



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



Contract No.

**Specification for Instrument & Control System For
Package Units**

Class

1

5365

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					<i>S.T.</i>	<i>S.B.</i>	<i>M.A.</i>	
03	18-Jul-21	Approved for Construction	IOEC	-	S.T	S.B	M.A	-
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REVISION RECORD SHEET

REV. NO.	PURPOSE	LIST OF UPDATED MODIFIED SECTIONS IF ANY
00	Issued for Comment	-
01	Issued For Approval	Section 3, 8.4, 9.2, 11, 12.3, 12.4, 15, 19.3, Appendix 1 (Notes)
02	Issued For Approval	Section 11
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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.

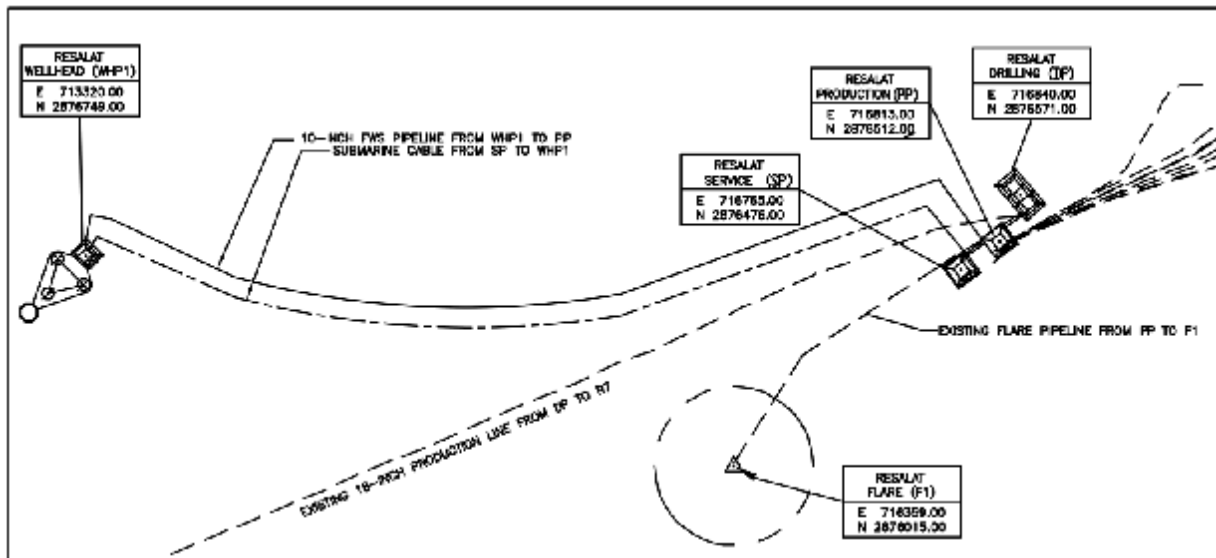





Figure 1: Resalat Development Field Layout (Datum ED 77, Zone 39, Cent. Meridian 51° East)

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1.2. Purpose of Scope

This specification covers the minimum requirements for the engineering / design, materials, manufacturing, supply, installation, inspection and testing, documentation and preparation for shipment of instrumentation equipment, control systems and commodities forming part of Package Units (PU).

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



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2. CODES AND STANDARDS

The latest editions of instrumentation codes and standards listed as referenced in this specification:

Reference	Title
[1] ASME B16.5	Pipe Flanges and Flanged Fittings
[2] ASME B1.20.1	Pipe Threads General Purpose (Inch)
[3] ASME B16.104	Control Valves Seat Leakage
[4] ASME PTC 19.3	Performance Test Code - Temperature Measurement
[5] ANSI/FCI-70.2	Quality Control Standard for Control Valve Seat Leakage
[6] ANSI MC 96.01	Temperature Measurement Thermocouple
[7] API 14 C	Analysis, Design installation and Testing of Basic Surface Safety Systems for Offshore Production Platform
[8] API 520	Sizing, Selection and Installation of Pressure Relieving Devices in Refineries: Part 1: Sizing and Selection Part 2: Installation
[9] API 550	Manual on Installation of Refinery Instruments and Control Systems Part I - Process Control and Instrumentation.
[10] API 551	Process Measurement Instrumentation.
[11] API 607	Fire Test for Soft-seated Quarter-turn Valves.
[12] API 670	Vibration, Axial - Position, and Bearing - Temperature Monitoring Systems.
[13] ISA 75.01.01	Flow Equations for Sizing Control Valves
[14] BS 1042	Measurement of Fluid Flow in Closed Conduits - Pt 1, subsection 1.2, "Specification for Square-edged Orifice Plates and Nozzles in Pipes below 50 mm".
[15] BS 3643	ISO Metric Screw Threads: Part 1: Principles and Basic Data. Part 2: Specification for Selected Limits of Size.
[16] ISO 228, Pt. 1	Pipe Threads where Pressure-tight Joints are not made on the Threads. Pt.1: Designation, Dimensions and Tolerances.
[17] NACE MR 0175	Standard Material Requirements - Sulfide Stress Cracking Resistant
[18] ISO 15156:2003	Metallic Materials for Oil Field Equipment / Petroleum and Natural gas industries - Material for Use in H ₂ S containing Environments in Oil and Gas Production -Parts 1, 2 and 3
[19] IEC-60079	Electrical Apparatus for Explosive Gas Atmospheres.
[20] IEC-60085	Thermal Evaluation and Classification of Electrical Insulation.
[21] IEC-60331	Tests on Electrical Cables Under Fire Conditions - Circuit Integrity
[22] IEC-60332	Tests on Electrical Cables Under Fire Conditions
[23] IEC-60423	Conduits for Electrical Purposes: Outside Diameters of Conduits for Electrical Installations and Threads for Conduits and Fittings.



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Reference	Title
[24] IEC-60445	Basic and safety Principles for Man-Machine Interface, Marking and Identification - Identification of Equipment Terminals and of Terminations of Certain Designated Conductors, Including General Rules for an Alphanumeric System
[25] IEC-60446	Basic and safety Principles for Man-Machine Interface, Marking and Identification - Identification of Conductors by Colors or Numerals

3. REFERENCE DOCUMENTS

Project documents as referenced in this specification:

Reference	Title
LRSL-000-IN-DB-632	Instrumentation Design Criteria
LRSL-000-IN-DR-302	Typical Earthing Detail Diagrams
LRSL-000-IN-SP-641	Specification for Control Valves (Endorsement)
LRSL-000-IN-SP-642	Specification for On-Off Valves (Endorsement)
LRSL-000-IN-SP-643	Specification for Safety Relief Valves (Endorsement)
LRSL-000-IN-SP-644	Specification for Other Field Instruments (Endorsement)
LRSL-000-IN-SP-646	Specification for Instrument Installation
LRSL-000-IN-SP-647	Specification for Instrument Cables
LRSL-000-IN-SP-648	Specification for Motor Operated Valves (Endorsement)
LRSL-000-IN-PH-636	Control and Safeguarding Philosophy
LRSL-000-PM-PR-302	Equipment Numbering Procedure
LRSL-000-PI-SP-697	Piping Material Specification (PMS)
LRSL-000-MW-SP-673	Specification for Painting
LRSL-WP1-PR-PI-301	P&ID Abbreviation & Legend
LRSL-000-PR-DB-706	Process Design Basis
LRSL-000-EL-SP-615	Specification for Power and Control Cable
LRSL-000-EL-SP-624	Specification for Electrical Requirement for Package Equipment



