diagram and calculation			**A**		
T25	External load calculation			**A**		
T26	Allowable forces and moments for piping connections			**A**		
T27	Foundation block diagram with weights, forces and moments			**A**		
T28	Calculation for conditions of maximum thrust During start up and various operating cases.			**A**		
T29	Seal leakage rates			**A**		
T30	Balance piston leakage rates			**A**		
T31	Minimum length of straight pipe required at machine inlet or side inlets			**A**		
T32	Maximum and minimum allowable seal pressure for each compressor			**A**		
	DRAWINGS:					
T33	General arrangement drawing showing following items as min. : -Dimensioned location, weights, size, rating, and facing of nozzles and all other connections for hookup by others, properly indicated and listed (composite for compressor, turbine, etc.) including list of connections. - Min. height and max. weight for maintenance - Maintenance platform for better access			**A**		

	- Location of terminal boxes and control panels - Name plate format - Grounding detail - Direction of rotation - Center of gravity and listing points					
T34	Equipment drawings included all auxiliaries with bill of quantities			**A**		
T35	Equipment part list with bill of materials			**A**		
T36	Dimensional and weight drawings for all equipment in package			**A**		
T37	Auxiliary piping & Equipment plant drawing with loads and estimated moments for foundations and supply limits			**A**		
T38	Foundation drawing with distribution of load and moments, location and anchor bolts detail of compressor and auxiliaries with direction & magnitude of all rotating forces and location of C.G. ,limits of amplitudes and partial deflections			**A**		
T39	Vibration and condition Monitoring documents including, warning and shut down limits, wiring diagram and bill of materials			**A**		
T40	Anti -surge control diagram			**A**		
T41	Cross-sectional drawing of compressor , seal, coupling, gear, and etc. including all tolerances and necessary information			**A**		
T42	Seal System detail drawings			**A**		
T43	Assembly drawing of compressor, seal, coupling, gear, and etc. including all tolerances and necessary information			**A**		
T44	Thrust and radial bearing assembly drawing with parts list and loading data			**A**		
T45	Rotor assembly drawing with bill of materials and part number			**A**		
	PROCEDURES/ REPORTS :					
T46	Site acceptance test procedure			**A**		
T47	Shop performance test procedures			**A**		Note 2
T48	Run test procedures			**A**		Note 2
T49	Hydro/helium testing procedure			**A**		Note 2
T50	Painting Procedure			**A**		
T51	Impeller overs-peed test report			**R**		Note 3
T52	Mechanical running test report			**R**		Note 3
T53	Performance test data and curves			**R**		Note 3
T54	Rigging and lifting instructions.			**A**		Note 1
T55	Preservation Procedure			**A**		Note 1
T56	Preparation for storage at job site before installation			**A**		Note 1
	TECHNICAL DOCUMENTS/LUBE OIL SYSTEM					
T1	General Index			**A**		
T2	P & I diagram with supply limit and connections			**A**		
T3	Filled-in component data sheets including utility consumption list			**A**		
T4	Catalogue and Brochure			**I**		
	DRAWINGS:					
T5	General arrangement drawing showing, weights, dimensioned location, size, rating, and facing of all connections for hookup by others, properly indicated and listed including list of connections.			**A**		
T6	Component out line drawings and bill of material			**A**		
T7	system schematics			**A**		
	PROCEDURES :			**A**		
T8	Site acceptance test procedure			**A**		

T9	Testing procedure			**A**		Note 2
T10	Painting procedure and rust prevention			**A**		
TECHNICAL DOCUMENTS/STATIC EQUIPMENT						
	GENERAL:			**A**		
T1	General index			**A**		
T2	Filled out data sheet (Condensers, coolers, ejectors, vessels, etc.			**A**		
	TECHNICAL DOCUMENT:			**A**		
T3	General Index			**A**		
T4	Heat treatment of plates at mill (chart)			**A**		
T5	Part list / MTO			**A**		
T6	Catalogue and brochure			**I**		
T7	Un-priced copy of suborders			**A**		
	CALCULATIONS:			**A**		
T8	Mechanical design calculations/analysis			**A**		
T9	Thermal design calculation (If applicable)			**A**		
T10	Anchor bolt detail (Material size and calculation)			**A**		
T11	Foundation load diagram and calculation			**A**		
T12	Expansion Joint calculation (If applicable)			**A**		
T13	Nozzle load calculation			**A**		
T14	Total volume of fabrication and erection welding at site in kilograms			**A**		
T15	Dynamic analysis of the exchanger			**A**		
	DRAWINGS/ DOCUMENTS:			**A**		
T16	General arrangement drawings			**A**		
T17	Tube bundle drawings (including tube layout)			**A**		
T18	Detail drawings			**A**		
T19	Nozzle detail drawing			**A**		
T20	Dimensional and weight Drawings			**A**		
T21	Erection drawing			**A**		
T22	Welding map			**A**		
T23	NDT map			**A**		
T24	Name plate drawings			**A**		
T25	Gasket drawings			**A**		
T26	Shipping drawing			**A**		Note1
T27	Expansion joint drawing			**A**		
T28	WPS/WPQ/PQR			**A**		
	PROCEDURES :			**A**		
T29	Site test procedure			**A**		
T30	Heat treatment procedure (if applicable)			**A**		
T31	Erection procedure (if deemed necessary)			**A**		
T32	Repair procedure (if applicable)			**A**		
T33	Tube rolling procedure			**A**		

