



**Resalat Oil Field Development Project
Phase 1 (EPC-EPD)**



Contract
No.

Specification for Electrical Requirement for Package Equipment

Class

1

5365

Pr. Code
LRSL

Area
000

Disc.
EL

Type
SP

Seq.
624

Rev.
03

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REVISION RECORD SHEET

REV. NO.	PURPOSE	LIST OF UPDATED MODIFIED SECTIONS IF ANY
01	Revised based on the client comment	As per highlighted items
02	Revised based on the client comment	As per highlighted items
03	Consider selector switch based on owner comment	Paragraph 4.3 & 4.6



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1. INTRODUCTION

1.1. Development Overview

The Resalat Field previously known as Rakhsh Field, is located in the Persian Gulf, some 80 km to the South of Lavan Island, in water depth of 65-75 meters. The facilities which were originally developed in 1968 have sustained some damage due to the Iran/Iraq war and adverse climate conditions thereafter.

To increase oil production capacity from this field (adding 12,000 stock barrels per day to current production), Iranian Offshore Oil Company (IOOC) has defined new project which includes Engineering, Drilling, Procurement, Construction for following items:

- New satellite Wellhead Platform (WHP1) with totally nine (9) conductor slots.
- Development and renovation of Existing offshore complex consist of new power generation, control system, HVAC, Electrical /control room, electrical panels(LV &MV),process & utility piping, and all necessary activities which shall be done for connection to existing facilities(Tie in requirements)
- Drilling of **two** new production wells in R1 and **three** wells in WHP1 platform and Re-entry and work-over of **one** existing well in R1 platform.
- One 10” productions submarine pipeline from WHP1 to PP and a single submarine cable (power and data) from SP to WHP1
- Inspection, Strengthening, Modification and Repair of existing R1 complex Jackets and topsides and replacement of boatlanding and Barge Bumpers.

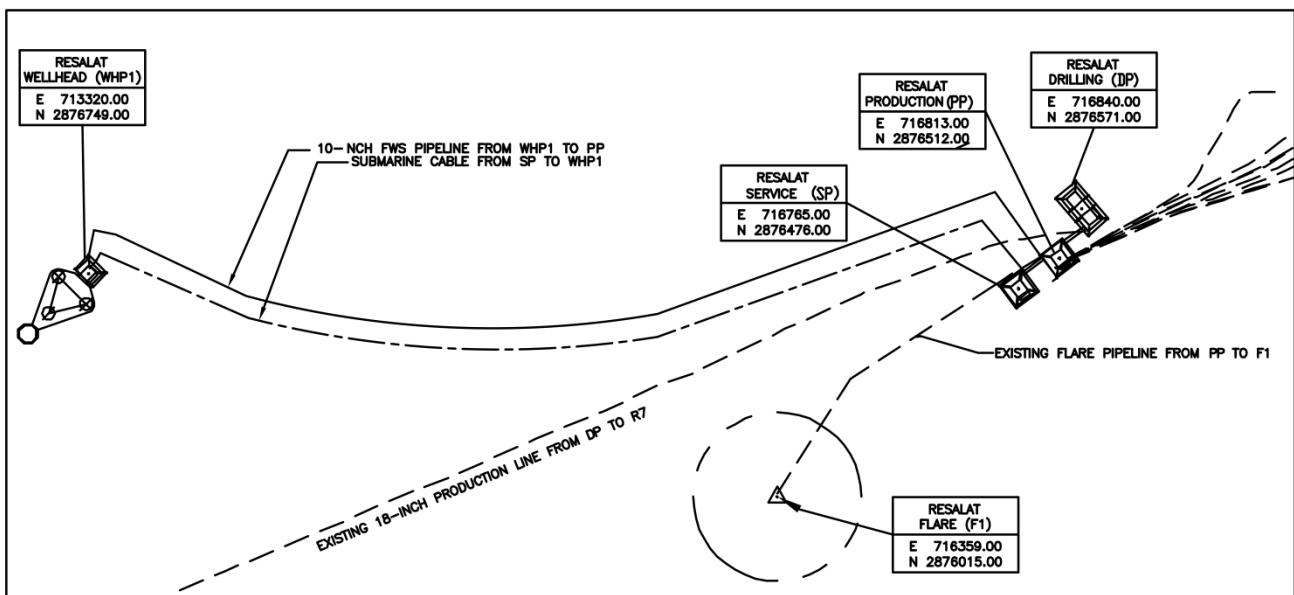


Figure 1: Resalat Development Field Layout (Datum ED 77, Zone 39, Cent. Meridian 51° East)



