



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



Contract  
No.

Specification for the Design of Piping In Mechanical  
Packages

Class

1

5365

Pr. Code  
LRSL

Area  
000

Disc.  
PI

Type  
SP

Seq.  
696

Rev.  
02

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## Specification for the Design of Piping In Mechanical Packages

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**REVISION RECORD SHEET**

REV. NO.	PURPOSE	LIST OF UPDATED MODIFIED SECTIONS IF ANY
01	Issued for Approval	Clause 7.4.4. Flexibility – Para. 3
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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 two wells in WHP1 platform and Re-entry and work-over of two 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.

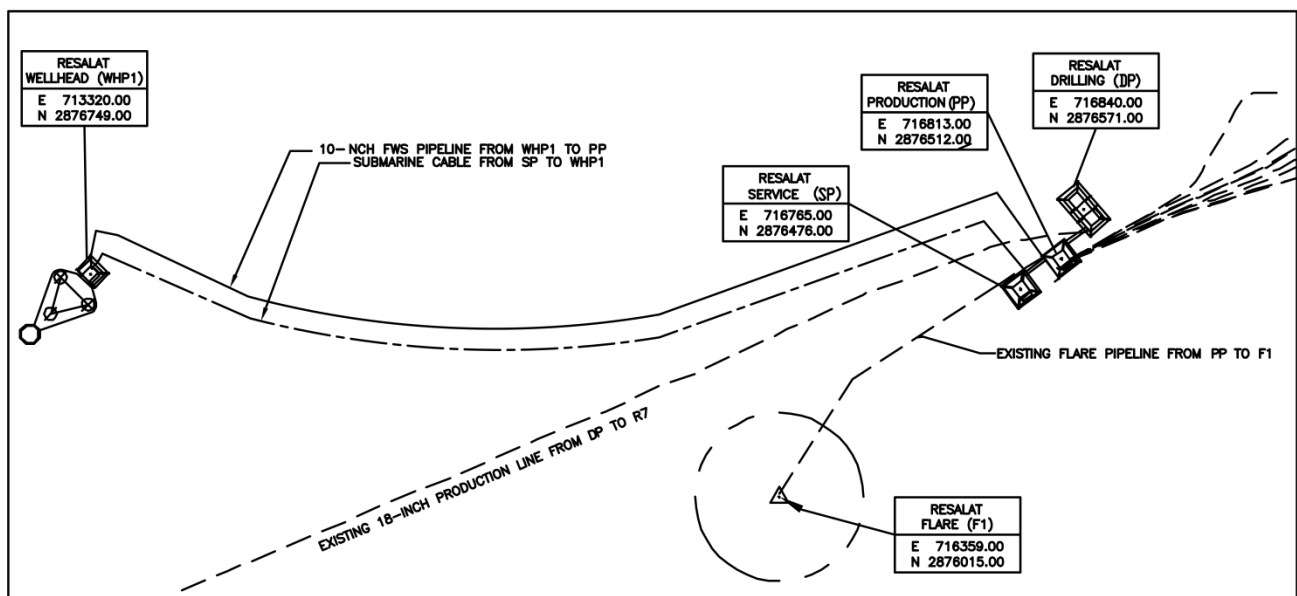


Figure 1: Resalat Development Field Layout (Datum ED 77, Zone 39, Cent. Meridian 51° East)



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**1.2. Purpose of Scope**

This specification defines the general requirements of piping within packaged units, designated for installation in “Resalat Oil Field Development Project -Phase 1.”

**1.3. Definitions**

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

**2. CODES AND STANDARDS**

All piping components design and fabrication shall meet the requirements of piping codes and standards that have been specified in “List of Applicable Codes & Standards” Doc. No.: LRLS-000-PM-LI-743.

**3. REFERENCE DOCUMENTS**

Piping Material Specification (PMS)	LRLS-000-PI-SP-697
Piping Design Criteria	LRLS-000-PI-DB-676



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Standard Drawings for Pipe Support

LRSL-000-PI-PS-682

#### **4. ABBREVIATIONS**

Not applicable for this specification.

#### **5. GENERAL**

##### **5.1. Requirements**

- It is the responsibility of Package SUPPLIER to ensure that all materials are supplied and all work is carried out in accordance with PURCHASER fabrication, testing and installation Specifications.
- Package SUPPLIER shall be responsible for the supervision of all fabrication, flushing, testing and installation of the pipe work within the package, which shall be to the satisfaction of the PURCHASER.

##### **5.2. Climatic Conditions**

Design, fabrication and installation shall take account of the prevailing climatic conditions as defined in the “Process Design Basis” Doc. No.: LRSL-000-PR-DB-706.