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4. ABBREVIATIONS

The following abbreviations are used in this document:

CENELEC	European Committee for Electro Technical Standardization
IPS	Iranian Petroleum Standard
IEC	International Electrotechnical Commission
IEE	Institution of Electro Engineers
EMC	Electro Magnetic Compatibility
HF	High Frequency
LV	Low Voltage
MV	Medium Voltage
PCS	Process Control System
ESD	Emergency Shut Down
DP	Differential Pressure / Design Pressure
GPR	Glass reinforced plastic
PTFE	Poly Tetra Fluoro Ethylene
PVC	Polyvinylchloride
PU	Package Unit
P&ID	Piping and Instrument Diagram
HVAC	Heat Ventilation & Air Conditioner
HART	Highway Addressable Remote Transducer
LAN	Local Area Network
PC	Personal Computer
PLC	Programmable Logic Controller
RTU	Remote Terminal Unit
I.S.	Intrinsically Safe
N.I.S.	Not intrinsically safe



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IP	Ingress Protection
LER	Local Equipment Rooms
MCR	Main Control Room
SWGR	Switchgear Room
MCC	Motor Control Center
MCT	Multi Cable Transit
MOV	Motor Operated Valve
MTBF	Mean Time between Failures
MOP	Maximum Operating Pressure
NB	Nominal Bore
OD	Outer Diameter
NPT	National Pipe Thread
QC	Quality Control
FAT	Factory Acceptance Test
NDT	Non Destructive Test
RTD	Resistance Temperature Detector
TSO	Tight Shut-Off
SOV	Solenoid Valve
PD	Positive Displacement
VA	Variable Area
SP	Set Pressure
US	Ultra Sonic
UV	Ultra Violet
UPS	Un-interruptible Power Supply
WHCS	Wellhead Safety Cabinet
HPU	Hydraulic Power Unit

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5. CONFLICT

Any conflicts between requirement of this specification, related contract documents, national standards and codes of practice shall be referred to the COMPANY for clarification. Where conflicts occur, the order of precedence shall be:

- Purchase orders
- Material requisition
- Data sheet / Material take off
- Contract scope of work
- This specification
- Other specifications
- Minimum code standard requirements
- CONTRACTOR's quality plan




6. ENVIRONMENTAL CONDITIONS

Refer to Process Design Basis; LRSL-000-PR-DB-706.

7. VENDOR RESPONSIBILITIES

Vendor responsibility shall be as follows, but not limited to:

- Any conflict between the requirements of this specification and related codes, standards, data sheets, drawings, requisition, etc., shall be referred to Purchaser for clarification. If required, Vendor is obliged to request Purchaser to provide missing information.
- Vendor shall provide all appliances, special tools and accessories that are necessary or incidental to the proper installation, operation and maintenance of the equipment, even though these items are not included on the drawings, specifications or data sheets.
- Vendor shall submit a list of all utility requirements and consumption's including electrical, plant and instrument air, etc. (if applicable).

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- Vendor shall list and fully describe all deviations from this specification and the related codes. Alternatives may only be offered when they are an enhancement and must be offered separately.
- Vendor shall not proceed with the implementation of any deviation prior to Purchaser written approval is received.
- Vendor shall provide a full performance guarantee that the equipment and system supplied will meet the requirements of the Project Specifications and Data Sheets.
- Compliance by the Vendor with the provisions of this specification does not relieve him of his responsibility to furnish equipment and accessories of a proper design suited to meet the specified service conditions and/or local codes governing healthy and safety.

8. DESIGN REQUIREMENTS

8.1. UTILITY DATA

The following power supply shall be made available for use by the package Vendor:

Normal Power Supply: 230VAC $\pm 1\%$, single phase, Rated frequency 50Hz (+) 1% / (-) 1%.

UPS Power Supply: 230VAC $\pm 1\%$, single phase, Rated frequency 50Hz (+) 1% / (-) 1%.

Instrumentation: 24 VDC

8.2. ELECTRICAL SAFETY

All electrical/electronic instrumentation and ancillaries should be in accordance with IEC standards.

All electrical apparatus for use in hazardous areas as specified in the equipment requisition, shall be certified by a recognized authority, e.g. BASEEFA, PTB, BVS, LCIE, CERCHAR, CESI, INIEX, DEMKO, etc., and comply with CENELEC or an equivalent international standard.

Vendor shall present copies of all certifying documents prior to release of the equipment.

The following types of protection, in order of preference, should be used for Ex certified equipment in accordance with IEC 60079-14:



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- IEC 60079-11 Intrinsic Safety "ia" (zone 0), "ib" (zone 1 or zone 2), with the exception of local loops.
- IEC 60079-7 Increased Safety "e" (only for terminal boxes in zone 1 or zone 2).
- IEC 60079-1 Construction and Verification Test of Flameproof Enclosures of Electrical Apparatus (type of protection "d" for zone 1 or zone 2).
- IEC 60079-18 Encapsulation "m" (zone 1 or zone 2).
- IEC 60079-2 Pressurization "p" (zone 1 or zone 2).
- All Field instrument shall be suitable for Zone 1 area as a minimum with Temperature class 'T3'

All electrical apparatus certified for use in the hazardous areas shall be marked with respect to:

- Type of protection.
- Gas group.
- Temperature class.
- Device group (ATEX category (1,2 or 3 Gas and/or Dust), if applicable)

8.3. ELECTRO MAGNETIC COMPATIBILITY

The design of electronic instruments should be in compliance with IEC 61000, Electro Magnetic Compatibility (EMC)

8.4. GENERAL REQUIREMENTS

This specification includes only commonly used instruments. Instrument types not included in this specification shall be identified by the Vendor for approval by Purchaser/COMPANY. In addition to the general requirement listed hereafter, any instrument shall comply with the relevant instrument specification (as listed in section 2 of the present specification).

Instrument tag numbers shall be assigned by the Purchaser in P&ID and be shown in all drawings and schedules provided by Vendor.



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Field instruments shall have a stainless-steel tag plate bearing the assigned tag number.

Field instrumentation and ancillary systems shall be protected in accordance with IEC- 60529, code IP 66, as a minimum.

All electronic instruments shall be tropicalized to avoid effects of mildew and fungicide.

Instrument accuracy should be as per related standards for each type of instruments and shall be specified in accordance with the process/equipment requirements.

Standard analog transmission and control signals shall be 4-20 mA, 24 V DC for electronic instruments, and ~~0.2-1.0 barg for pneumatic instruments~~. Other signal types require Purchaser approval.

Electronic analog transmitters shall be of the smart type. The transmitters connected to the plant control system shall be of HART type.

Signals from the package unit associated with shutdown functions implemented in remote safeguarding system should be analog 4-20 mA (potential free contacts to be avoided). In general, this requirement is intended for the main process streams of the package unit and not for auxiliary systems.

Safeguarding instruments shall be separated from process control instruments including the transmitter, process connection and wiring to operate independently of other control and monitoring instruments.

Switch functions shall be snap acting, Single Pole Double Throw, (SPDT), hermetically sealed and shall have potential-free contacts. Double Pole Double Throw (DPDT) may be used if specific requested through the related datasheets.

Minimum contact rating for disconnecting inductive loads shall be:

- 1.0 A for 24 - 48 V DC.
- 0.4 A for 110 - 125 V DC.
- 5.0 A for 60 - 260 V AC.