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1.2. Purpose of Scope

This specification defines the minimum requirements for the design, manufacture, inspection and testing of the electrical equipment supplied as part of a packaged unit.

The specification is to be read in conjunction with the material requisition and all attachments thereto.

1.3. Definitions

PROJECT	Resalat Oil Field Development – Phase 1
COMPANY	Iranian Offshore Oil Company (IOOC)
CONTRACTOR	Consortium of Iranian Offshore Engineering and Construction Company (IOEC) and Intelligent Solutions Inc. (ISI)
SUB-CONTRACTOR	Tehran Raymand Consulting Engineers (TRCE)
PURCHASER	Any firm who buy services, material and/or equipment for execution of the project within a dedicated contract.
SUPPLIER	Any vendor, manufacturer who supply any Service, Material or Equipment for the project
SHALL	Refer to a mandatory requirement
SHOULD	Refer to a recommendation
MAY	Refer to one acceptable course of action

2. CODES AND STANDARDS

Materials selection, design, manufacturing, testing and installation of the packaged unit electrical equipment shall comply with the latest editions of the following IEC standards:

IEC 60034	Rotating electrical machines
IEC 60079	Electrical Apparatus for Explosive Gas Atmospheres.
IEC 60092	Single and multicore non-radial field power cables with extruded solid insulation for rated voltages 1kV and 3kV
IEC 60158	Low-voltage control gear
IEC 60204	Safety of Machinery - Electrical Equipment of Industrial Machines.



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- IEC 60228 Conductors of Insulated Cables.
- IEC 60269 Low-voltage fuses
- IEC 60331 Fire resisting Characteristics of Electrical Cables.
- IEC 60332 Tests on Electric Cables under Fire Conditions.
- IEC 60364 Electrical Installations of Buildings.
- IEC 60391 Marking of Insulated Conductors.
- IEC 60439 Low-voltage Switchgear and Control Gear Assemblies.
- IEC 60445 Identification of Equipment Terminals and Terminations of Certain Designated Conductors, including General Rules for an Alphanumeric System.
- IEC 60502 Extruded solid dielectric insulated power cables for rated voltages from 1 kV up to 30 kV.
- IEC 60529 Degrees of Protection provided by Enclosures.
- IEC 60754 Test on Gases Evolved during Combustion of Materials from Cables.
- IEC 60947 Low-voltage Switchgear and Control Gear.
- IEC 61000 Electromagnetic Compatibility.

3. REFERENCE DOCUMENTS

- LRS L-000-EL-DB-603 Electrical Design Criteria
- LRS L-000-EL-SP-611 Specification for Power & Distribution Transformer
- LRS L-000-EL-SP-615 Specification for Power and Control Cable
- LRS L-000-EL-SP-614 Specification for Asynchronous Electrical Motor
- LRS L-000-EL-SP-612 Specification for LV Switchgear
- LRS L-000-EL-SP-623 Specification for Bulk Material
- LRS L-000-EL-SP-616 Specification for Lighting & Distribution panel
- LRS L-000-MW-SP-673 Specification for Painting



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4. DESIGN

4.1. General

All electrical equipment and associated installation materials shall be suitable in all respects for the service conditions stated herein and the datasheets for the packaged unit and, where applicable, in the datasheets for the individual electrical items of equipment which form part of the packaged unit.

The electrical installation shall be designed for operation at the voltages and frequency stated below, the MV power network shall be 'IT' and the LV power network 'TN-S' in accordance with IEC 60364 part 3.