T34	Hydro-testing procedure			**A**		
T35	NDT procedures (RT, UT, PT, MT, VE)			**A**		
T36	Tube to tubesheet mock up test procedure			**A**		
T37	Painting procedure			**A**		
T38	Pickling & Passivation procedure (if applicable)			**A**		
T39	Internal lining procedure (if applicable)			**A**		
T40	Dimensional control procedure			**A**		
T41	Air soap procedure			**A**		
T42	Helium leak test procedure			**A**		
T43	Ferroxyl test procedure			**A**		
T44	Weld Overlay procedure			**A**		
	TECHNICAL DOCUMENTS/INSTRUMENTATION					
T1	General Index			**A**		
T2	P & I diagram with supply limit and connections			**A**		
T3	Filled-in data sheets (instruments, valves, JBs, cables,…)			**A**		
T4	Catalogue and Brochure			**I**		
	CALCULATIONS:					
T5	Calculation data (where applicable) for noise& control valves			**A**		
T6	Flow elements calculations			**A**		
T7	Safety valves calculations			**A**		
T8	Stress analysis of thermo-wells			**A**		
	GENERAL DRAWINGS:					
T9	Drawings showing overall drilling and mounting dimensions			**A**		
T10	Electrical wiring connection and junction boxes terminal arrangements diagrams			**A**		
T11	Process and air hook ups			**A**		
T12	Fabrication / erection drawings			**A**		
T13	Field layout indicating instruments and junction boxes locations and cable routing			**A**		
T14	Local control panels (dimensions, specifications, front and internal general arrangements, wiring diagrams, terminations, etc.)			**A**		
T15	instruments materials and calibration certificates			**A**		
T16	Local gauge board(dimensions, general arrangements, list of materials)			**A**		
T17	Control valves pneumatic diagram			**A**		
T18	Instruments and valves dimensional and weight drawing/ documents (including main scope of package vendor and all items supplied by sub-vendors)			**A**		
	LIST:					
T19	Instrument list indicating type, make , characteristics and specification			**A**		
T20	Cable list indicating cable type, length, source and destinations			**A**		
T21	Instrument air and power requirements			**A**		
T22	Alarm and shutdown set-point list			**A**		
	CONTROL CABINET:					
T23	Certifications and approvals for PLC's and other peripheral hardware			**A**		

T24	List of consumables for erection, commissioning and start-up +two years spare part lists			**A**		
T25	Sub-Vendor's and main Supplier's listings			**A**		
T26	Bill of material (hardware and software)			**A**		
T27	Technical data sheets with part No. for each component of the control system			**A**		
T28	Proposed layout for cabinets and other equipment in auxiliary/control room, indicating dimensions, access spaces, weights, etc.)			**A**		
T29	Control philosophy (narratives) and proposed control system block diagram showing all system main hardware/equipment and their interconnections			**A**		
T30	Electrical power consumption ,heat dissipation (including 230 VAC, 110 VAC and 24 VDC)			**A**		
T31	Electrical power supply distribution diagram which indicates cables size and fusing capacity for each feeder			**A**		
T32	Detailed grounding and shielding requirements for all equipment			**A**		
T33	Cabinet's dimensions/ general arrangement and cabinets internal arrangements drawings.			**A**		
T34	A reference list of projects where the offered system is at least two (2) year in operation			**A**		
T35	Functional design specification for hardware & software			**A**		
T36	Interconnecting cable schedule with cable list			**A**		
T37	System internal cabling and terminations, including system internal cable list			**A**		
T38	PLC loop wiring diagrams for each tag No. indicating tag No. , terminals , barriers/relays , I/O channels , installed spares , etc.			**A**		
T39	Logic diagram and functional charts of the interlocks and sequences controls (according to IEC 848)			**A**		
T40	System configuration indicating system key codes and software distribution			**A**		
T41	Hardware assignments including assignments of terminals, isolators, boards, I/O modules and channels, etc. (system data base).			**A**		
T42	Factory / Site acceptance test procedure			**A**		
T43	Painting Specification			**A**		
T44	Modbus list (including exchange signals with FCS system, address…)			**A**		
T45	Calculation of overall system availability/reliability including the failure mode and effect analysis			**A**		
T46	A fault finding/trouble shooting narrative for the complete system(Recommended format is an "if-then" connection diagram			**A**		
T47	A list of special tools/ instruments Owner needs to operate the system.			**A**		
T48	Catalogue and Brochure			**I**		
T49	Test records (vendor's quality control)			**A**		
T50	Test records (factory acceptable test)			**A**		
T51	Proposed Graphic display pages based on purchaser initial information (if any)+ proposed logging and report formats (if any)			**A**		
T52	Proposed logging and report formats (if any).			**A**		
T53	Installation Manual			**A**		
T54	Operation Manual			**A**		
T55	Maintenance Manual			**A**		
T56	Engineering and user's manual			**A**		
T57	Cause and effects diagrams			**A**		
T58	Hardwired interfacing signals between packages systems and plant systems (including FCS,ESD,MCC,F&G,HVAC…)			**A**		