Field contacts subject to 24 V DC or less shall be gold plated.

Flanged connections for instrumentation items shall be in accordance with ASME B16.5; screwed connections shall be in accordance with ASME B1.20.1 (NPT) or DIN ISO 228, Pt. 1 (parallel).



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For details, which are not covered by this specification, the instrument installation (process, pneumatic and electrical) should follow API RP 550, part 1 and API RP 551.

All field mounted instrumentation, associated valves and junction boxes should be accessible from grade or by permanent ladder or platform. In case the requisition of the package unit specifies that ladders/platforms do not form part of Vendor's scope of supply, Vendor's documentation shall show where they are required.

Wiring and piping leaving or entering the package unit shall terminate at a central location, near the edge, utilizing appropriate junction boxes, bulkhead plates or panel terminations.

Asbestos, asbestos compounds and mercury are not allowed. The use of aluminum shall be avoided.

If applicable, signals from the package unit connected to the auxiliary cabinets(s) shall have barriers provided by Vendor.

All carbon steel or low/intermediate alloy steel parts not in contact with the process medium shall be painted.

Vendor may propose to use his standard painting system. However, application is subject to Purchaser approval.

All sensing elements of instruments exposed to process fluids shall be stainless steel as minimum; all materials coming in contact with sour services shall comply with requirement of NACE, MR-01-75/ISO 15156:2003.

8.5. UNITS OF MEASUREMENT

The instrument ranges and scales shall be in SI units. The instrument scales shall be of the direct reading type.

8.6. INSTRUMENT VENDOR

In order to standardize with the main plant instrumentation, the Vendor should supply the make of instruments according to the Purchaser Approved Vendor List.

Vendor may alternatively propose Vendor standard instruments for Purchaser approval.



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9. SCOPE OF SUPPLY

9.1. VENDOR'S SCOPE OF SUPPLY

Vendor shall supply and install all instrumentation required to enable a fully operational package unit. The package unit equipment should as far as practical be supplied complete, having the instruments installed and tested.

Vendor shall refer to the package unit requisition for specific requirements.

Typically, the scope of supply should follow attachment 1 of this specification, including the following, as applicable:




- Specialized equipment or items licensed or manufactured by Vendor.
- Vibration, axial displacement and speed detectors.
- Vibration/temperature monitors.

Note: Monitors may be local field mounted or mounted remotely in LER. Local monitors are not preferred by Purchaser. Communication with the PCS via serial link or hardwire, when required will be stated in the package unit requisition. For ESD signals these shall be hardwired to the plant ESD system.

- Indicating instruments for local observation of the package operation.
- Local control loops.
- Initiating devices for alarm, safeguarding and sequence operation.
- Local alarm annunciators.

Note: Electronic logic circuits of alarm annunciators may be local in the field or remote mounted in the control building. Remote alarm logic shall be implemented via either:

- Vendor supplied rack-mounted electronics, to be installed in an auxiliary cabinet by Purchaser, or
- Local field sequencing and safeguarding systems (hardware and software).
- Suitable tie-in points including JB's for wiring termination and flange for pipes on edge of package skid. The interfaces with packages shall be approved by the CONTRACTOR.

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Note: Sequencing and safeguarding implementation should, in principle, be remote in the control building (into Purchaser's scope). Local field implementation is not the preferred approach.

- Transmitters and measuring elements.
- Control valves, on-off valves, solenoid valves, and regulators.
- Relieving devices.
- Utility reduction/regulation as required for the supplied instrumentation.
- Seals and purges.
- Instrument housings.
- Gauge boards to concentrate the location of operating instruments and switches.
- Field local panels (on-skid or off-skid).
- Junction boxes for electrical power cables and signal cables.
- Pre-wired racks with electronic components, for remote control building installation.
- All wiring, cabling, cable trays, tubing, valves, fittings and supports for the instrumentation in the package unit up to gauge boards, junction boxes, bulkhead plates and local panels mounted on the skid.
- Special cables for interconnection of the package unit with special off-skid items.
- Documentation including design documents, certificates, test plan, procedures and final bond book.

9.2. PURCHASER'S SCOPE OF SUPPLY

Typically, Purchaser's scope of supply should include:

- Equipment installed in control building.
- Integration with ICSS (Integrated control & Safety System) on ICSS side (Wiring, Programming, control, sequencing, monitoring, and alarming).
- F&G Devices on package skids shall be supplied by package vendor.

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Note: Purchaser provides ICSS hardware and software implementation in accordance with the functionality requirements detailed by Vendor. All interface provisions shall be provided by vendor on package side.

- Platform Fire and Gas (F&G) detection system (by CONTRACTOR)
- Platform Auxiliary devices (lights, switches, relays, etc.).
- Cabling, tubing, wiring between skids and between skid and off-skid panels, boxes or cabinets

9.3. MAIN PACKAGES

A package unit (PU) is a prefabricated process or utility unit.

Package units shall form an integral part of the plant and are supplied as individual units ready for installation.

PU's should be completely installed by the VENDOR with all necessary instruments or instrument systems, requiring only the external connections or connections between individual PU modules to be executed by others.




The extent of the instrumentation requirements will differ from one PU to another. For this purpose, the PU's are classified into four (4) types as described below.

Type P1

This Package unit shall be without Junction Box, Local Control Panel, dedicated control panel or dedicated control system. Control and shutdown included in Platform ICSS.

However the complete engineering for package shall not be scope of the PU vendor. In this type, the complete functionality of PU should normally be implemented in ICSS.

The minimum requirements shall be stated in the PU requisition. However the complete engineering for the package shall not be the scope of the PU vendor. The detail engineering for the PU shall be carried out by the PU vendor. Instrument selection shall be as per project specifications listed in section 3.

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Type P2

This Package unit shall be with Junction box only. Control and shutdown included in Platform ICSS.

In this type, the complete functionality of PU should normally be implemented in ICSS. The minimum requirements shall be stated in the PU requisition, with special attention to the interface with the plant instrumentation like ICSS communication, alarms and safeguarding function, type of electrical contacts etc. The detail engineering for the PU shall be carried out by the PU vendor. Instrument selection shall be as per project specifications listed in section 3.

Type P3

This Package unit shall be with Junction box and Local Control Panel. Control Monitoring and critical shutdown by Platform ICSS.

In this type, the complete functionality of PU should normally be implemented in ICSS. The minimum requirements shall be stated in the PU requisition, with special attention to the interface with the plant instrumentation like ICSS communication, alarms and safeguarding function, type of electrical contacts, interface of the local control panel with control system etc. The detail engineering for the PU shall be carried out by the PU vendor. Instrument selection shall be as per project specifications listed in section 3.

Type P4

This Package unit shall be with junction Box. Control and shutdown is by package UCP. In addition, remote Shutdown from plant ICSS system shall be available (one hardwired signal to the UCP).

Implementation of monitoring, control and safeguarding functions, which require electronic components, shall in general be based locally under PU seller's responsibility. However, when the unit cannot be isolated for reasons of operation or maintenance without disturbing the main process or when safety is in question, the control and safeguarding functions shall be implemented



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in the total plant systems. Serial Interface for Remote monitoring with ICSS shall be supplied and implemented. Instrument selection shall be as per project specifications listed in section 3.

10. INSTRUMENTATION

Shall be according to projects specifications listed in section 3.