- 6600V, 3 Phase, 50 Hz, low resistance earthed.
- 2200V, 3 Phase, 50 Hz, low resistance earthed
- 400V, 3 phase, 50 Hz (3 or 4 wire), solidly earthed.
- 230V, 1 phase, 50 Hz, solidly earthed.
- Control voltages shall be 230V single phase and neutral for contactors and LV circuit breaker closing control and 110V DC for circuit breakers and protective systems tripping control.

Equipment shall be suitable for the following supply variations:-

- Steady state voltage $\pm 10\%$
- Steady state frequency $\pm 5\%$
- Transient voltage variations - 20% and +15% with recovery to minus 5% in 5 seconds
- Transient frequency variations $\pm 5\%$

Electrical components shall be designed for the following nominal voltages.

Motors above 1000KW	6.6 kV, 3 Phase, 3 wire.
Motors above 150 up to 1000KW	2.2 kV, 3 Phase, 3 wire.
Motors up to 150 kW	400 V, 3 Phase, 3 wire.
Motors up to 0.4 kW	230 V, 1 Phase or 400 V, 3 Phase
Lighting System	230V, 1 Phase, 50 Hz
Convenience Sockets	230V, 1 Phase, 16A, 1 Phase + N + E, (indoor & outdoor) 50Hz, 3 Pin
Process Control System, Emergency Shutdown and Gas detection systems	230 V, 50 Hz, 1 phase (from UPS un-earthed – IT system)



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Users other than motors:

- Users up to 3kW 400V, 3Phase, or 230V, 1 Phase, 50Hz
- Users above 3kW 400V, 3Phase, 50Hz

4.2. Enclosures

The minimum enclosure ingress protection degree of equipment shall be in accordance with their area and shall be as follows:

1) Indoor (in enclosed buildings) equipment degree of ingress protection shall be as a minimum:

- Panels degree of ingress protection shall be as a minimum: IP42
- Equipments such as but not limited to, junction boxes, lighting fixtures, receptacle sockets, etc.: IP44, transformers (IP 21) and neutral earthing resistors (IP 23).

2) Outdoor equipment degree of ingress protection shall be as a minimum:

- General electrical equipment: IP55
- Electric motors: IP56
- Small installation materials such as but not limited to, junction boxes, lighting fixtures, control stations, distribution boards, control panels, receptacle sockets, cable glands, etc. : IP66

3) Submerge equipment degree of ingress protection shall be IP68

Equipment exposed to direct sunlight shall be provided with suitable sunshades.

All enclosures specified for outdoor shall, in addition to the above requirements, be designed to shed rain water and prevent the accumulation of standing water on any part of the enclosure. In addition, sunshades shall be provided as required.

Control panels should be located indoors where possible, however, where an outdoor location is specified, a suitable weather shelter shall be provided in addition to the requirements specified above.

Enclosures for relay boxes, control panels, control stations or other similar equipment shall be constructed from a suitable material to provide a lasting rigid structure. Cover doors shall be hinged gasketed and padlockable. Control enclosures over 1.2 metres in height shall have three point latching mechanisms. Wall mounted equipment shall be provided with external fixing lugs.

Junction boxes for outdoor installation shall have an enclosure rating of IP 66 and shall be flame resistant and retardant.



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Separate junction or terminal boxes shall be provided for power, control, instrumentation and IS instrumentation circuits groups. Groups containing both A.C. and D.C. circuits shall also be terminated in separate junction or terminal boxes. Terminals for intrinsically safe terminals shall be colored blue.

Each terminal shall be clearly and permanently numbered on the body of the terminal itself.

Within enclosures, separately mounted and screened terminal blocks/strips shall be provided for each voltage level. Terminals for 3 phase supplies shall be phase segregated by installation of barriers. A.C. terminals over 55V shall be shrouded and fitted with hazard warning labels indicating voltage level.

The preferred direction of entry into terminal boxes and equipment is side or bottom entry. Top entry not to be used without prior written agreement by the Company.