T59	HAZOP/SIL reports and relevant certificates			**R**		
T60	Special complicated control documents /drawings (including complex loops descriptions, APC, Extraction / Admission control, BMS, ….)			**A**		
	TECHNICAL DOCUMENTS/ELECTRICAL					
	GENERAL:					
T1	On-skid earthing layout with detail for all skids			**A**		
T2	Electrical heaters specification and drawings			**A**		
T3	Electrical Connection and all junction boxes diagram			**A**		
T4	Cable list			**A**		
T5	Motor List / Electrical Load List			**A**		
T6	Installation Manual			**A**		
T7	Operation Manual			**A**		
T8	Maintenance Manual			**A**		
T9	Catalogue and Brochure			**I**		
T10	Electrical equipment layout & cable routing drawing			**A**		
T11	List of special tools and devices (if any)			**I**		
T12	List of deviations to the purchase specifications			**A**		
	LV & MV MOTORS:					
T13	Technical Data & Specifications			**A**		
T14	Bearing type/ lubrication/ oil pressure/ flow rate / lubrication intervals			**A**		
T15	List of deviations to the purchase specifications			**A**		
T16	Reference list			**A**		
T17	Data sheet Completed by vendor with actual equipment data			**A**		
T18	General arrangement drawing showing dimensions and weight			**A**		
T19	Main terminal box drawing showing main connections, size and No. of entries, etc.			**A**		
T20	Static & dynamic foundation loadings & anchor bolt locations			**A**		
T21	Torque/speed curves with internals & accelerating times at 80 & 100% voltage			**A**		
T22	Thermal capability curve for MV motors			**A**		
T23	Current/speed curves			**A**		
T24	Rotor drawing and data for torsional analysis			**A**		
T25	Connection diagrams for RTD's heaters & other auxiliaries			**A**		
T26	EX. Certificate for all certified equipment			**A**		
	Local panel					
T27	Local control panel/ Local panel (dimensions, general arrangements, list of materials , wiring diagram) and Graphic Display			**A**		
T28	Electrical Wiring Diagram such as One-Line Diagram, Interlock System,etc.			**A**		
T29	Control Logic Diagram and Description / Control philosophy Block diagram			**A**		
T30	Test reports of the performance tests			**R**		

Notes:

1. To be issued 4 weeks before shipment.
2. To be issued at least two months before performing the shop test
3. To be issued after performing the test

Sr. No.	PART DESCRIPTION	ERECTION, PRE, COMMISSIONING & START UP SPARES	TWO YEARS SPARES	CAPITAL SPARES
1	**Rotary Compressors**			
1.1	Dry gas seal		100%	
1.2	Radial bearings		100%	
1.3	Thrust bearings		100%	
1.4	Thrust Bearing Pads complete with thermo-elements (Sets)		2	
1.5	Journal bearing pads complete with thermo-elements (Sets)		1	
1.6	Coupling assembly (Sets)		1	
1.7	Oil Filter Elements (a)		10	
1.8	Instrument parts (sets)		1	
1.9	Accumulator Bladder Labyrinths		100 %	
1.10	Gaskets + O-rings for compressor casing (Sets)		4	
1.11	Gaskets + O-rings for internal piping (sets)		4	
1.12	Oil Pumps		1	
1.13	Flushing Nozzles Oil Cooler (Sets)		1	
1.14	Bolt ,Nut, Screw & washers (Sets)		1	
1.15	Bypass and screening for oil flushing (Sets)		1	
	a) Quantities for washable oil filter elements can be reduced to 5. b) The Parts listed are the principal parts only. Other parts shall be considered for recommendation in quantities consistent with the above table.			
6	**Electrical Equipment**			
6.1	**LV Switchgear and Motor Control Center/ Local control panel:**			
6.1.1	LV Fuses		15%	
6.1.2	Time Delayed Relays		8%	
6.1.3	Lamps		10%	
6.1.4	Space Heaters		10%	
6.1.5	Terminal Blocks		7%	
6.1.6	Auxiliary relays		10%	
6.1.7	Contactors for Control Circuits (each type)		20%	
6.1.8	Thermal overload Relays (each type)		20%	
6.1.9	Isolators for each type		20%	
6.1.10	Current Setting Earth Fault Relays		11%	
6.1.11	Motor Circuit Breakers (Complete Unit for Each Type & size)		15% (min 1 No.)	
6.1.12	Main Contactors (each type)		20%	
6.1.13	Metering		10%	
6.1.14	CT		20%	
6.1.15	PT		20%	
6.1.16	Main circuit breaker (incoming and bus tie)		One per each type	
6.2	**Motors (No. of machines)**		**1/2/3/4/5/More**	
6.2.1	Set of bearings		1/1/1/2/2/40%	
6.2.2	Fan, terminal blocks, space heater (MV) per type		5%/5%/5%/5%/ 5%/ 5%	
6.3	**UPS**			
6.3.1	Fuses		30 %	

6.3.2	MCB (Miniator circuit breaker)		15 %	
6.3.3	SCR		30 %	
6.3.4	Signaling lamps and protection device		15 %	
6.3.5	Diode		10 %	
6.3.6	Transistor		30 %	
6.3.7	Control cards		one per each type	
6.3.8	Batteries		10 %	
6.3.9	Isolator switch (make before break)		one per each type	
6.4	**Battery Charger**			
6.4.1	Fuse		30 %	
6.4.2	MCB		15 %	
6.4.3	SCR		30 %	
6.4.4	Diode		10 %	
6.4.5	Signaling lamps		15 %	
6.4.6	Control cards		one per each type	
6.4.7	Batteries		5 %	
6.5	**Local Control stations for control motors**			
6.5.1	Selector switch		20 %	
6.5.2	A meter		20 %	
6.5.3	Terminal blocks		20 %	
6.5.4	Push button		30 %	
Note: The Quantities indicated are only preliminary estimation, so the firm quantities will be specified later in conjunction with recommendations of EQUIPMENT VENDORS.				
7	**Instruments**			
7.1	Flow instruments		Refer to Note 1	
7.2	Level instruments		Refer to Note 1	
7.3	Temperature instruments		Refer to Note 1	
7.4	Pressure Instruments		Refer to Note 1	
7.5	Analyzers		Refer to Note 1	
7.6	Control valves: valve bodies		Refer to Note 2	
7.7	Valve plugs		15 % (min 1) of each type and size	
7.8	Seat rings		25 % (min 1) of each type and size	
7.9	Valve stems		Refer to Note 3	
7.10	Stem packing		20 % (min 3 boxes) of each type and size	
7.11	Grease		20 % (min 3 boxes) of each type and size	
7.12	Diaphragms		20 % (min 1) of each type and size	
7.13	Blank orifice plates		10 % (min 1) of each type and size	
7.14	Dial thermometers		10 % (min 1) of	