11. ALARMS AND INTERLOCKS

If required, the alarm annunciator should be installed on the package unit local panel. The annunciator should include back lighted legend plates, logic circuits (local or remote), buzzer and acknowledge/test/reset buttons. A "first-out" sequence shall be provided, where necessary, to identify the failure causing unit shutdown. Alarm sequences should be according to ISA S18.1, sequences "A" (standard) and "F3A3" (first-out).

Pre-alarms and shut-down alarms shall be provided on the alarm annunciator for all devices that cause a shutdown. Common unit trouble and unit shut-down alarm contacts shall be provided for remote annunciation.

Interlocks (process and emergency shut-down functions) shall be independent, with dedicated primary elements and shall operate directly and not via the alarm annunciator.

Shut-down functions shall be individually protected (fused).

Contacts for alarm and interlock actuation shall be fail-safe. This generally requires:

- Initiating contacts closed during normal conditions and open on abnormal conditions.
- Solenoid valves and relays energized during normal conditions and de-energized on abnormal conditions.

Automatic restart, after an interlock function, shall not be used without Purchaser's approval.

Manual reset of solenoid valves in the package unit shall be local.

Operational override and maintenance override switches shall be provided where required for start-up and to enable maintenance of sensors and logic without disruption of the operation of the unit.

Override switches shall be rotary/key-protected type, with the key retained in the override position.



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Override alarms shall be provided for the attention of the operator in the control room and on the local panel. Override switches shall not deactivate the associated process alarms.

Maintenance override switches should be located in the logic cabinet. Process override switches should be located on the local panel.

Note: Operational override switches should be avoided; preference is given to operational overrides implemented with logic functions.

Safeguarding functions may be executed via programmable controllers (PLCs) provided by Vendor. PLCs may also perform annunciator functions.

The PLC shall be supplied in a cabinet fully wired & tested. This shall be includes but not limited to:

- Power generation and / or distribution with all protecting devices.
- PLC chassis & modules
- System interconnecting cable
- Input / Output mirror termination boards
- Cross wiring to marshalling terminals
- Cabinet utilities, e.g. lighting, fans, temperature monitoring, heater and etc.

All PLC parts except CPUs and power supply modules when not redundant shall be able to be changed lives and online.

PLCs in safeguarding applications shall have the following features:

- Fail-safe/redundant, designed for 99.99% availability between 99.9% and 99.99%.
- IEC 61508 SIL 3 for hardware and software.
- Engineering/diagnostic/reprogramming / supervisory equipment.
- Galvanically isolated inputs/outputs.
- 20% installed spare capacity at start-up.
- Communication with ICSS, via serial link such as RS422/485 MODBUS RTU protocol (when requested in the package unit requisition).



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- Memory modules shall be non- volatile type
- Self-diagnostic alarms like - PLC watchdog, Power supply failure, communication failure.
- Process & safety I/Os (if any) shall be segregated
- I/O cards shall have integrated LED's showing card status
- Inputs & outputs shall be powered from the cards. Galvanic isolation shall be done at marshalling terminal strips
- All safety signals which are not failed safe shall be fully monitored (powered from the card). Typically this covers signals from/to fire detection and protection devices.

Communication card shall have integrated LED's showing card & communication port status.

12. CABINET & CABLING

12.1. GENERAL

Marshaling Cabinets shall be used as the interface panel for the field wiring and system cabling. Similarly the Interposing relay cabinet shall be used as the interface panel for the Instrument and Electrical interface signals.




Marshaling Cabinets/Interposing relay cabinets related to Packages control system will be integrated within Package scope of supply and shall be supplied as single UCP cabinet or separated ones.

Marshaling cabinet/IRC shall be provided with high temperature switch where necessary, and wired to the respective ICSS system for alarm.

All cabinets/Panels shall be bottom entry.

The following shall be installed in each cabinet as a minimum to be supplied by Non-UPS 230 VAC power supply.

- Internal Lighting
- Heater
- Utility Power Socket for non-UPS 230 VAC power supply

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12.2. PACKAGE UCP

Package UCP shall interface the field instrument loop wiring, the I/O module, CPU and etc. Interposing relay shall be supplied as a part of UCP for interconnections with MCC.

The UCP shall be certified according to SIL requirements of package and hazardous area classification.

Depend on project requirements the UCP shall be sized and set out to accommodate the "cross wiring" technique, in which:

- Field wiring terminates on terminal strips located on one side of each cabinet.
- The field signals shall be segregated by signal type, function and method of hazardous area protection.
- The Supplier shall prepare terminal board drawings.
- Cross wiring shall be done between field terminals and the termination assemblies (or IS barriers if any).

24V DC power feeders are wired to separate terminal strips and used as required.

All the analog inputs/outputs required for vibration monitoring, etc. shall be segregated and connected through separated terminal strip (if any).

12.3. PACKAGE LOCAL CONTROL PANELS

Package local control panels should be installed within the limits of the package unit. Where space or accessibility is limited or package is supplied with loose items (such as firefighting panels), a location adjacent to the package unit may be considered. The LCP shall be certified according to SIL requirements of package and hazardous area classification.

Design and fabrication of panels/cabinets shall be as detailed elsewhere in this specification.

Cable entry shall be at the bottom or side and shall be via suitable glands. A 20% allowance shall be made on panel front space, interior component space and piping and electrical wiring connections for possible future expansion.



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It is intended that panels shall not be located in hazardous areas, if this is unavoidable then the panel equipment shall be suitably certified for the hazardous area, this may include the use of Ex (p) certified pressurized panels.

Ingress protection for field mounted local control panels shall be IP 66 to IEC 60529 minimum. Panels mounted on skids containing rotating or reciprocating machines shall be provided with anti-vibration isolating mountings at all attachment points to floor or wall. Control panels shall be fully tested in accordance with a detailed approved test procedure at the supplier's works.

Doors shall be provided with corrosion resistant locks operated by a "T"-type handle without cylinder lock or a universal fold-down metal handle. Covers shall have dimensions and weights, which allow easy handling.

Panels shall be provided with metallic gland plates with a minimum thickness of 5 mm. Gland plates should be mounted on the bottom side of the panel and be easily removable.

Metric size threaded cable glands, according to BS 3643/IEC 60423 and the applicable area classification shall be used to suit the size of the cables. Unused gland holes shall be plugged.

Sizes and quantities required for the Purchaser wiring will be informed in the package unit requisitioning.

Internal wiring shall be made with stranded XLPE-insulated conductors. Minimum conductor section should be 1.5 mm² for signal and 2.5 mm² (solid) for power supply. Wiring shall run in covered plastic ducts with a maximum fill of 70%. All wires shall be terminated to clip-on type terminals mounted on DIN rails. Internal cables shall be flame retardant according to IEC60332.

Signal, thermocouple and power wiring should be run in separate trays. Wiring for alarm, shutdown and interlock circuits of the same voltage as the power wiring may be run in the same tray as the power wiring.

Instruments requiring electrical power shall be fed from a fused mains isolator, with a miniature circuit breaker for each consumer. Fused terminals with neon status lamp shall be provided in outputs to solenoid valves.

All instruments, terminal rails, terminals, fuses, wires, etc., shall be identified in accordance with the Vendor's documentation.



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Access shall be provided within the panel to wiring terminations, instruments and other components requiring operation or maintenance.

Front panel nameplates shall be screwed, of stainless steel type, with instrument tag number and duty identification in the English language unless otherwise stated. Rear of panel nameplates shall bear instrument tag number only.