The VENDOR shall provide separate gland plates for the glanding of Project cables and, where compatible with the appropriate standards and Hazardous Area Certification, the gland plates shall be removable and undrilled. Drilled holes in certified apparatus shall be fitted with certified stopping plugs.

Not more than one conductor shall be connected per terminal. If more than one conductor has to be terminated at the same point the supplier shall provide the required number of terminals linked together. The link shall not occupy the same place as the conductor.

The junction boxes provided shall be adequately rated and sized to accept the external cabling. Terminals shall either be of the pressure clamp or bolted lug type. Pinch screw terminals where the screw bears directly onto the conductor are not acceptable. Space shall be provided for 20% additional terminals.

Any special control panel requirements to meet site regulations and standards will be specified by the CONTRACTOR in the datasheets.

Where a VENDORS standard control panel is specified, full details shall be provided for approval by the CONTRACTOR.

All items mounted in panels shall have individual dust covers, be easily accessible and have adequate space for maintenance.

Equipment that incorporates indicator lamps shall include a separately fused, push-to-test, lamp test circuit.

All control signals between equipment e.g. motor starters, contactors and the package unit, for starting and stopping drives, permissive, indicating lamps, etc., shall be volt-free contacts with a minimum rating of 230 V 2A, non-inductive unless specified otherwise.



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Where specified, control panels shall be fitted with anti-condensation heaters, where these are less than 2kW they shall be controlled by a series thermostat and be suitable for operation from the users single phase mains supply. In addition, isolation facilities shall be provided.

Control panels shall be equipped with internal lighting and door switches when required or where specified.

Enclosure paint finish shall be in accordance with document Specification for Painting (LRS L-000-MW-SP-673). The complete interior surface of all enclosures shall have a final coat of moisture and fungus resistant varnish.

Gaskets shall be of a rot-proof material i.e., neoprene or synthetic rubber, with resistance to splitting.

Floor standing enclosures shall be provided with facilities to enable them to be bolted to the floor and be suitable for top lifting. Eyebolts, lifting frames or other suitable means of lifting shall be provided.

All control panels shall be provided with a document pocket, securely fixed to the inside of the door, to hold relevant drawings etc.

4.3. Installation and construction

The VENDOR shall install all cabling, cable glands and equipment in his scope of supply within the package unless otherwise specified.

Cable glands shall be of the compression type. The use of compound-filled “barrier type” glands is to be kept to a minimum and used only where required by IEC 60079 and with the written permission of the CONTRACTOR. The manufacturer and type shall be approved by the CONTRACTOR. Shrouds shall not be provided.

The use of conduit fittings shall be avoided if possible.

Cables shall be strapped to tray or rack with stainless steel/PVC or EVA (LSOH) covered straps or saddles (plastic ties are not acceptable) and care shall be taken to avoid stress on cable terminations. All bulk items required to install the cables shall be supplied by the VENDOR e.g. cable straps, saddles, glands, shrouds, markers etc.

Cable support shall be either ladder rack or tray. Cable support systems shall be mounted to avoid being walked upon. Ladder rack and tray shall be stainless steel grade 316L.

Separate racking or tray shall be installed for the following electrical systems:

- MV power and associated control cable



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- LV power and control cables for non-instrument control (i.e. control stations)
- Instrument Cables.
- I/S Instrument Cables

The racking or tray shall be sized to carry the cables provided by the CONTRACTOR from the skid edge, where connected directly to the packaged equipment, as well as the package VENDOR'S own cables together with provision for 20% spare capacity.

The equipment shall be located such that it can easily be maintained in its service position. In addition a clear space of 300mm minimum shall be provided in the direction of cable entry to gland plates.

Local isolation shall be provided for incoming power supplied to the control panel. Isolating switches or switch fuse units shall be provided with padlocks and shall be lockable in the 'OFF' position only. The isolator shall be interlocked with the enclosure doors or cover.

All equipment identification labels shall be of engraved plastic in black letters on a white background ('Traffolyte' or equivalent). Labels shall be fixed by means of screws.

All control panels, relay boxes and terminal boxes, etc., shall be fitted with nameplates indicating equipment tag number and function.