			each type and size	
7.15	Manual loading stations		10 % (min 1) of each type and size	
7.16	Instrument air filters (regulation sets)		10 % (min 1) of each type and size	
7.17	Pressure gauges		10 % (min 1) of each type and size	
7.18	Pressure switches		10 % (min 1) of each type and size	
7.19	Plug-in assemblies for elect. instr.		10 % (min 1) of each type and size	
7.20	Plug-in assemblies for pneum. instr.		10 % (min 1) of each type and size	
7.21	Seal, condensate and vent pots		10 % (min 1) of each type and size	
7.22	Solenoid and trip valves		10 % (min 1) of each type and size	
7.23	Thermocouples		10 % (min 1) of each type and size	
7.24	Thermowells		10 % (min 1) of each type and size	
7.25	Signal lights		10 % (min 1) of each type and size	
7.26	Valve positioners		10 % (min 1) of each type and size	
7.27	I/P convertors		10 % (min 1) of each type and size	
7.28	Bonnet gasket		20% (min2 for each type)	
7.29	O-rings		20% (min2 for each type)	
7.30	Seat ring		10% (min2 for each type)	
7.31	Fire safe gasket		10% (min2 for each type)	
7.32	Limit switch		10% (min1) of each type and size	
	For PLC following items:			
7.33	I/O cards		5 % min 1 for each	

			type	
7.34	CPU Card (Sets)		2	
7.35	Communication Card (Sets)		1	
7.36	Other Main cards (Sets)		1	
7.37	power supply (AC If any) (Sets)		1	
7.38	power supply (DC, of any) (Sets)		1	
7.39	Relay, Barrier,…		15%	
7.40	Relay, Fuse, Terminal, IS Barriers		10% Min 1 for each type	

Note 1: Quantities To be determined in conjunction with the EQUIPMENT VENDOR (based on VENDOR'S experience on similar type of PLANT)
Note 2: None unless service is corrosive or erosive. For corrosive or erosive service, shall be determined in conjunction with the EQUIPMENT VENDOR.
Note 3: 1 of each diameter. These vary in length depending on valve size. Purchase the longest of each dia. These can be cut to the correct size.

8	**Spare parts for pressure vessels ,Heat exchangers**			
8.1	**Heat Exchangers-Shell and Tube**			
8.1.1	Tubes		Straight tubes sufficient to retube the largest bundle of, each tube size and material.	
8.1.2	Bolts		(Special or Alloy) of each exchanger minimum one number	
8.1.3	Gaskets		200 %	
8.2	**Pressure Vessels**			
8.2.1	Gaskets		200 %	
8.2.2	Bolts		10 % (Special, Alloy or size 2" diam. or greater), minimum one number.	
8.3	**Plate Type Exchanger (If applicable)**			
8.3.1	Plate Gasket		100 %	
8.3.2	Flow Plate		10 %	
8.3.3	Nozzle Gasket		200 %	
8.3.4	Glue (1 kg Pot)		1	
8.3.5	Special Spanner tool		1 for each size/type	

Note: The parts listed are the principal parts only. Other parts shall be considered for recommendation in quantities consistent with the above table.

9	**Fan (If applicable)**			
9.1	Set Of Bearing		1	
9.2	Oil Level Glass		1	
9.3	Set Of Louver Guide Busing		1	
9.4	Repair list for lover contract		1	
9.5	Set of gasket and o-ring		2	
9.6	Set of shaft seal		1	
10	**Piping (If applicable)**			
10.1	Valves up to 1½" complete units		5 % for each size, type and material minimum 1 piece	

10.2	Valves from 2" to 6"		2 % (minimum 2 pieces) for each size, type and material	
10.3	Valves above 6" to 10" complete units		1 piece for each size, type and material	
10.4	Valves above 10"		1 only if installed valves quantity is greater than 30	
10.5	Valves up to 10" gland packing and bonnet gasket		10 % for each type, size and material	
10.6	Valves from 2" to 10" set of changeable inner parts		2 sets for each type, size and material	
10.7	Valves above 10" set interchangeable inner parts: bonnet gasket and stem packing		1 set for each type, size and material	
10.8	Piping gaskets and bolts set for each size, type		10 %	
10.9	Permanent Strainers (Extra screen, cover gasket)		10% of total quantity (min one piece) for each size, type and material	

REMARKS: This list specify minimum requirements for spare parts. Vendor shall recommend any further spare parts if required. In addition, Erection, pre- commissioning and start up spares for all equipment of package shall be recommended by vendor.