Panels should be shipped with all components installed, piped and wired and tested. Delicate instruments should be removed after testing and shipped separately.

Keyboard/display type industrial terminals suitable for field mounting may be considered in order to reduce space requirements.

12.4. CONSTRUCTION, LAYOUT AND FINISHING

All Unit Control Panels (UCP) and Remote Control Panels shall be of standard Rittal type or approved equivalent, constructed of cold rolled steel sheet (minimum 3mm thick), welded to channels and/or angles to form a rigid structure bolted to a supporting plinth. Cabinets shall be protected against ingress of solids and water to a minimum of IP66 for external locations, or IP 42 indoor applications.

Electronic equipment for use in hazardous areas shall generally be intrinsically safe, with the exception of switches & solenoid operated valves, which shall be explosion proof. For standardization the minimum level of certification shall be Zone 1, IIA & IIB, and T3 for hazardous areas.

Each bay will have overall dimensions of:

- Height (including 100 mm plinth) 2100 mm
- Width 800 mm
- Depth 800 mm.

Any cabinet suites will be mounted on standard plinths that will be used for both transportation and floor-mounting purposes. Lifting lugs will be provided for transportation purposes. Cabinet access will preferably be from the front only, however, where space constraints rule, front and rear



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access may be considered in consultation with the Purchaser. A single metal door will be fitted to each bay with a three-point lock mechanism. The keys for the door locks will be common to all cabinet suits. Standard split, adjustable gland plates will be provided at the bottom of the cabinet.

Each cabinet bay shall be fitted with an internal standard 220V/230V AC light unit operated from a door switch. All cable entries shall be through the bottom of the cabinet. The cabinet shall have removable cable clamps and supports shall be provided for all incoming cables. Adequate cable connection stress relief shall be provided. Sufficient free space shall be available for properly accommodating clamping & terminating of all cables, plus 20% spare.

Cable entry shall be located in such a way that the cables can be routed to their destination as direct as possible.

Terminals for power and signal shall be separated.

Circuits for intrinsically safe (I.S) signals shall be segregated from the non-IS a circuit. Cables and ducting for IS signals shall have a blue color.

Terminals carrying voltages higher than 48 volts shall be protected against accidental contact by having non-conducting cover plates and labeled to indicate the high voltage.

Terminals used for powering field solenoid valves shall be fused, and shall be equipped with "fuse blown" indicators.

In order to protect components from excessive heat, 220V/230V AC fans may be fitted, complete with filters, Ventilation rating must allow for 20% spare installed equipment. Note IP rating of cabinetry must not be impaired by ventilation equipment and all equipment must meet the Hazardous area requirements. Anti-condensation heater wired to the non-UPS 230 VAC power supply shall be provided in the cabinets. A thermostat shall control this anti- condensation heater for automatic cut in and out. Cabinets will be finished and painted inside and out in standard colors:

- Framework Dipcoat primed RAL7035
- Doors Dipcoat primed and powder coated RAL7035
- Mounting Plate powder coated RAL2000 Spare must be allowed as follows:
 - 20% connections & plugged cable gland entries, for incoming cables.
 - 20% capacity for power distribution, including circuit breakers.



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- 20% space within wiring ducts.

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

All of the contacts with fuse shall be equipped with LED.

12.5. VENTILATION REQUIREMENT

Two options are available for cooling the cabinet internals depending on the amount of the heat generated inside:

- Natural ventilation (preferred) by means of screened and louvered openings on the doors and on top of the cabinet.
- Forced ventilation by means of openings on the doors fitted with dust filters and with extraction fans mounted on the bottom of the cabinet door fitted with finger guards and fan switch.




Vendor shall provide a calculation of heat generated under the worst possible conditions i.e. with all loads energized, at the maximum ambient temperature.

Cabinets shall be provided with temperature switch to generate an alarm in the event of high temperature. The supplier shall provide revealed failure robust fans; fan failure alarm shall be included in the cabinet common utility alarm.

Forced ventilation shall be provided for all cabinets. Based on the heat calculations (provided by the Vendor) if the temperature, under the specified conditions, remains within 10°C above the maximum ambient temperature and all devices certified for the operation for mentioned temperature, natural ventilation could be considered. The application of natural ventilation shall be approved by the CONTRACTOR.

A fan-failure alarm annunciation via the PCS shall be provided for cabinets with forced ventilation. The alarm shall be available as a potential free contact.

Dust filters shall be of the replaceable or cleanable type, and this action shall be possible without disturbing the functions of the cabinet.

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12.6. WIRING

Wiring shall be installed in standard open slot plastic duct with snap-on lids. Wiring for different voltage levels and also IS/non-IS circuits shall be segregated in separate ducts. Installation of ducts shall not restrict installed equipment or inhibit the use of space allocated for future expansion. All wire shall be according to Specification for Instrument Cables; RSL-000-IN-SP-647.

Note: All bonding conductors for panel metalwork shall be a minimum size of 2.5mm². All doors shall be bonded to adjacent metalwork using un-insulated copper braid equivalent in cross-section to 2.5mm².

Rising clamp, compression type terminals shall be used throughout, sized for specific conductor sizes (typically, Klippon/Weidmuller SAK 2.5 or equal).

All terminals other than those terminating on Radikor boards shall be typically Klippon / Weidmuller type SAK terminals mounted on asymmetric DIN rail. All terminals strip accessories such as group markers and brackets etc., shall be manufacturer's standard. All terminals shall be numbered.

The Vendor shall carry out all internal wiring suitable for the loads applicable. Wire ends at terminal points shall be provided with suitable wire crimp lugs and markers.

Wiring carrying signals susceptible to electrical interference shall be adequately screened. All inter-section wiring shall pass through the normal cabinet entries.

12.7. LABELING

All doors shall be clearly labeled to show the allocated equipment number and function. Labels will also be provided in the interiors.

Circuit breakers, terminal rails and individual terminations will be clearly identified using manufacturer's standard labeling accessories. All cabling and wiring is labeled using heat- shrink ferrules that will enable cross-reference of each cable/wire to its associated terminal or connection.

Bay door shall have a warning label "CAUTION Risk of electric shock" fixed next to the handle.



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12.8. EARTHING

Different earthing circuits shall be provided in each cabinet for safety earth, instrument earth and I.S. earth.

12.8.1. SAFETY EARTH

This earthing circuit provides equipotential bonding on general metal equipments.

Each cabinet will contain a safety earth bar, which is un-insulated from the cabinet metalwork; this earth bar shall have an earth stud provided for connection to the platform main earthing system.

Removable panel metalwork-with continuity being maintained to the doors by means of earth straps. Cable armour shall connect to safety earth.

12.8.2. INSTRUMENT EARTH

This earthing circuit provides equipotential bonding on instrument metal equipments.

Each cabinet bay contains an instrument earth bar, which is mounted on insulating studs so as to ensure that there is no continuity to any other earth. Each bar is provided with a minimum of two earth connections, suitable for termination of 35mm² main earth cables.

The unused cores and screens are connected together using standard insulated cross connection combs within blocks of terminals. Within a rail these blocks are then linked together with two wires, one to the block above, one to the block below. The top and bottom blocks of unused cores and screens are then be linked to the local instrument earth bar with a single wire. All the circuit grounds, shields and drain wires shall be connected to the respective ground system at one end by leaving the other end floating.