#### **6. DRAWINGS**

##### **6.1. Piping and Instrument Diagrams (P & IDs)**

According to Project specification “Piping Design Criteria” Doc. No.: LRSL-000-PI-DB-676.

In addition to above specification:

SUPPLIER Shall Prepare and authorize P&ID’s which will show sufficient Information regarding piping schematics, line sizes, piping classes, valves, piping special items, tie-in points, instruments and control concept.

This information will be in sufficient detail for piping section to complete their design.

Preliminary P&ID of packages will be produced by CONTRACTOR at basic phase and should be developed at Detail Design stage by SUPPLIER.





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**6.2. General Arrangements**

Piping general arrangements shall convey as much detail as necessary to identify the location of all pipe work, tie-in points, pipe supports, equipment, cable trays, ducting, etc. Whichever scale is used it is essential that small details are clearly visual and understood.

**7. PIPING GENERAL**

**7.1. Selected Nominal Sizes**

For all types of piping components, the following limitations shall be considered:

Nominal pipe size in pipe racks and main pipe runs shall not be less than 2”.

Nominal pipe sizes 1¼”, 2½”, 3½” and odd number such as 5”, 7”, 9” and also 22” shall not be used

These rules may not be applicable where pipe must be connected to equipment, e.g., pumps, compressors, the flanges of which sometimes deviate from the selected sizes, but form an integral part thereof. If in SUPPLIER’s scope of supply there are any termination points that fall into this category for connection by PURCHASER, SUPPLIER shall provide a suitable companion weld neck flange with his equipment, written CONTRACTOR approval is necessary in this situation.

**7.2. Clearances**

According to Project specification “Piping Design Criteria” Doc. No.: LRS L-000-PI-DB-676.

**7.3. Layout Considerations**

The layout of equipment shall be determined with considering and compliance with process, safety, operability and maintainability requirements.

All SUPPLIERS’ pipe work shall be run to termination points at the skid/package edge for connection by PURCHASER. The location of each termination point shall be agreed with PURCHASER.

When the overall equipment package comprises of one or more discrete packages, to be positioned away from the main equipment base area, the SUPPLIER shall be expected to minimize the interconnecting pipe work as follows:



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- All manifolding such as drain headers shall be included within the base areas of the SUPPLIER's package.
- SUPPLIER's pipe work terminations at the edge of the main equipment or console of base area shall be neatly grouped to permit the use orderly integrated interconnecting pipe runs.
- The routing of interconnecting piping shall be agreed with the PURCHASER.
- The SUPPLIER's design and supply of finished packaged pipe work shall take into account to protect against possible damage during transit. Additional support/package shall be provided as required.

For preventing of the corrosion at the end of headers, in piping system design, the dead ends shall be avoided.

#### **7.4. Maintenance Access**

(Based on Practical Engineering)

Pipe work shall be suitably flanged and valved to allow for the following:

- Dis-jointing for normal maintenance of equipment such as bearing or seal replacement on a pump.
- Removal of all equipment (major or minor) for repair or replacement.
- Flushing prior to start up.

#### **7.5. Installation of Pipe Work and Valves**

The pipe work on package units shall be installed in accordance with the guidelines laid down in the following specifications:

- Piping Design Criteria: LRSL-000-PI-DB-676

#### **7.6. Vent and Drain Points**

Vents / drains shall be installed at high / low points of all lines. Due regard shall be given to a facility for blanking / spading off.

The size of vents and drains connections shall be in accordance with IPS-E-PI-240(2) Part-2 Para 2.5.



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**7.7. Supporting of Pipe Work**

7.7.1. Strength (Robustness and Operability)

According to Project specification “Piping Design Criteria” Doc. No.: LRS�-000-PI-DB-676.

In addition to above specification:

Where it is the SUPPLIER’s intention to install a valve or other component on a pipe branch, the adequacy of the branch connection design for this purpose shall be checked by the SUPPLIER and additional support or reinforcement provided if be needed.

7.7.2. Gusseting of Small Bore Connections

According to Project specification “Piping Design Criteria” Doc. No.: LRS�-000-PI-DB-676.

7.7.3. Piping Vibration

According to Project specification “Piping Design Criteria” Doc. No.: LRS�-000-PI-DB-676.

7.7.4. Flexibility

According to Project specification “Piping Design Criteria” Doc. No.: LRS�-000-PI-DB-676.

In addition to above specification:

All piping must be designed for expansion / contraction under start-up and operating conditions without over-stressing.

Stress due to thermal expansion / contraction must not exceed the allowable expansion range that is defined by the “Specification for Piping Stress Analysis” Doc. No. : LRS�-000-PI-SP-695.