LIST OF SPARE PARTS

		Attachment No. : 05
EPs Contractor: Petrochemical Industries Design & Engineering Company (PIDEC) **Project No. : 1231**	**ZANJAN UREA FERTILIZER PROJECT** **List of Spare Parts**	**Owner:** ZANJAN Agricultural & Fertilizer Industries Co. **Project No.: 214**
REQUISITION FOR : **REFRIGERATION UNIT**	ALWAYS REFER TO REQ. NO.	Rev.
	REQ No.: **1231-DE-10-RE-REQ-330**	**02**
	Page 2 of 2	

Sr. No.	Equipment	Spare Part Specifications			
	Tag No.	Part Number	Part Description	Unit Price ☐EURO ☐IRR	Total Price ☐EURO ☐IRR

		Attachment No. : 06
EPs Contractor: Petrochemical Industries Design & Engineering Company (PIDEC) Project No. : 1231	ZANJAN UREA FERTILIZER PROJECT **Spare Parts List and Interchangeability Record**	Owner: ZANJAN Agricultural & Fertilizer Industries Co. Project No. : 214
REQUISITION FOR : **REFRIGERATION UNIT**	ALWAYS REFER TO PIDEC REQ. NO.	REV.
	REQ No.: 1231-DE-10-RE-REQ-330	02
	Page 1 of 2	

THE COMPLETION OF THE SPIR FORM (S) BY MANUFACTURER (S) / SUPPLIER (S)

The SPIR consists of main sheet and continuation sheets. The completed forms shall be distributed on A3 formats as specified in the purchase order. The manufacturer/supplier is requested to complete columns 1 to 11 and 20 of the form as described below.

All information should be given in the English language.

Column 1 : EQUIPMENT REG. or TAG NO.

Enter the same equipment registration- or tag number for each place of equipment as stated in the requisition -or purchase order.

Column 2 : MANUFACTURER'S MODEL or TYPE

State model, Type or other positive identification reference of the equipment / instrument ordered.

Column 3 : Manufacturer's serial No.

State serial number or other indication reference of the equipment / instrument ordered (each)

Column 4 : NO. OF UNITS

Enter the total number of pieces of identical equipment /instruments as quoted in columns 1, 2 and 3.

Column 5 : NUMBER OF PARTS PER UNIT

For each unit (including identical units) enter in the appropriate space the number of parts listed in each unit of equipment / instrument.

Column 6 : REQUISITION/ ORDER REF. NO.

State company's requisition number or order reference number.

Column 6a : UNIT

Enter the weight to kg of such items such as adhesives and grease .If items are supplied as sets state "ST", if in pairs "PR " and if it is single item (piece) state "PC ".

Column 7 : TOTAL NUMBER OF IDENTICAL PARTS INSTALLED

Enter the total number of identical parts covered by the equipment specified. In the case of identical units multiply the quantity of columns 5 by the number of units given in column 4.

Column 8 : DESCRIPTION OF PARTS

List all parts which should be carried in stock for each of the three categories of spares. Including slow wearing parts. If an item is interchangeable between two or more units it should be listed only once (refer to columns 10 and 20)

Column 9 : DRAWING NUMBER

For each part in column 8 enter the manufacturer's parts list and / or drawing number.

Documents referred to must always be attached to the SPIR form by the manufacturer or supplier.

Column 10 : MANUFACTURER'S PART NUMBER

Enter the manufacturer's unique reference number or other information which specifically identifies each part in the manufacture's organization.

NOTES FOR 10 & 20

In view of the wide variety of systems in use for identification of parts, It is not possible to lay down firm rules for completion of those columns.

Manufacturers/ suppliers should give whatever identification system they use to positively identify parts and to show interchangeability with other existing equipment.

Manufacturer's/ supplier's final cross sectional drawings. Workshop drawings and real part numbers may not always be available in the early stage of manufacture.

This should not delay the completion of the SPIR form and subsequent ordering (see column 1)

In such cases it is recommended that reference is to manufacturer's documentation which is readily available such as brochures, exploded views, typical drawings of similar equipment in which the parts can be identified. As soon as final drawings etc. become available the SPIR from should be revised immediately.

Column 11 : MATERIAL SPECIFICATION

Enter material specification in terms of full international standards and accepted conversions not manufacturer's or sub-manufacturer's reference.

Column 12 thru 14 : OPERATIONAL SPEAR PARTS RECOMMENDED BY MANUFACTURER

Enter manufacture's /supplier's recommended quantities of operational spare parts which are required for :

a) Erection and pre- commissioning .col. 12

b) Two years operation -col. 13

c) Commissioning and start -up .col. 14

Column 18 : APROXIMATE UNIT PRICE

State the ex works price per piece of each part in the currency shown at the top of the column, only for those parts not included in the requisition / order for the original equipment.

Column 20 : REMARKS- SUPPLIERS PART NUMBER

Enter the supplier's unique identification number or items from third party manufacturers (bought- out items) such as ball bearings oil, seals mechanical seals, Gaskets, couplings, Instruments electrical parts, fuses relays etc, identifying sizes etc.

Attachment No. : 06

EPs Contractor :

Petrochemical Industries Design & Engineering Company (PIDEC)

Project No. : 1231

ZANJAN UREA FERTILIZER PROJECT

Spare Parts List and Interchangeability Record

Owner:

ZANJAN Agricultural & Fertilizer Industries Co.