All internally mounted components in panels e.g. relays, terminal strips, switches etc., shall be labelled adjacent to the component, with references as detailed on schematic and wiring diagrams.

All electrical field devices shall be clearly identified by labels engraved with equipment tag number and function. In addition, control stations and similar equipment shall also indicate normal operating functions i.e. 'Stop', 'Start', 'On', 'Off', etc.

All withdrawable type units shall be identified in both the fixed and withdrawable parts.

Each motor shall be provided with a local control station having start/stop push buttons. In addition a local-off-remote switch shall be provided for remote or auto control. The stop button shall be of the 'stay put' type, lockable where specified. An ammeter shall be provided as an integral part of the control station for motors > 4 kW.

4.4. External connections

All outgoing electrical connections from the packaged unit, except as stated below, shall be grouped and wired to interface junction boxes. The boxes shall be supplied by the vendor and shall be mounted in an accessible position, which shall be agreed with the CONTRACTOR.



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Incoming cabling to heaters (not anti-condensation heaters) and motors shall normally be run directly to those heaters and motors. The VENDOR shall provide a list of electrical equipment requiring a power supply with his bid.

The configuration of outgoing connections shall be arranged within the junction boxes to minimize the number of outgoing cables but not to minimize the operating integrity of the packaged unit if, for example, a pump is undergoing maintenance.

For motors equipped with anti-condensation heaters, the supply will be interlocked with the motor contactor to ensure that when the motor switchboard isolator is open, the heater is energized. The motor heater shall be suitable for 230 V a.c. supply.

All terminals shall be easily identifiable with those shown on the schematic diagrams.

Cable lugs shall be pre-insulated or with suitable insulating shrouds. Insulating materials shall be used to provide galvanic separation between stainless steel fixings and steel supports. Insulating sleeves/washer shall be used around the bolts/nuts.

4.5. Cables

All outdoor cables shall be in accordance with specification LRLS-000-EL-SP-615, IEC 60228 (for copper conductors) and IEC 60092 (for insulation).

Cables for medium and low voltage power installations shall be stranded annealed copper conductor, extruded XLPE insulated, UV, Oil, Mud and water resistant, flame retardant, low smoke and zero halogen (LSZH), gas and vapor tight, and galvanized steel wire braided, with SHF-Mud outer sheath in accordance with NEK 606 or IEC 60092-360 standards as mentioned in clause 4.2.

For production and living quarter platforms SHF2 cables shall be provided.

SHF-Mud cables shall be considered for wellhead platforms.

Single core cables shall have Phosphor Bronze Wire Braided armour (PBWB).

Low voltage power cables shall be 600/1000V.

Earthing cables are considered non-current carrying cables. Earthing cables shall be made of tinned annealed copper, with green/yellow SHF2 sheath. The SHF2 sheath is a protection against electrolytic corrosion, UV radiation and hydrocarbon.

Cables for safety systems and life support shall be fire resistant in accordance with IEC 60332 and IEC 60331.



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Cables sheath color shall be:

Black For low voltage

Red For MV voltage

Orange For fire resistant

Yellow/Green For earthing

The minimum stranded conductor cross-sectional area sizes permitted are detailed below:

Alarms, protection system and

Electrical instruments 2.5mm² (min)

Lighting and small power 2.5mm² (min)

Motor control circuits 2.5mm² (min)

Power Circuits, motor feeders etc. 4.0mm² (min) to 240mm²(max – 3 core)
and 400 mm² (max- 1 core)

Conductor cross sectional areas less than 4.0mm² and 2.5mm² shall not be permitted for power and control applications respectively. Only standard sizes shall be allowed.

Wire and cable splices shall not be permitted.

Cables shall have stranded copper conductors unless specifically agreed otherwise by the CONTRACTOR.

The VENDOR shall be responsible for the cable volt-drop, rating, installation, connection and mechanical protection of all cables in this scope.

Each cable and cable core shall be clearly, precisely and indelibly identified at both ends as detailed on the VENDOR'S wiring and schematic diagrams. Cables shall also be similarly identified on both sides of a transit penetration. Markers, which do not completely encircle and lock around the conductor or markers of paper and/or adhesive tapes are not acceptable.

