



شماره صفحه : ۱ از ۲۲

SPECIFICATION FOR AIR DRYER PACKAGES							
نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه
D01	0007	SP	ME	120	PEDCO	GCS	BK

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IDC: Inter-Discipline Check
IFC: Issued For Comment
IFA: Issued For Approval
AFD: Approved For Design
AFC: Approved For Construction
AFP: Approved For Purchase
AFQ: Approved For Quotation
IFI: Issued For Information
AB-R: As-Built for Client Review
AB-A: As-Built –Approved

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض احداث ردیف تراکم گاز در ایستگاه جمع آوری بینک							 شرکت توسعه و پترو ایران HIRGAN ENERGY TE
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1.0 INTRODUCTION

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

As a part of the Project, a New Gas Compressor Station (adjacent to existing Binak GCS) shall be constructed to gather of 15 MMSCFD (approx.) associated gases and compress & transfer them to Siahmakan GIS.

GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields Company (NISOC)
PROJECT:	Binak Oilfield Development – Surface Facilities; New Gas Compressor Station
GENERAL CONTRACTOR (GC):	Petro Iran Development Company (PEDCO)
EPC CONTRACTOR:	Joint Venture of : Hirgan Energy – Design & Inspection(D&I) Companies
VENDOR:	The firm or person who will fabricate the equipment or material.
EXECUTOR:	Executor is the party which carries out all or part of construction and/or commissioning for the project.

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THIRD PARTY INSPECTOR (TPI): The firm appointed by EPD/EPC CONTRACTOR(GC) and approved by CLIENT (in writing) for the inspection of goods.

SHALL: Is used where a provision is mandatory.

SHOULD: Is used where a provision is advisory only.

WILL: Is normally used in connection with the action by Client rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR.

MAY: Is used where a provision is completely discretionary.

2.0 SCOPE

This document covers minimum necessary requirements for the design, selection, manufacture, inspection, testing and delivery of air dryer packages. It shall be used in conjunction with data/requisition sheets for present document subject.

3.0 NORMATIVE REFERENCES

The latest edition of following codes & standards are applicable in this project (unless otherwise mentioned):

3.1 LOCAL CODES AND STANDARDS

- IPS-E-PR-905 Engineering Standard for Process Design of Dryers.
- IPS-E-PR-330 Engineering Standard for Process Design of Compressed Air Systems.
- IPS-G-ME-150(1) General Standard for Towers, Reactors , Pressure Vessel and Internal.
- IPS-G-GN-210 General Standard for Packing and Packages.
- IPS-E-PR-170 Engineering Standard for Process Flow Diagram.

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- IPS-E-PR-190(1) Engineering Standard for Layout and Spacing.
- IPS-E-PR-230(1) Engineering Standard for Piping and Instrumentation Diagrams.
- IPS-E-PR-440 Engineering Standard for Process Design of Piping System.
- IPS-E-PR-830 Engineering Standard for Process Design of Valves and Control Valves.
- IPS-E-IN-100(1) Engineering Standard for General Instrumentation.
- IPS-G-IN-200(2) General Standard for Instruments Air System.
- IPS-E-PI-240(2) Engineering Standard for Plant Piping Systems.
- IPS-G-PI-230(1) General Standard for Strainers and Filters.
- IPS-M-PI-110(1) Material & Equipment Standard for Valves.
- IPS-M-PI-150(1) Material Standard for Flanges and Fittings.
- IPS-E-CE-210(1) Engineering Standard for Steel Structures.
- IPS-E-CE-500(1) Engineering Standard for Loads.
- IPS-G-SF-900 General Standard for Noise Control and Vibration.
- IPS-E-TP-100(1) Engineering Standards for Paints.
- IGS-M-PM-105(0) Dry Gas Filter.
- IPS-E-EL-100 Engineering Standard for Electrical System Design.

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- IPS-M-EL-161(2) Material and Equipment Standard for Electrical Items.