Project No.: 214

REQUISITION FOR :

REFRIGERATION UNIT

ALWAYS REFER TO REQ. NO.		Rev.
REQ No.:	1231-DE-10-RE-REQ-330	02

SPARE PARTS LIST AND INTERCHANGEABILITY RECORD — فهرست قطعات یدکی و اقلام مشابه

SPARE PARTS ORDER NO. — شماره سفارش قطعات یدکی

NOTES: — توضیحات

1) All equipment having interchangeable items to be stated on same form. — کلیه قطعاتی که دارای اقلام مشابه هستند باید در فرم یکسان درج گردد
2) Quote in column 10 part numbers showing interchangeability within equipment manufacturer's organization. — در ستون ۱۰ شماره حقیقی قطعه ای ذکر گردد که با سایر دستگاه های اولین کارخانه سازنده تشابه داشته باشد
3) Quote in column 20 the original identification numbers for items of third party manufacture.("bought-out items") such as ball bearings, mechanical seals, couplings, fuses, auxiliaries. — در ستون ۲۰ شماره های حقیقی سازنده فرعی(ثالث) مانند بلبرینگ، آب بند های مکانیکی، اتصالات و فیوزها درج گردد
4) Quote in column 11 name and type of material, e.g. bronze, cast iron, Stainless steel 304, Rubber, Buna Viton , etc. — در ستون ۱۱ اسم و نوع جنس بکار رفته در کالا ذکر گردد(مانند مفرغ، چدن، فولاد درجه ۳۰۴، لاستیک و غیره)

Subject : — دستگاه

Manufacturer : — سازنده

Address : — آدرس

Date : — تاریخ

Required on site date: — تاریخ مورد نیاز

REMINDER : ATTACH TO THIS FORM ALL PART LISTS AND DRAWINGS AS LISTED IN COLUMN 9 AND 10 — کلیه کتابچه های قطعات یدکی و نقشه های ذکر شده در ستونهای ۹، ۱۰ پیوست گردد

Approved for purchase by: — تایید خرید توسط

Row	Field															
21	Equipment Class															
1	Equipment reg. No. or Tag No.															
2	Manufacturer's Model — مدل کارخانه سازنده															
3	Reference / Serial No. — شماره سریال سازنده															
4	No. of Units — تعداد دستگاه															
5	NUMBER OF PARTS PER UNIT — تعداد قطعات در هر دستگاه															
6	Equipment Purchase Order No. — شماره سفارش خرید دستگاه															

UNIT (Kg, No., Pair, Set) — واحد جنس (کیلوگرم، عدد، جفت، ست)	Total No. of identical parts — تعداد کل قطعات مشابه نصب شده	Manufacturer's Data — اطلاعات مربوط به سازنده: DESCRIPTION OF PARTS: to include all parts recommended to be kept for normal operation and slow wearing parts. — شرح قطعات	Drawing / Ref. No. — شماره نقشه / مرجع سازنده	Manufacturer's Real Part No. (See note 2 above) — شماره حقیقی کارخانه سازنده	Material (See note 4 above) — نوع جنس	Operational Spare Parts: Recommended by manufacturer — پیشنهاد سازنده	Recommended by contractor — پیشنهاد پیمانکار	Commissioning Spares — قطعات یدکی در مرحله راه اندازی	Quantity to be supplied — تعداد مورد سفارش	MESC — شماره طبقه بندی کالا	Classification of parts — رده بندی قطعات	Approximate Unit price in — قیمت واحد به تقریب	Approximate Total price in — قیمت کل به تقریب	Remarks (See note 3 above) — ملاحظات	Item No. — شماره ردیف
6a	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22

PROJECT / PLANT :		پروژه / واحد :
CONSIGNEE :		تحویل گیرنده :
ENGINEERED BY :	PIDEC	طراحی توسط :

Rev. :	تجدید نظر
Date:	تاریخ
Sign	امضاء

Approximate total value	قیمت کل	Delivery time	مدت زمان تحویل :

EPs Contractor:	ZANJAN UREA FERTILIZER PROJECT	Owner:
Petrochemical Industries Design & Engineering Company (PIDEC) Project No. : 1231	Data Sheet for Electrical Motors Owner Doc. No.: - PIDEC Doc. No.: Typical Rev.: XX	ZANJAN Agricultural & Fertilizer Industries Co. Project No. : 214

DATA SHEET

FOR

(Motor name)

BE	EXT		
Eng. Phase	Purpose Of Distribution (POD)	Purpose Of Issue (POI)	Owner's Action

Rev.	Date	Description	Prepared by	Checked by	Approved by	Authorized by
XX	dd.mm.yyyy					

EPs Contractor:	ZANJAN UREA FERTILIZER PROJECT	Owner:
Petrochemical Industries Design & Engineering Company (PIDEC)	Data Sheet for Electrical Motors	ZANJAN Agricultural & Fertilizer Industries Co.
Project No. : 1231	Owner Doc. No.: - / PIDEC Doc. No.: Typical / Rev.: XX	Project No. : 214

Page No.	Internal Issue	Change Index During Formal Issues						Reason of Latest Change
		First Issue	Second Issue	Third Issue	Fourth Issue	Fifth Issue	Sixth Issue	
	Rev. 0A	Rev.00	Rev.01	Rev.02	Rev.03	Rev.04	Rev.05	
1								
2								
3								

EPs Contractor:	ZANJAN UREA FERTILIZER PROJECT	Owner:
Petrochemical Industries Design & Engineering Company (PIDEC)	Data Sheet for LV Motors	ZANJAN Agricultural & Fertilizer Industries Co.
Project No. : 1231	Owner Doc. No.: - / Doc. No.: TYPICAL / Rev.: XX	Project No. : 214