Wiring of factory assembled panels and any associated plastic trunking shall be flame retardant with a low smoke and halogen emission with an oxygen index of 28 or 30. In addition the conductors shall be stranded copper with a minimum cross sectional area of 1.5mm².

Cable cores shall be identified as follows:



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Single Core	Black
2 Core	Black/Red
3 Core	Red/Yellow/Blue
4 Core	Red/Yellow/Blue/Black
Above 5 Core	White with black numbers or black with white numbers

4.6. Junction Boxes and Local Control Station (LCS)

All junction boxes and local control stations shall be selected in accordance with the hazardous area classification and shall be housed in enclosures made of Cast Iron or Stainless Steel 316L.

All LCSs shall be Ex-d certified for both Zone1 and Zone2 areas.

Each motor on the platform shall be provided with a Local Control station (LCS).

At least two push buttons and one selector switch should be considered for each LCS. Also one mushroom push button shall be provided on LCS for Emergency Stop. The LCS shall be installed on a secure structure, in a convenient location, close to the motor.

Junction boxes and LCSs enclosure shall be ingress protected to a degree not less than IP66, as defined by IEC 60529.

Junction/marshalling boxes shall include a minimum of 25% spare capacity. Terminals shall be provided such that only one conductor is terminated on each side.

Junction boxes located in or adjacent to deluge areas shall have bottom cable entry only.

Standard LCS shall have the following:

- Start-stop push button
- Mushroom emergency push button
- Local-off-remote (or manual-off-automatic) selector switch according to process requirements, pad lockable in the "Off" position.
- Ammeter (1 phase) for all motors > 4Kw

4.7. MV and LV motors



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LV & MV motors shall be supplied in accordance with the Asynchronous Electrical Motor specification LRS L-00-EL-SP-614 associated datasheets.

Unless otherwise specified, motors shall be purchased from the CONTRACTOR approved supplier.

4.8. Metering, Protection & Control Equipment

Metering protection and control equipment shall comply with the project standards.

All sub-circuit protection should be by MCB's, MCCB's or MPCB's. In this regards, motor feeders 75kW and above, should equipped with MCCB and microprocessor type protection relay include over current, earth fault and thermal over load protection functions. For motor feeders above 18.5kW, MCCB, electronic thermal over load relay and earth fault protection should be provided. Motor feeders rating 18.5kW and less should be equipped with MPCB as well as earth fault protection. Coordination type 2 shall be respected in selection of CB, contactor and thermal over load.

Three ammeter should be installed on motor starter for all motor feeders.

All non-motor distribution feeder should be equipped with earth fault relay. For feeders 630A and above ACB with microprocessor type protection relay should be utilized. Feeder 500A and less, should be by MCCB. In addition, one ammeter with selector switch should be installed on panel starter for non-motor distribution panel.

Earth fault protection shall apply to all outgoing circuits for direct contact (lighting and small power) and indirect contact (motors, contactor feeders, etc) protection.

Earth fault relays shall have the following sensitivity rating at different stages:

- 300mA motor and other main outgoing feeders
- 30mA for lighting and small power outgoing circuits

Instrument transformers and their connection shall be in accordance with IEC 60044.

Accuracy class for metering current transformers shall be Class 0.5 and the saturation factor shall be such that the instruments are not endangered at maximum fault current.

Protective current transformers shall be accuracy Class 5P10 unless another class is required to prevent the risk of endangering protective relays at maximum fault level.

Short interval thermal current ratings of the transformers shall be one second. Current transformers shall be rated accordingly if electrical systems require a duration of 3 seconds.



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The rated primary currents for all CT's shall be selected from the standard values given in IEC60044-1. The rated secondary currents shall be 1A.

Accuracy for voltmeters and ammeters shall be Class 1.5 min; Energy meter and power meter shall have an accuracy of Class 2.5, as per IEC 60051.

The design shall include adequate metering for proper control, operation and check of the electrical installation. The upper limits of effective range of indicating instruments should be chosen so that the full load reading is approximately 80% of full-scale deflection.