12.8.3. IS EARTH

This earthing circuit provides ground level for I.S. system.

For each cabinet bay where there is a requirement an IS earth bar will be fitted. This bar is mounted on insulating studs so as to ensure that there is no continuity to any other earth. Each bar is



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provided with a minimum of two earth connections, suitable for termination of 35mm² main earth cables.

Blocks of unused cores and screens are earthed to the local IS earth bar in the manner described above for the instrument earth.

12.9. SPARE CAPACITY

The system shall be sized to provide at least the following:

- 20% spare with respect to each individual type of I/O card, pre-wired up to field termination assemblies.
- 20% spare with respect to each individual type of I.S. barrier.
- 10% spare rack space capacity for the addition of additional I/O modules and termination assemblies (of each I/O type).
- 20% spare terminals and accessories for field termination assemblies.

All spare quantities shall be rounded up to nearest whole number. Spares shall also include 20% space capacity for future expansion.

12.10. CABLING AND INTERNAL POWER DISTRIBUTION

12.10.1. GENERAL

Internal power distribution from platform 230V AC \pm 1% 50 Hz UPS Dual supplies, and single 230 VAC non-UPS power supply shall be by use of miniature circuit breakers fitted in a distribution board sized to accommodate the number of circuits to be fed. Relays used shall be plug in type with all terminals from bases wired to terminal strips.

Vendor shall provide dual redundant 24V DC power supply units housed within the cabinets. Either power supply shall be capable of running the system at full load including spares at rated temperature. Internal power supplies for CPU and I/O shall be separated and galvanically isolated.

Each power supply in a revealed failure robust set of power supplies shall be rated such that all loads, including spares, can be simultaneously powered. Vendor shall provide dual redundant



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regulated 24V DC power supplies, for field devices, wired to fused terminals mounted on rails in the cabinet. Vendor shall estimate the number of such power feeds. The power supply to the input and out circuit shall be floating (non-earthed). Alarm shall be included in the common utility alarm if the supply is not floating due to fault in the system.

Diagnostic, signaling and isolation facilities shall be provided to service or replace a faulty power supply unit.

It shall be possible to isolate, disconnect, remove and replace faulty power supplies without loss of operation.

12.10.2. SEGREGATION

Intrinsically safe and non-intrinsically safe circuits shall not be mixed on the same termination rail and ducting shall also maintain this segregation.

Analog signals shall be segregated from digitals.

Separate cabinet and termination rails shall be supplied for PCS circuits, ESD circuits and Fire and Gas circuits.

Where the total amount of input/output (I/O) is low on a package, analogue signals (4-20 mA) and trip/alarm circuits (24V DC) may be combined in one junction box, provided mechanical separation of terminals is maintained.

Sufficient terminals shall be provided to enable all incoming cores of the Company's supplied multicore field cables to be terminated, plus 20% spare.

As a minimum the following parallel separation distances between power and instrument cables shall be used wherever possible:

A Minimum separation of 300 mm shall be provided between Power wiring and electronic or signal wiring within the cabinets.

Where the above separation distances are not possible due to space restrictions prior written approval shall be obtained from the COMPANY.

13. JUNCTION BOXES



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Junction boxes should be installed on the skid edge. Final location and configuration of terminals shall be agreed between purchaser and vendor.

Separate junction boxes shall be provided for each type of signal, e.g. analog, digital, solenoids, RTD, thermocouple, vibration, intrinsically safe and for power supply.

For other requirements refer to the related section of project specifications listed in section 3.

14. INSTRUMENT PIPING

"Instrument piping" in this context, refers to the piping, tubing, fittings, valves and multi- valve manifolds required to connect an instrument to a pipe or vessel.

Instrument piping materials shall be selected in accordance with the relevant piping or vessel materials.

As a minimum, connections between the first block valve and the instrument shall be made by means of ½" OD annealed, seamless SS 316L stainless-steel tubing and compression- type fittings.

Unless other convenient means allow for maintenance and testing of the instrumentation without shutting down the unit, all tappings for instruments shall be provided with isolation valves, in accordance with the Piping Material Specification (PMS); LRS�-000-PI-SP-697. Locked open block valves shall be used for instruments with safeguarding functions.

Pressure and differential pressure instruments shall have vent valves or multi-valve manifolds to provide the capability of depressurizing/draining the sensing line after the block valve is closed.

15. INSTRUMENT ELECTRICAL INSTALLATION

All electrical instruments should be wired to the local control panel. If the local panel is not skid mounted or is not called for in the requisition, then all instruments requiring off-skid connections shall be wired to terminal boxes at the skid edge. Refer to appendix 1 of this specification.

Cables shall be installed on cable trays. Only cable trays for top decks shall have covers. Heavy duty stainless steel SS316/L or GRP suitable for a sour environment shall be provided.

All single and multi-pair signal cables shall have twisted pair(s) and overall screen with drain wire.



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Cables shall have flame retardant propagation properties in accordance with IEC 60332-3 and shall be oil resistant.

For packages which shall remain in operation for a specified time under fire conditions, typically for firefighting equipment, all cabling shall have fire resistant, zero halogen and low smoke properties. Cables shall be as stated above, but shall have fire resistant capabilities in accordance with IEC 60331. The type of operational service will be indicated in the requisition.

Each cable and wiring conductor (including panel wiring) shall be clearly and indelibly identified at both ends with closed ring shaped coding, in accordance with IEC 60391, paragraph 3.4.1 a.2 (dependent remote end marking).

Cables from local panel/junction boxes to instruments shall be identified with instrument tag number close to the panel/junction boxes.

For other requirements refer to them Specification for Instrument Cables; LRS�-000-IN-SP-647.

16. INSTRUMENT/PROCESS CONNECTIONS

Refer to R1 Typical Instrument Hook-Up Drawing; LRS�-000-IN-HU-633.

17. INSPECTION AND TESTING

The inspection and testing of each instrumentation device in the packages shall be performed as mentioned in the specification/standards which are referred in this document. The integration test of control system and the instruments provided with the package unit shall be carried out in accordance with inspection test plan (ITP) and related procedures. The ITP and procedures shall be approved by the CONTRACTOR and the COMPANY.

18. CORROSION INSPECTION



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All metal parts are used for the instrument installation shall be protected against corrosion in accordance with the manufacturer's standard protection system suitable for the environmental conditions specified in this specification and supplemented by the requisitioning documents.

Vendor shall submit in his quotation his standard surface preparation and painting system for Purchaser's approval.

The color of the top coat of panels shall be Vendor's standard unless a specific color is specified on the datasheets and/or requisition.

19. MARKING

19.1. MARKING OF CABLES AND WIRING

Cables shall be properly marked by stainless steel tags or by cable markers mounted on a carrier strip with ties. Cable markers shall be installed near each gland.

Wiring shall be marked in accordance with IEC 60445 and IEC 60446.

19.2. IDENTIFICATION OF EQUIPMENT AND TERMINALS

Equipment terminals shall be identified in accordance with IEC 60445.

Rail-mounted terminals of equipment and components shall be identified by numerical or alphabetical markings in accordance with the manufacturer's drawings. Terminals of input and output supply cables shall be clearly marked to indicate the nominal system voltage and the phase/polarity of the supply.

All external operating, measuring and indicating components shall be clearly identified with permanent descriptive labels that facilitate easy recognition by the operator. Descriptive labels shall be white with black lettering.