3.2 INTERNATIONAL CODES AND STANDARDS

- AISC – ASD Manual of Steel Construction – Allowable Stress Design.
- ANSI / ISA S5.1 Instrumentation Symbols and Identification.
- ANSI / ISA 7.0.0.1 Quality Standard for Instrument Air.
- ASME BPVC SEC. II Boiler and Pressure Vessel Code – Materials Specifications.
- ASME BPVC SEC. V Boiler and Pressure Vessel Code – Non-destructive Examination.
- ASME BPVC SEC. VIII Boiler and Pressure Vessel Code – Rules for Construction of Pressure Vessels.
- ASME BPVC SEC. IX Boiler and Pressure Vessel Code - Welding and Brazing Qualification.
- ASME B 16.11 Forged Fittings, Socket Welding and Threaded Ends. .
- ASME B 16.5 Steel Pipe Flanges and Flanged Fittings.
- ASME B 16.20 Metallic Gaskets for Pipe Flanges – Ring Joint, Spiral Wound and Jacketed.
- ASME B 16.21 Non-Metallic Flat Gaskets for Pipe Flanges.
- ASME B 31.3 Process Piping.
- ASTM American Society of Testing & Materials.

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- BK-GNRAL-PEDCO-000-PI-SP-0004 Specification For Metallic Pipes.
- BK-GNRAL-PEDCO-000-PI-SP-0006 Specification For Painting.
- BK-GNRAL-PEDCO-000-PI-SP-0011 Specification For Welding of Plant Piping System.
- BK-GNRAL-PEDCO-000-IN-SP-0001 Specification For Instrumentation.
- BK-GNRAL-PEDCO-000-IN-SP-0004 Specification For Instrument and Control of Package Unit System (PU).
- BK-GNRAL-PEDCO-000-EL-SP-0011 Specification For Electrical Requirements of Packaged Units.
- BK-GCS-PEDCO-120-PR-UF-0001 Utility Flow Diagrams.
- BK-GCS-PEDCO-120-PI-RT-0001 Corrosion Study & Material Selection Report.
- Piping & Instrumentation Diagrams
- Process Flow Diagrams

3.4 ENVIRONMENTAL DATA

Refer to "Process Basis of Design; Doc. No. BK-GNRAL-PEDCO-000-PR-DB-0001".

4.0 SYMBOLS AND ABBREVIATIONS

The following abbreviations have been used in this document.

W/W	Weight to Weight Ratio
ppm	Parts per Million
ITP	Inspection & Test Plan

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5.0 SCOPE AND LIMITS OF SUPPLY AND SERVICES

The Vendor's responsibilities, scope of supply and services shall include, but not necessarily be limited to the following:

5.1 SCOPE OF SUPPLY

Engineering activities for the design of packaged units shall meet the process requirements as specified on data sheets and P&ID Diagrams.

Documentation for information and /or approval as required. Detail requirements will be dedicated forms included in material requisition.

Data Book containing final technical documentation for all equipment within the scope of supply, including Brochures, operating and maintenance manual.

Supply of Air Dryer System, complete of:

- Twin vessel (2*100%) including all necessary internals, as minimum
- heatless desiccant type air dryer
- Exhaust silencers
- Dryer pre-filters
- Dryer after-filters
- Automatic draining (condensate water, purge air, etc.)
- Supporting assembly for drying unit
- Control panel
- Power panel (if any)
- Gauge board

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- Regenerative instrument air dryer package
- Micro filter
- Humidity meter transmitter
- Drawing and documentation
- Common mounting plate
- All required pipe work (piping, valves, check valves, etc.)
- Wiring, cabling, junction boxes and glands within the base plate limits
- Painting & coating as per "Specification for Painting; doc. No. BK-GNRAL-PEDCO-000-PI-SP-0006."