Each feeder at least shall have three indication lamps on panel:

- i) Red lamp for close position
- ii) Green lamp for open position
- iii) Yellow or amber lamp for tripping or fault purpose

4.9. Hazardous areas

The electrical components utilized in package units shall be suitable for the area classification where the package is to be installed. The VENDOR shall also consider any sources of hazard within his scope of supply in accordance with the latest edition of API standard RP500.

Where an air pressurization system forms part of the equipment, all provisions for personnel entry and exit together with interlocks, alarms and protection systems shall be subject to approval by the CONTRACTOR. Air purged/pressurized electrical equipment shall only be used if approved by the CONTRACTOR.

All equipment intended for use in hazardous areas shall be certified by an internationally recognized Certifying Authority (as approved by the CONTRACTOR). Certificates shall be in English or be accompanied with an exact English translation

4.10. Earthing

Earthing shall comply with the relevant standards and codes listed in document LRSL-000-EL-SP-621.

Where metallic enclosures are used with no electrical discontinuity and the entry is via a tapped hole in a 4mm minimum thick gland plate, a bonding connection between the gland and the enclosure is not required. Where entry is via a clearance hole a 'star' washer shall be fitted under the back nut to ensure good electrical contact.



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Where non-metallic enclosures are used, means shall be provided to preserve the electrical continuity of the armouring or metallic sheaths of cables.

To ensure the requirements for earthing in Hazardous Areas are met, each package unit shall be provided with two welded bosses, easily accessible and at opposite corners of the skid, to allow the user to earth the packaged unit as required.

Large packages shall include earth bars where package electrical equipment earth bonding cables shall be terminated.

Luminaires shall be earthed by means of a separate conductor in the cable connecting them to the lighting interface junction box.

4.11. Main and component labelling

The following information shall be clearly marked on a nameplate attached to a permanent part of the control cabinet, or in the absence of a control cabinet on the package unit:

Purchasers order number

- Year of manufacturer
- Name of manufacturer
- Type and serial number of unit
- Nominal input current/voltage/frequency

Terminals, cabling and connectors shall be suitably identified as per the schematic and interconnection diagram prepared at detailed design. Label inscriptions shall be in English Language, written in black on a white plate.

The rating plates shall be made of corrosion-resistant metal or “Resopal” (white-black-white), and shall be fixed to a non-removable part of the equipment on a well visible place.

If additional rating plates are have to be mounted on removable parts, VENDORS serial number and reference shall be repeated on these plates.

Nameplates shall be fixed in such a way that they are easy to replace.

When the system is delivered with several separate cabinets, each individual panel shall be clearly tagged.

Sizes and letters of nameplates and equipment number plates shall be specified in detailed in the requisitioning documents.

All individual components within the cabinet(s) shall be suitably item tagged.



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4.12. Materials list

A material list shall be furnished listing the quantity, rating, type and VENDORS catalogue number of all equipment of the package unit.

4.13. Spare parts and special tools

Together with the supply of all equipment a complete set of spare parts and special tools for commissioning shall be supplied for the equipment and also recommended spare parts list for two years of operation shall be included for all the equipment. The supplied spare parts shall be of the same specifications as the original parts

5. QUALITY ASSURANCE / QUALITY CONTROL

The VENDOR shall have in effect at all times, a QA/QC program that clearly establishes the authority and responsibility of those responsible for the quality system. Persons performing quality functions shall have sufficient and well defined authority to enforce quality requirements, initiate, identify, recommend and provide solutions to quality problems and verify the effectiveness of the corrective action.

A copy of the VENDORS QA/QC program shall be submitted to the CONTRACTOR with its quotation for CONTRACTORS review and concurrence prior to award. If VENDOR'S QA/QC program and facility, where the work is to be performed, is ISO 9001:1994 certified, then only a copy of the VENDORS ISO 9001:1994 certificate is required. In addition, if VENDORS facility is ISO certified, CONTRACTORS QA audit requirements will be waived in favour of ISO 9001:1994 registrar audits, unless the CONTRACTORS trend analysis program indicates areas of concern.