All components shall be identified by labels inscribed in accordance with the system of identification as used on the manufacturer's reference drawings and documents.

19.3. NAME PLATES



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Nameplates shall be provided indicating the equipment (tag) number and description. The dimensions of the nameplates incl. the required letter height will be specified in the requisition.

Nameplates and labels for indoor use shall be "Resopal", white, black, white and shall be fixed in such a way that they are easy to replace.

Nameplates for outdoor use shall be Stainless steel SS316/L engraved type, corrosive resistance, and suitable for the saline, humid and marine environment.

Each Instrument shall have a 22 mm H X 60 mm W of 20 gauges thickness SS316/L Tag Plate with Tag number and service engraved or embossed in 6 mm H X 0.3 mm D bold characters. The Tag Plate shall permanently attach to the instrument with SS316/L bolts and nuts.

20. VENDOR DOCUMENTATION

Documentation for the instrumentation provided with the package unit shall be supplied as requested in the requisition package.

Vendor documentation should be provided in electronic form; vendor shall indicate, in the proposal phase, the standard and/or optional formats and programs that can be provided in order to attend this requirement.

All documentation, specification, drawings, leaflets, procedure, certificate, manuals, reports, etc. shall be in the English language.

Calibration sheet/reports shall be supplied for all instruments supplied with the package.

21. SPARE PARTS & SPECIAL TOOLS

The VENDOR is required to complete a Spare Parts List and Interchangeability Record (SPIR).

The VENDOR shall make clear on the submission of the SPIR the quantities in priced list for each of the following;

- Recommended spare parts for pre-commissioning, commissioning - initial spare parts/spare parts for start-up.



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- Recommended spare parts for the first two (2) years continuous operation.
- Special tools for correct operation and maintenance (CONTRACTOR Scope of Work and shall be supplied by vendor.)

The VENDOR shall also submit a complete priced list of spare parts and special tools for the package in his bid submission.

22. QA/QC REQUIREMENTS

The Vendor shall have in effect at all times, a QA/QC program, which 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 that initiate, identify, recommend and provide solutions to quality problems and verify the effectiveness of the corrective action.




Vendor's proposed quality system shall fully satisfy all the elements of ISO 9001, "Quality Systems - Model for Quality Assurance in Design/Development, Production Installation and Servicing", ISO-9003, "Quality Systems - Model for Quality Assurance in Final Inspection and Test" and ISO-9004, "Quality Management and Quality System Elements - Guidelines." The quality system shall provide the planned and systematic control of all quality-related activities performed during design.

The VENDOR shall identify in purchase documents to his SUBCONTRACTOR all applicable QA/QC requirements by the COMPANY/CONTRACTOR.

On request, Vendor shall provide evidence of its QA/QC surveillance of its SUBCONTRACTORS activities. If selected SUBCONTRACTORS have ISO 9001 and ISO 9002 year 2000 certification, as required for contracted scope, then copies of these certifications are to be provided for COMPANY'S/CONTRACTOR's review.

The COMPANY and CONTRACTOR may elect to waive their audits in favor of ISO 9001 register audits. Any contracted service not covered in ISO 9001/9002 certification will be subject to COMPANY and CONTRACTOR audit requirements.

The VENDOR shall assume unit responsibility and overall guarantee for the supply.

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The **VENDOR** shall transmit all relevant Purchase Order documents including specifications to his **SUBCONTRACTORS** or **SUBVENDORS**.

It is the **VENDOR'S** responsibility to enforce all Purchase Order and Specification requirements on his **SUBCONTRACTORS** and **SUBVENDORS**.

The **VENDOR** shall submit all relevant **SUBVENDOR** and **SUBCONTACTOR** drawings and engineering data to the **COMPANY/CONTACTOR** for review and approval. All comments from The **COMPANY/CONTACTOR** shall be incorporated in the **SUBCONTACTOR/VENDOR** design/supply/works. Any conflicts and/or discrepancies shall be brought to the notice of the **COMPANY/CONTACTOR** for resolution.

The **VENDOR** shall obtain and transmit all **SUBVENDOR** and **SUBCONTACTOR** warranties to the **COMPANY/CONTACTOR**, in addition to the system warranty.

23. PREPARATION OF SHIPMENT

Unless otherwise specified in the requisition and/or datasheets, the equipment shall be shipped completely assembled, ready for installation and commissioning.

Unless otherwise specified in the requisition the preparation for shipment shall be in accordance with **VENDOR'S** standard practice for the method of shipment indicated in the ordering documents.

A complete instruction for shipment, handling and unpacking, and re-assembly if required, shall be provided with the equipment.

24. CERTIFICATION

All Certificates (as applicable) shall be original or authenticated. The following are the minimum required certification:

- Hazardous Area Certification
- Ingress Protection



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- Material Test Certificate
- Hydro Test Report
- NDE Report
- Painting Report
- Seat Leakage
- Manufacturer Report
- Traceability Certificate for the test equipment used for calibration
- Release Certificate

The VENDOR'S serial number shall be quoted on all certificates relating to the each item.

The VENDOR shall ensure that appropriate certificates are received or delivered for all items.

Any item furnished without certification is unacceptable.

25. WARRANTY

VENDOR shall have the final and total responsibility for the design and performance of all equipment supplied under this specification. VENDOR shall warrant the equipment furnished by him and the performance of said equipment in accordance with this specification. The warranty shall cover both, the supply of material and manpower to make good any defective components or equipment offshore.

The Warranty period shall extend for a minimum of 1 year after the unit is placed into operation but not more than 18 months after delivery.

VENDOR shall warrant that the system shall remain commercially available for at least 10 years after the purchase and the availability of spares and services for all parts for a minimum of 5 years thereafter.



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APPENDIX 1

PACKAGE UNIT INSTRUMENTATION - SCOPE OF SUPPLY



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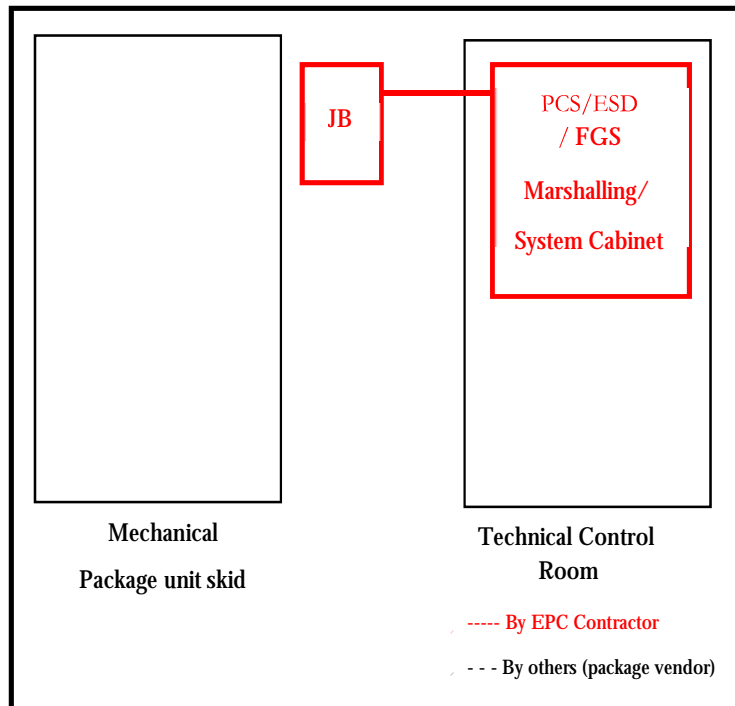
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Type - P1



Type P1 - Package unit without Junction Box, Local Control Panel, dedicated control panel or dedicated control system.