5.2 LIMITS OF SUPPLY

The equipment shall be delivered with the following accessories:

- Lifting lugs
- Bracket for name plate and name plate
- Necessary pipe supports (if any)
- Earthing system and related connection
- First fill of consumables
- The necessary spare parts for commissioning and start-up
- Special tools, if any

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5.3 SCOPE OF SERVICES

- Complete detailed engineering, design and calculations,
- Fabrication and assembly of the equipment,
- Purchasing of raw materials, parts, etc.
- Shop tests and inspection,
- Cleaning and flushing after test,
- Preservation, protection and painting,
- Packing and Marking,
- Preparation for shipment,
- Shipping and transportation to the site,
- Attending at all meetings held by Client,
- Submitting list of spare parts for 2 (two) years operation,
- Test certification
- Commissioning, installation supervision

5.4 VENDOR'S RESPONSIBILITIES

Vendor has the sole responsibility of design, manufacture, assembly, inspection, test, packing, and shipment of the subject packages. Vendor is responsible for start-up and commissioning during plant operation. Vendor shall fully comply with the requirements of this specification. Vendor shall express any deviation in writing. In otherwise, the vendor shall be guaranteed that there are not any deviation between the consumables and the client documents.

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Approval of Vendor's drawings shall not relieve vendor from responsibility with regard to performance of the equipment specified therein. The Vendor shall ensure that all Sub-vendors comply with all applicable parts of this specification and related documents, standards and codes. Compliance with the requirements of this specification does not relieve the Vendor of the responsibility of furnishing equipment and accessories of the proper design, mechanically suited to meet the specified service requirements. The vendor shall develop the relevant P&IDs in detail based on the project P&IDs, identifying scope of supply and interface with control system.

6.0 GENERAL DESIGN CONDITIONS

6.1 DESIGN CONDITIONS

Air dryer package units shall be according to Vendor's standard process design and in compliance with this specification, the process requirements stated on respective process and Mechanical data sheets. Material of construction shall be chosen as per the data sheets.

6.2 MECHANICAL DESIGN DATA

6.2.1 GENERAL

Vessels and filtration systems of the dryer shall be designed and manufactured to ASME code Sec. VIII, Div.1 and "Specification For Pressure Vessels; Doc. No. BK-GNRL-PEDCO-000-ME-SP-0001". PSA air dryer is subject to the high cycle fatigue loads. FEA and ASME VIII-2 are necessary.

The air dryer package shall be of the heatless regeneration type that includes all necessary controls required to regenerate the drying air whilst the dryer is in service. It shall be complete with air venting silencers. Silencers shall be positioned to point away from any operators.

Dryer vessels shall be fitted with fill and drain ports to facilitate charging/discharging of desiccant without the need to remove inlet/outlet piping.

Each air dryer shall be complete with the Vendor's standard twin coalescing pre-filters to

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remove 99% of all liquid and particles carryover at full design flow, with automatic drain valves, and twin after-filters to prevent particulates carry-over to the plant distribution network.

Maximum allowable noise level produced by each individual unit in operation shall be less than 85 dB at 1 meter from the involved equipment.

An exhaust silencer shall be fitted in the depressurization line to limit the noise levels.

The equipment shall be designed and fabricated to take into account the effect of direct exposure to solar radiation. The surface temperature of any exposed surface shall not exceed 85°C. The VENDOR shall advise his recommended method of protection.

For all parts made of carbon steel, corrosion allowance of 3.2 mm and for the stainless steel material corrosion allowance of zero shall be considered.

6.2.2 REGENERATION SYSTEM

The idle desiccant bed shall be regenerated by circulation of dried air.

Regeneration shall be carried out at atmospheric pressure, whilst the dryer is in services.

Switchover from drying to reactivating shall be completely automatic. The idle (reactivating) vessel shall automatically be re-pressurized before the towers are reversed. The regeneration purge rate shall be automatically adjustable.

In the event of a power failure, the dryer shall continue to dry the incoming air to the specified dew point for a minimum of one hour. Regeneration (purge) air shall not be used during this period. The regeneration time cycle shall be specified by the vendor.