The VENDOR shall identify in purchase documents to its SUBVENDORS all applicable QA/QC requirements imposed by the CONTRACTOR, and shall ensure compliance thereto. On request, VENDOR shall provide objective evidence of its QA/QC surveillance of its SUBVENDORS activities.

The VENDOR shall submit certified reports of production tests as soon as the tests are completed satisfactorily.

The COMPANY/CONTRACTOR reserves the right to inspect materials and workmanship at all stages of manufacture and to witness any or all tests. The VENDOR, 30 days after award but prior to the pre-inspection meeting, shall provide the CONTRACTOR with a copy of its Manufacturing and Inspection Plan for review and inclusion of any mandatory COMPANY/CONTRACTOR witness points.



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6. DOCUMENTATION

VENDOR shall submit the type and quantity of drawings and documentation for CONTRACTORS authorization or information as listed in the individual Material Requisitions and Purchase Orders.

Mutual agreement on scheduled submittal of drawings and documentation for CONTRACTORS authorization or information as listed in the individual Material Requisitions and Purchase Order.

Comments made by CONTRACTOR on drawing submittal shall not relieve VENDOR or SUBVENDORS of any responsibility in meeting the requirements of the specifications. Such comments shall not be construed as permission to deviate from requirements of the Purchase Order unless specific and mutual agreement is reached and confirmed in writing.

Each drawing shall be provided with a title block in the bottom right-hand corner incorporating the following information:

- Official trade name of the COMPANY.
- VENDORS drawing number.
- Drawing title giving the description of contents whereby the drawing can be identified.
- A symbol or letter indicating the latest issue or revision.
- PO number and item tag numbers.

Revisions to drawing shall be identified with symbols adjacent to the alterations, a brief description in tabular form of each revision shall be given, and if applicable, the authority and date of the revision shall be listed. The term "Latest Revision" shall not be used.

7. OPERATING AND MAINTENANCE MANUALS

In addition to the instructions in standard forms, the VENDOR shall comply with the following additional requirements for Installation, Operating and Maintenance Manuals.

- a) The front cover, spine and inside page shall state the purchase order number and VENDORS reference number.
- b) The inside front page shall carry and index listing the content of each section of the manual.
- c) Individual sections shall be complete and shall refer to equipment actually supplied.
- d) Published data shall also be included, including published data for bought in items.
- e) Full details of any special equipment shall be clearly set out in separate sections.
- f) A punch list of "do's" and "don't" shall be included.
- g) Full details for installation setting up shall be included.
- h) Recommendation test data shall be stated, covering initial and regular testing, i.e. values for high voltage, AC or DC etc. shall be given.



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- i) Items requiring regular inspection, checking, testing and maintenance shall be listed and the time scale clearly indicated.
- j) Important items shall be cross referenced to other parts of the manual as necessary.

8. DELIVERABLES

Documentation shall be part of the VENDOR'S Package Equipment supply.

The following drawings/documents shall be included as a minimum, in the quantities and at the times stated in the Requisition:

- a) General Arrangement of the Package showing main dimensions, weights, operating clearances, access and cable entry, cable routes and provisions for earthing.
- b) Schematic and connection diagrams covering all equipment pertaining to the package.
- c) Schedule of recommended spare parts.
- d) Technical manual giving installation, operation and maintenance instructions.
- e) Schedules – Cable, Certified Equipment, Interface and Utilities
- f) Type and special test certificates

9. SUBVENDORS

The VENDOR shall assume unit responsibility and overall guarantee for the equipment package and associated equipment.

The VENDOR shall transmit all relevant purchase order documents including specifications to his SUBVENDORS.

It is the VENDORS responsibility to enforce all Purchase Order and Specification requirements on his SUBVENDORS.

The VENDOR shall submit all relevant SUBVENDOR drawings and engineering data to the CONTRACTOR.

The VENDOR shall obtain and transmit all SUBVENDOR warranties to the CONTRACTOR/COMPANY in addition to the system warranty.