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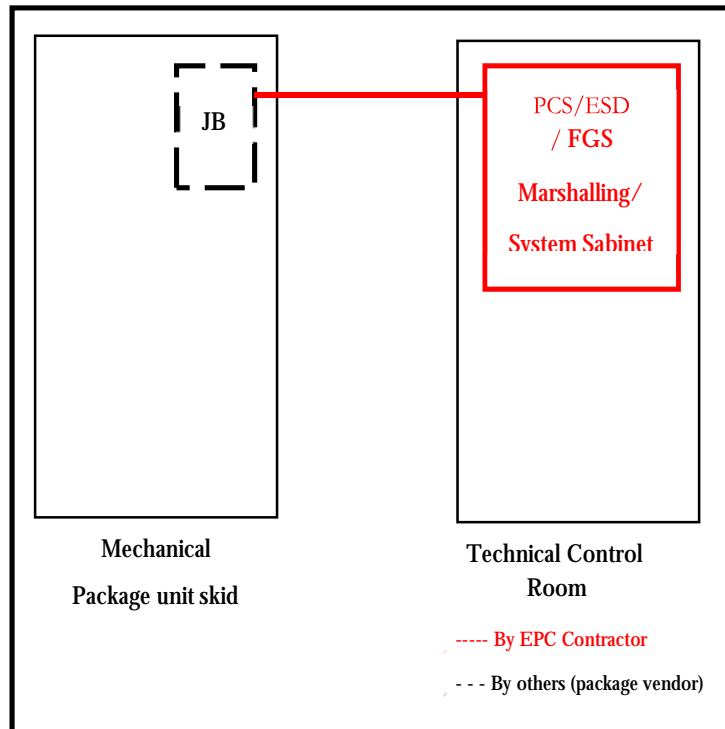
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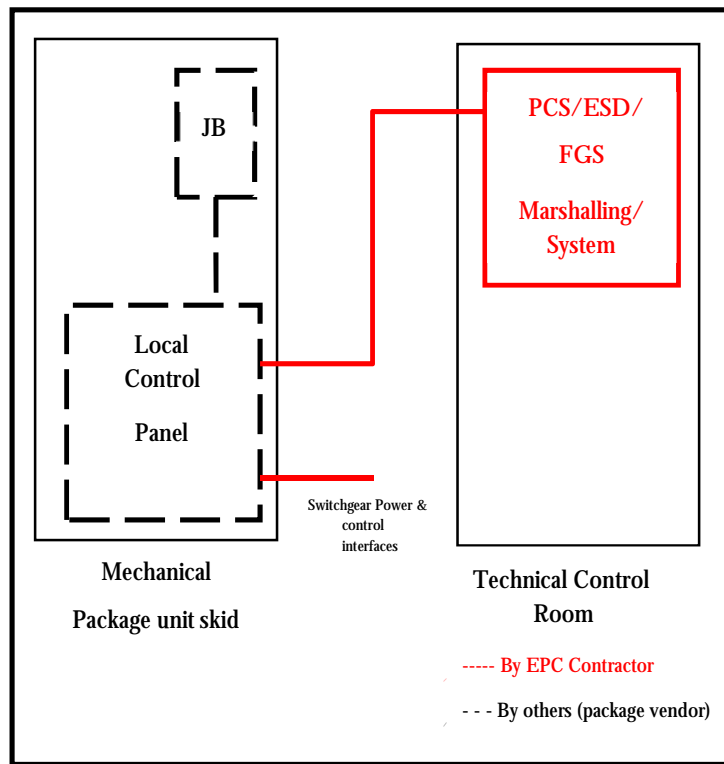
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Type - P2



Type P2 - Package unit with Junction box only. Control and Shut down by Platform ICSS.

Type - P3



Type P3 - Package unit with Junction box and Local Control Panel. Control Monitoring and critical shutdown by Platform ICSS.



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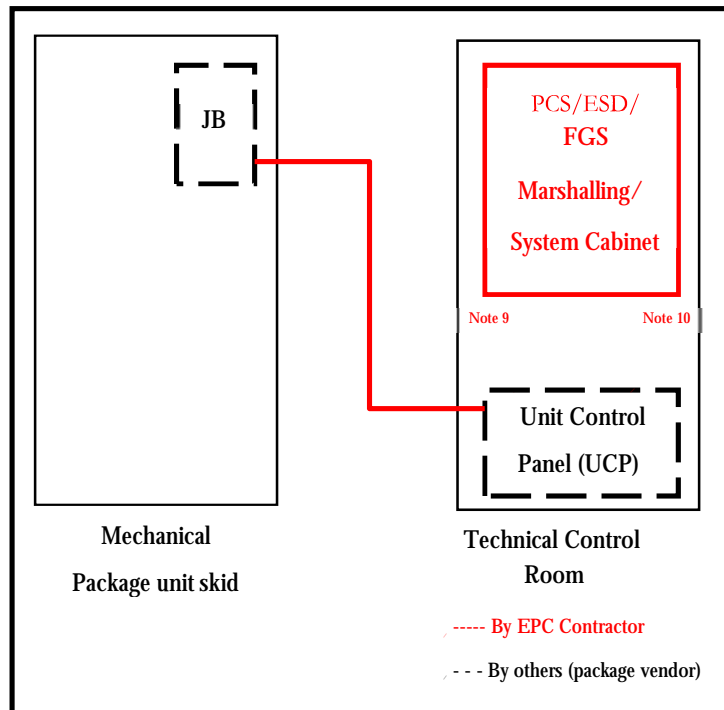
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Type - P4



Type P4 -Package unit with junction Box Control and shutdown is by package UCP. In addition, remote Shutdown/Monitoring from ICSS shall be available (one hardwired and one serial link signal to the UCP)

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Notes:

1. The above sketch shows an example of scope of supply for a package unit having an off-skid mounted Junction boxes, local control panel and control building mounted racks with electronic components.
2. Package unit instruments shall be pre-wired by Vendor, to junction boxes and/or skid mounted local panel.
3. All wiring between the package unit skid and Vendor supplied off-skid panels/cabinets, shall be provided and installed by contractor in accordance with Vendor's requirements.
4. Package unit instruments shall be pre-piped by Vendor to skid-mounted gauge board, local panel or bulkhead plate.
5. Purchaser will supply and install all tubing between the package unit skid and off- skid mounted local panels. Vendor shall provide identified bulkhead unions at both locations.
6. Purchaser will supply and install all tubing between the package unit skid and off- skid mounted local panels. Vendor shall provide identified bulkhead unions at both locations.
7. The auxiliary cabinet houses the racks with electronic equipment like: Intrinsically safe barriers, trip amplifiers, power supplies, alarm annunciator logic, control (e.g. surge) and monitoring (e.g. vibration) devices, as applicable.
8. Package Unit Control Panel (UCP) shall be located in LER or in field for Type P4 Packages.
9. Connection of Safety signals from ICSS (PCS/ESD/F&G) marshalling cabinet to Package Unit Control Panel (UCP) shall be hardwired, if required for Type P4 Packages
10. Serial Link connection from ICSS cabinet to Package Unit Control Panel (UCP), if required for Type P4 Packages.