Particular attention shall be paid to the thermal expansion of lines subjected to sunrays and server temperature changes during start-up. Piping flexibility shall be used in preference of any type of expansion joints. If a suitable piping configuration cannot be designed to eliminate the use of expansion joints, the matter shall be discussed and approved by CONTRACTOR before proceeding with any work.

Flare system piping shall be designed to take care of expansion, movement or vibration caused by the most servers operating and it shall be constrained against a tendency to move off its supports.

All supports on main flare header shall be furnished by shoe or stool.



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Providing expansions shall be normally made with pipe loops. Bellows type or other expansion joints may be used where necessary. When expansion joints are applied, adequate guide for piping shall be provided to avoid eccentricity of the center line. Care shall be taken in use of horizontally installed below for the possible creation of condensate.

Thermal expansion shall be in accordance with the requirements of “Specification for Piping Stress Analysis ” Doc. No.: LRSL-000-PI-SP-695.

#### 7.7.5. 3D Model

SUPPLIER shall provide PDMS model within package to CONTRACTOR for integration with overall model which piping classes shall be compatible with PDMS catalogue and PMS of PURCHASER.

### **8. PIPING ADJACENT TO EQUIPMENT**

#### **8.1. General**

When more than one pump is installed on a common suction and/or discharge header, each pump shall be isolated in such a manner that, when shut down for maintenance occurs, one pump can be isolated without effecting the operation of the other pump(s).

All piping shall be installed in a neat and orderly arrangement. Piping immediately adjacent to a machine shall be adapted to the contours of the machine and shall not obstruct bolting or access for normal operation and maintenance.

For any branch connection on piping inside the package battery limit, fabricated fitting (Tee, Red Tee, Olet) shall be used based on “Piping Material Specification (PMS) ” Doc. No.: LRSL-000-PI-SP-697.

Wherever possible, threaded connections shall not be used for either pipe work joints or for connection of pipe work to the equipment. They may only be used with the specific approval of the PURCHASER and where other more satisfactory connections are impractical and the contained material is non corrosive.

“Piping Material Specification (PMS) ” Doc. No.: LRSL-000-PI-SP-697 shall be followed for connections in Tie-in between Packages and Piping of plant.



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**8.2. Instrument Connections**

For general instrument requirements such as standards, materials, installation, etc., see “Specification for Instrument & Control System For Package Units” Doc. No.: LRS L-000-IN-SP-645.

**9. PIPING COMPONENTS**

**9.1. General**

All piping materials and requirements (such as requirements of NACE for corrosive service) shall be selected in accordance with “Piping Material Specification (PMS)” Doc. No.: LRS L-000-PI-SP-697 for avoiding unnecessary effort during initial engineering design and future maintenance. Any deviation from this standard must be submitted to the PURCHASER for approval prior to use.

All pipe threads (when permitted) shall be taper threads in accordance with ASME B1.20.1.

**9.2. Pipe**

According to Project specification “Piping Design Criteria” Doc. No.: LRS L-000-PI-DB-676.

**9.3. Fittings (Except Branch Fittings)**

According to Project specification “Piping Design Criteria” Doc. No.: LRS L-000-PI-DB-676.

**9.4. Branch Fittings**




According to Project specification “Piping Design Criteria” Doc. No.: LRS L-000-PI-DB-676.

**9.5. Flanges, Spectacle Blinds and Spades etc**

According to Project specification “Piping Design Criteria” Doc. No.: LRS L-000-PI-DB-676.

**9.6. Valves**

The selection of valve types will be as specified in applicable PURCHASER Piping Classes. Any deviation or special valve requirements to these classes shall be subject to approval by the PURCHASER.

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## **10. FABRICATION, TESTING, INSPECTION AND PREPARATION FOR TRANSPORT**

### **10.1. General**

Metallic pipe work shall be fabricated, inspected and tested at the manufacturer's works in accordance with Specification for Prefabrication and Testing of Steel Piping.

For metallic piping materials not mentioned in the above specification, testing and inspection shall be done in consultation with the inspector representing the PURCHASER.

## **11. CONFLICT REQUIREMENT AND DOCUMENT PRIORITY**

In the case of conflict between documents relating to the inquiry or order, the following priority of documents shall apply:

- First Priority: Purchase order and variations thereto
- Second Priority: Data sheets and drawings
- Third Priority: This specification
- Forth Priority: IPS standard
- Fifth Priority: Other codes and standards

All conflicting requirements shall be referred to PURCHASER in writing. PURCHASER will issue conformation document if needed for clarification.