6.2.3 PRE-FILTERS AND AFTER FILTERS

A Pre-Filter capable of scrubbing and eliminating solid particles and liquids shall be provided. Oil removal shall be up to at least 0.1 ppm and particle removal 3 micron and more.

The prefilter shall be supplied with an automatic drain valve and bypass for removal of collected liquid.

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An after filter shall also be provided for removal of suspended desiccant particles. The maximum particle size at the outlet of after filter shall be less than 3 micron. The maximum total oil or hydrocarbon content, excluding non-condensable shall be as close to zero (0) W/W as possible, and under no circumstances shall it exceed 1 PPM W/W under normal operating conditions.

Disposable cartridge element should be used for pre-filter and after-filter. The vendor shall furnish the pre and after filters with filter bypasses with differential pressure indicators.

6.2.4 MATERIAL

All materials used in the fabrication shall be new and have a minimum quality as specified in data sheets and shall be in accordance with ASME specifications and standards.

For all parts made of carbon steel or stainless steel corrosion allowance shall be in accordance with the project "Corrosion Study & Material Selection Report" and related Data Sheet.

The dryer vessels shall be made of carbon steel material. All welded internal parts shall be of stainless steel.

The skid shall be fabricated from structural steel.

The Vendor shall provide all necessary information for a good understanding of the base materials employed. In particular, the Vendor shall specify:

- Their origin
- Their method of preparation
- Their chemical composition

The material used for the construction of the equipment shall not cause chemical/electro-chemical reactions between one another.

As the project proceeds, the Vendor shall not under any circumstances be allowed to change the materials of any part without Client 's prior written approval.

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6.2.5 PIPING AND CONNECTIONS

All package piping and valves shall comply with the requirements of the "Specification For Piping Material; Doc. No. BK-GCS-PEDCO-120-PI-SP-0001 ". On skid piping shall be in accordance with ANSI B31.3 and fully welded. Raised face weld neck flanged joints shall be provided only for maintenance purposes. The piping arrangement shall provide adequate clearances for installation, removal and access for maintenance and operation. Minimum connection size shall be NPS ½". All piping Tie-in(s) shall be flanged and brought out to the edge of package mounting plate.

All piping Tie-in(s) shall be designed so that movements and rotation tend to zero and allowable imposed loads and moments from piping conform to the approved allowable forces and moments of pressure vessel.

The structural analysis for the structure and stress analysis for piping within the skid (NPS 6" and more) shall be considered.

6.2.6 BASEPLATE

All package components shall be mounted on package mounting plate, so as to permit safe access for operation and maintenance activities. Attention shall be paid to potential tripping and overhead hazards. Skid shall be designed to be sufficiently rigid to prevent damage or distortion during handling. The mounting plate shall be equipped with lifting lugs and be suitable for single point lifting. Lifting eyes or other lifting facility shall be furnished on each of four corners of the skid. Package lifting beam(s)/frame(s), completes with slings and shackles for transportation, installation and erection.

6.3 PAINTING, COATING

Painting shall be compatible with site and service conditions and "Specification for Painting; Doc. No. BK-GNRAL-PEDCO-000-PI-SP-0006" and IPS-E-TP-100. Vendor shall provide his painting specification to Client for review and comment.

All equipment shall be painted with final coating before shipment.

Guarantee duration shall be at least the same as for the whole equipment.

All the painting materials shall be compatible with each other.

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6.4 NAME PLATE

All equipment items shall be supplied with a stainless steel nameplate. The vendor shall submit nameplate drawings for approval. The name plate shall be provided for each dryer stamped with the following data:

- Dryer Identification No.
- No Order
- Order placed by
- Vendor's Name
- Type and size Serial No
- Maximum Working Pressure barg
- Hydrostatic Test Pressure barg
- Dew Point Deg. C
- Capacity /Hr
- Regeneration /Hr
- Type of Desiccant
- Total Desiccant Charge kg
- Total Package Weightkg
- Heaviest Maintenance kg

The nameplate shall be securely fixed to the relevant equipment, but the method of fixing shall not involve drilling into the wall of a pressure containing part.