General	Tag(s)		Motor Manufacturer	
	Service		Vendor	
	Purchase Order		Owner	
	Power System		**Site Conditions**	
	Voltage	400V ± 5%	Plant Location	Zanjan, Iran
	Frequency	50Hz ± 2%	Area	☐ Indoor ■ Outdoor
	Earthing	Solidly Earthed (TNS)	Ambient Air Temperature	Min. -30 °C Max. 48 °C
	Applicable Documents		Humidity	71%
	Project Specification	1231-DE-00-EL-MSS-521	Altitude	+ 1846 meter above Sea Level
	Applicable Standards	IEC 60034, IEC 60079, IEC 60529	Area Classification	☐ Safe ☐ Zone 2, IIC, T3
	Paint Specification	Acc. to Manufacturer's Standards	Corrosive gases	Ammonia

	Particulars of Equipment	Unit	Purchaser's Requirements	Vendor's Data
Basic Design	Rated Voltage (Un)	V	400	
	Rated Frequency	Hz	50	
	Rated Power (Pn) at Standard Conditions & Continuous Duty	kW	-	
	Rated Power at Site Conditions	kW	-	
	Rated Synchronous Speed / No. of Poles	RPM	-	
	No. of Phases, Startor Connection, Rotor Type		3 Ph, Y, Cage Rotor	
Thrmal Spec	Insulation Class		Class F	
	Temperature Rise		Class B	
Frame & Construction	Frame Size		-	
	Frame Material		-	
	Fan Material		Bronze, Copper-Free-Aluminum or Steel	
	Frame Ingress Protection acc. to IEC 60529		IP54	
	Main Terminal Box Ingress Protection acc. to IEC 60529		IP55	
	Location of Main Terminal Box		Right Side, Facing Drive End	
	Main Cable Entry Size			
	Cooling Type acc. to IEC 60034-6		TEFC, IC411	
	Mounting Type acc. to IEC 60034-7		-	
	Painting Color (RAL)		According to the Requisition	
	Motor / Rotor Weight	kg	-	/
	Noise Level at Distance of 1m	dB(A)	At Most 85	
Bearings	DE Bearing Manufacturer and Code		-	
	NDE Bearing Manufacturer and Code		-	
	Lubrication Interval for DE / NDE Bearings	Hours	>4000 if Horizontal; >2000 if Vertical	
	Lubricant Type		-	
Load Spec	Direction of Rotation, Facing Shaft End		-	☐ Bidirectional ☐ CW ☐ CCW
	Mechanical Load Driven by Motor (BHP)	kW	-	
	Run-up Time at Un & 0.8Un	S	-	
	Load Duty (S1…S9)		-	
Electrical Performance	Full Load Current	A	-	
	Efficiency at Pn, 0.75Pn & 0.5Pn	%	-	
	No-load Losses	kW	-	
	Power Factor at Pn, 0.75Pn & 0.5Pn	%	-	
Mechanical Performance	Full Load Torque	Nm	-	
	Breakdown Torque	%	-	
	Pull-up Torque	%	-	
	Full Load Speed	RPM	-	
	Slip at Pn & 0.75Pn	%	-	
	Over-speed Capability	%	-	
Starting Characteristics	Starting Method		Direct-On-Line	
	Allowable Stall Time at Hot and Cold Conditions	S	-	
	Maximum No. of Harmless Successive Starts		At Least 3 from Cold / 2 from Hot State	
	Starting Current at Un & 0.8Un	%	For motors > 55kW, At Most 700% at Un	
	Locked Rotor Power Factor at Un & 0.8Un	%	-	
	Locked Rotor Torque at Un & 0.8Un	%	-	
	Allowable Run-up Time at Un & 0.8Un	S	-	
EX Type	EX Type, Gas Group & Temp. Class (If Area is Hazardous)		EExeb / EExec / EExd / EExde; IIC T3	
	Is Pre-start Gas Purging or Any Other Provision Required?		NO	
	Te Time (for EExe Motors)	S	-	
	Certificate Number		-	

Remark: Un means rated voltage, Pn means motor rated power at standard conditions.

EPs Contractor:	ZANJAN UREA FERTILIZER PROJECT	Owner:
Petrochemical Industries Design & Engineering Company (PIDEC) Project No. : 1231	Data Sheet for Electrical Motors Owner Doc. No.: - PIDEC Doc. No.: Typical Rev.: XX	ZANJAN Agricultural & Fertilizer Industries Co. Project No. : 214

DATA SHEET

FOR

(Motor name)

BE	EXT		
Eng. Phase	Purpose Of Distribution (POD)	Purpose Of Issue (POI)	Owner's Action

Rev.	Date	Description	Prepared by	Checked by	Approved by	Authorized by
XX	dd.mm.yyyy					

EPs Contractor:	ZANJAN UREA FERTILIZER PROJECT		Owner:
Petrochemical Industries Design & Engineering Company (PIDEC)	Data Sheet for Electrical Motors		ZANJAN Agricultural & Fertilizer Industries Co.
	Owner Doc. No.: -	Rev.: **XX**	
Project No. : 1231	PIDEC Doc. No.: Typical		Project No. : 214

Page No.	Internal Issue	Change Index During Formal Issues						Reason of Latest Change
		First Issue	Second Issue	Third Issue	Fourth Issue	Fifth Issue	Sixth Issue	
	Rev. 0A	Rev.00	Rev.01	Rev.02	Rev.03	Rev.04	Rev.05	
1								
2								
3								