6.5 CONTROL, INSTRUMENTATION AND ELECTRICAL REQUIREMENTS

Design, supply and installation shall follow the requirements of the project "Specification For Instrument and Control of package Unit System (PU); Doc. No. BK-GNRAL-PEDCO-000-IN-SP-0004" and "Specification For Instrumentation; Doc. No. BK-GNRAL-PEDCO-000-IN-SP-0001".

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A PLC based and proprietary microprocessor based control panel shall be used for all electronic, etc. Unless otherwise approved by Client. Control systems shall be designed and supplied by the dryer's vendor and shall perform package's shutdown and Process control. As minimum ingress protection of the panels shall be IP 65.

The Process Control System (PCS) of BINAK will provide supervisory control of this package via a dual redundant serial link (except for critical data such as dew point transmitter and differential pressure transmitter of filters that shall be in communication with PCS by hard wire) to the Unit Control Panel (UCP) using an industry standard protocol.

The package shall contain all required local gauges, transmitters, control valves, relief valves, etc., as required for the safe operation of the Package. All instrumentation equipment shall be fully installed in accordance with all relevant Codes, Standards and Regulations that shall be in based on "Specification For Instrument and Control of package Unit System (PU); Doc. No. BK-GNRAL-PEDCO-000-IN-SP-0004". Transmitters, control valves, etc., shall be cabled to skid edge JB's for subsequent connection, by others, to the PCS. The signal segregation for cable and JB's should be accordance with requirement of the project "Specification For Instrument and Control of package Unit System (PU); Doc. No. BK-GNRAL-PEDCO-000-IN-SP-0004".

The VENDOR/BIDDER shall provide fully detailed P&IDs, control & safeguarding narratives and skid wiring diagrams for the equipment within his supply.

All power, control and shutdown cable terminations at skid edge junction boxes shall be fully detailed in interface documentation.

The Package shutdown systems shall be via the Emergency Shutdown system (ESD).

The electrical requirement shall meet the project "Specification for Electrical Requirements of Packaged Units; Doc. No. BK-GNRAL-PEDCO-000-EL-SP-0011".

The UCP panel will be supplied from the 110 VAC feeder coming from the plant's redundant UPS panel. UCP shall derive the required voltage levels (e.g. 24VDC etc.) from the incoming 110 VAC using power supply units. Power supply/control voltage of field instruments, alarms, indicating lights, solenoid valve and relays shall be 24 VDC.

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Degree of protection shall be suitable for electrical equipment, panels, boxes and instruments for installation in site's safe area and shall be in accordance with relevant data sheets. As minimum ingress protection for outdoor condition shall be IP 65.

Independent terminals and connections shall be considered in UCP for ESD circuits (if required).

7.0 INSPECTION AND TESTS

7.1 INSPECTION

Vendor shall notify to Client of all suborders for design/supply of equipment made to ensure realization of order .

After 45 hour advanced notification, Inspector nominated by Client shall have free access, during all periods of manufacturing, test and preparation for shipment, to Vendor or Sub-Vendor plant for inspection .

All shop checking, inspection and testing of the equipment shall be carried out in accordance with the applicable codes and standards, especially ASME SEC. VIII and related ITP.

All equipment and their materials shall be inspected and tested per requirements set forth in code/standard/or reference specifications, the material requisition and its attachments. However, the acceptance of any work and/or equipment shall not release the Vendor from its responsibility to supply the equipment capable to function properly at the specified site and service conditions, and his guarantees.

7.2 TEST

7.2.1 GENERAL

After control by Vendor, final reception can be carried out.

The dryer package shall be fully assembled and tested in the Vendors factory prior to shipment.