EPs Contractor:	ZANJAN UREA FERTILIZER PROJECT	Owner:
Petrochemical Industries Design & Engineering Company (PIDEC)	**Data Sheet for MV Motors**	ZANJAN Agricultural & Fertilizer Industries Co.
Project No. : 1231	Owner Doc. No.: - / Doc. No.: TYPICAL / Rev.: xx	Project No. : 214

General	Tag(s)		Motor Manufacturer	
	Service		Vendor	
	Purchase Order		Owner	
	Power System		**Site Conditions**	
	Voltage	6kV ± 5%	Plant Location	Zanjan, Iran
	Frequency	50Hz ± 2%	Area	☐ Indoor ■ Outdoor
	Earthing	Low Resistance Earthed (TN)	Ambient Air Temperature	Min. -30 ºC Max. 48 ºC
	Applicable Documents		Humidity	71%
	Project Specification	1231-DE-00-EL-MSS-522	Altitude	+ 1846 meter above Sea Level
	Applicable Standards	IEC 60034, IEC 60079, IEC 60529	Area Classification	☐ Safe ☐ Zone 2, IIC, T3
	Paint Specification	Acc. to Manufacturer's Standards	Corrosive Gases	Ammonia

	Particulars of Equipment	Unit	Purchaser's Requirements	Vendor's Data
Basic Design	Rated Voltage (Un)	kV	6	
	Rated Frequency	Hz	50	
	Rated Power at Site Conditions & Continuous Duty	kW	-	
	Rated Synchronous Speed / No. of Poles	RPM	-	
	No. of Phases, Startor Connection, Rotor Type		3 Ph, Star, Cage Rotor	
Thermal Design	Insulation Class / Temperature Rise		Class F / Class B	/
	Starting Thermal Time Constant	S	-	
	Cooling Thermal Time Constant	S	-	
	Thermal (Overload) Time Constant	S	-	
	Minimum Cool-down Time for One Restart	S	-	
Frame & Construction	Frame Size		-	
	Frame Material		Ferrous Metals	
	Fan Material		Bronze, Copper-Free-Aluminum or Steel	
	Frame Ingress Protection acc. to IEC 60529		IP54	
	Main Terminal Box Ingress Protection acc. to IEC 60529		IP55	
	Location of Main Terminal Box		Right Side, Facing Drive End	
	Cooling Type acc. to IEC 60034-6		IC: 411,511,611 (or 616,7A1W7 if Rating > 2MW)	
	Mounting Type acc. to IEC 60034-7		-	
	Painting Color (RAL)		According to the Requisition	
	Motor / Rotor Weight	kg	-	/
	Noise Level at Distance of 1m	dB(A)	At Most 85	
Bearings	DE Bearing Manufacturer and Code		-	
	NDE Bearing Manufacturer and Code		-	
	Lubrication Interval for DE / NDE Bearings	Hours	>4000 if Horizontal; >2000 if Vertical	
	Bearing Life acc. to ISO 281-1	Hours	>40000 if Horizontal; > 16000 if Vertical	
	Lubrication System & Lubricant Type		-	
	Maximum Bearing Temperature Rise	°K	At Most 50	
Auxiliaries	Space Heater Rating	W		
	Space Heater Voltage	V	230V if Space Heater Rating <= 3kW; else 400V	
	Stator Winding RTD		Two per Pahse	
	Bearing RTD		Required if Motor >= 1MW or Bearing is Thrust Type	
	CT for Differential Protection	no.	Required if Motor Rating > 1MW	
	CT Burden / Accuracy / Ratio			
Load Spec	Direction of Rotation, Facing Shaft End		-	☐ Bidirectional ☐ CW ☐ CCW
	Mechanical Load Driven by Motor (BHP)	kW	-	
	Total Moment of Inertia (Load + Coupling + Motor)	kg.m2	-	
	Run-up Time at Un & 0.8Un	S	-	
	Load Duty (S1…S9)		-	
	Load Type (Centrigugal / Reciprocating / Fan / Mixer / etc)		-	
Electrical Performance	Current at Pn, 0.75Pn & 0.5Pn	A	-	
	Efficiency at Pn, 0.75Pn & 0.5Pn	%	-	
	No-load Losses	kW	-	
	Power Factor at Pn, 0.75Pn & 0.5Pn	%	-	
Mechanical Performance	Full Load Torque	Nm	-	
	Breakdown Torque at Un & 0.8Un	%	-	
	Pull-up Torque at Un & 0.8Un	%	-	
	Full Load Speed	RPM	-	
	Vibration Severity	mm/S	At Most 2.8	
Starting Characteristics	Starting Method		Direct-On-Line	
	Allowable Stall Time at Hot and Cold Conditions	S	-	
	Maximum No. of Harmless Successive Starts		At Least 3 from Cold / 2 from Hot State	
	Starting Current at Un & 0.8Un	%	At Most 550% at Un	
	Locked Rotor Power Factor at Un & 0.8Un	%	-	
	Locked Rotor Torque at Un & 0.8Un	%	-	
	Allowable Run-up Time at Un & 0.8Un	S	-	
EX Type	EX Type, Gas Group & Temp. Class (If Area is Hazardous)		EExd/ EExde; IIC T3	
	Is Pre-start Gas Purging or Any Other Provision Required?		NO	
	Te Time (for EExe Motors)	S	-	
	Certificate Number		-	

Remark: Un means rated voltage, Pn means motor rated power at standard conditions.