During final reception, conformity to drawings and specification shall be checked.

Vendor shall notify the Client at least 1 month minimum before the date forecast for test.

Test procedures shall be submitted to Client for his review and comments.

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7.2.2 HYDROSTATIC TEST

All equipment shall be tested hydrostatically prior to any painting in accordance with applicable codes. Water used for testing carbon and low alloy carbon steel equipment shall contain a suitable corrosion inhibitor. The water temperature shall not be less than +7°C. The concentration of chlorine ions in water used for tests shall not exceed 20 ppm. The test pressure shall be held at full pressure for a minimum of 30 minutes. After hydrostatic test all test equipment shall be removed and the inside of the equipment shall be completely cleaned and dried.

7.2.3 NON-DESTRUCTIVE TEST

Non-destructive test shall be in accordance with applicable codes (ASME, API, etc. and other specifications).

Non-destructive test shall be performed after the Post Weld Heat Treatment and prior to the hydrostatic test.

7.2.4 OTHER TESTS

The following tests shall be performed on compressor with all its auxiliaries:

- Mechanical running test
- Performance test
- Noise test

8.0 PREPARATION FOR SHIPMENT

The equipment shall be carefully cleaned inside and outside and free from any foreign matter.

Flanges and connections shall be closed with blind flanges and plugs. Permanent blind flanges or covers included in the Vendor's scope shall be bolted with service stud bolts and nuts. All tell-tale holes shall be plugged.

All parts shall be marked for identification and conditioned for shipment.

Each loose piece or assembly shall be properly protected to prevent damages during normal shipping and handling.

Before delivery, the equipment shall be properly prepared for shipping and road transport or other possibility (see material requisition).

All bolting shall be lubricated, before assembly.

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Preparation for packing and shipment of the equipment shall be in acc. with IPS-G-GN-210.

9.0 SPARE PART INTERCHANGEABLE RECORD LIST(SPIRL)

Vendor shall furnish list for following categories:

1. Spares for Commissioning and start-up.
2. Spares for 2 years of normal operation.
3. Special Tools.

Commissioning and start-up spares, two years operation spares and Special Tools are in Vendor's Scope of Supply.

All spare parts, special tools accessories and parts of package shall be packed in the separate, rugged boxes and marked "Special tools/ Spare parts for (Tag/Item No.)" Each tool shall be stamped or tagged to indicate it intended use; Vendor shall provide a detailed packing list for this equipment.

All spare parts, special tools accessories and parts of package shall be packed in the separate boxes. Vendor shall provide a detailed packing list for this equipment.

Vendor shall recommend special tools for normal operation and maintenance and special lifting gear if necessary for lifting of the equipment components during installation/removal, these shall be itemized in the bid and shall be purchased with the equipment.

10.0 SUPERVISION ON INSTALLATION

Supervision on Installation is in the scope of Vendor. The Vendor shall be present during installation the equipment and shall have supervision on its procedure. It is obvious that the Vendor will be responsible for any problem due to misdoing above mentioned. The Vendor shall individually price all requirements.

11.0 PRE-COMMISSIONING & COMMISSIONING

Pre-commissioning & Commissioning are in the scope of Vendor. The Vendor shall propose all pre-commissioning and commissioning requirements including software and hardware such as Number of Personnel involved, Man-hour of proposed pre-commissioning and commissioning operation etc. Each

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item shall be individually priced.

12.0 GUARANTEE AND WARRANTY

The guarantee period shall be eighteen (18) months from the date of delivery or twelve (12) months from the installation date of each equipment/packages at site. The Vendor shall guarantee the process performance of the assembled equipment as specified on the Data Sheets.

If any defect or mal-performance occurs during the guarantee period, the vendor shall make all necessary alterations, repairs, and replacements free of charge, fob factory. Field labour charges, if any, shall be subject to negotiation between vendor and Client. The Vendor shall warranty required after sale services and supply the required spare parts for 15 years.