



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



Contract
No.

Generator Sizing

Class 2

5365

Pr. Code	Area	Disc.	Type	Seq.	Rev.
LRSL	R1X	EL	CC	009	03

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Generator Sizing

					<i>S.S.</i>	<i>A.S.</i>	<i>M.A.</i>	
03	01-Aug-21	Approved for Construction	IOEC	-	S.Saffari	A.Samadi	M.Aghaei	-
02	11-Jul-21	Issued for Approval	IOEC	-	S.Saffari	A.Samadi	M.Aghaei	-
01	29-May-21	Issued for Approval	IOEC	-	S.Saffari	A.Samadi	M.Aghaei	-
00	26-Apr-21	Issued for Comment	IOEC	-	A.Samadi	A.Samadi	M.Aghaei	-
REV.	Date	Purpose of Issue	ORIG.	BY	PREP'D	CHECK'D	APP'D	COMPANY APP'D



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REVISION RECORD SHEET

REV. NO.	PURPOSE	LIST OF UPDATED MODIFIED SECTIONS IF ANY
01	Change based on Network Study report	Power capacity of GEGs has been increased.
02	Change due to client comments	According to highlighted items
03	Change of purpose of issue	-



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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.

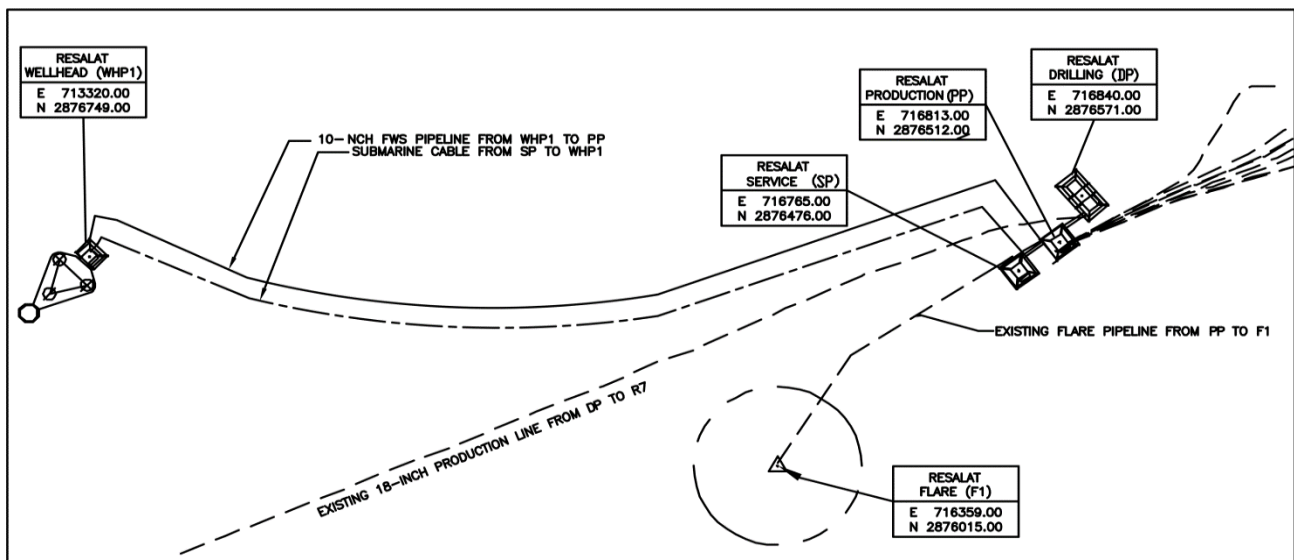


Figure 1: Resalat Development Field Layout (Datum ED 77, Zone 39, Cent. Meridian 51° East)



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1.2. Purpose of Scope

This document defines the sizing calculation for gas generator of the Resalat offshore normal loads. In this project, we have diesel generator for supplying power for electrical emergency loads.

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. SIZING PROCEDURE

The gas generator will be sized in two operation modes: steady state sizing and transient sizing.

In steady state sizing calculation, gas generator sets shall supply electrical demand (peak load plus 20% spare).

When rough size of gas generator in steady state mode is determined, then transient mode criteria (motor starting reactive power requirement) shall be studied. It shall be in its allowable range in the selected model and the selected size could be finalized by exact data from Motor and generator manufacturer.



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Ever is greater, steady state or transient size shall be declared as final gas generator set size.

All de-rating factors (Ambient, Mechanical and etc.) shall be applied by vendor to guarantee the required power conditions.

2.1. Steady State Sizing

In Steady State Operation Mode, gas Generator shall supply peak Loads including 20% Margin as Spare Capacity (According to Contract in end of project). According To project load list (LRSL-R1X-EL-LI-001, peak Load is 2643.22 KW (3018.81 KVA). Therefore, Size of the required gas generator in steady State mode with 20% margin will Be $2643.22 \times 1.2 = 3171.86$ KW as Minimum for two set and 1586 KW for each set and in the other word: 2000KVA, P.F:0.8.

2.2. Transient Sizing (Motor Starting)

According to project load list (LRSL-R1X-EL-LI-001), the largest motor which shall be fed from generator is 250 kW at 2 KV voltage level, “ESP Electrical pump-ARK-01” (as per contract load list). The starting power characteristic for the largest motor is as follows:

$$S_{Start} = 6 * S_{work} = 6 * \frac{250}{0.97 * 0.97} = 1594 \text{ KVA}$$

And, total apparent power (KVA) before start largest motor load is equal to:

$$S_b = S_{max} - S_{LM}$$

And, total apparent power during start largest motor as last load is:

$$S_{Total} = S_b + S_{Start}$$

Where:

S_b = network apparent power before start largest motor load (with 20% spare)

S_{max} =Max. apparent power of network

S_{lm} = apparent power of largest motor during work

S_{Total} = Total apparent power required during start of largest motor

Therefore:



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$$S_b = 1.2 \times \left(3018.81 - \frac{250}{0.97 \times 0.97} \right) = 3303.7 \text{ KVA}$$

And

$$S_{Total} = 3303.7 + 1594 = 4898 \text{ KVA (for two sets)}$$

This power required during start of largest motor in last step of loading and each generator shall supply 50% of this load as 2449 KVA.

Besides, regarding to document Electrical System Study (LRS L-000-EL-ST-625), the required power of each GEG based on the load flow and motor starting analysis, is 2500kVA, pf: 0.8.

So the selected value for each GEG based on the Network Study and this sizing is:

2500kVA, pf: 0.8. @ site condition

All calculated value shall be review by Gen-set manufacturer and confirm during Bid stage based on loading curve of generator. It is emphasized that this rating is at site condition and so all required de-rating factors (Ambient, Mechanical and etc.) shall be applied by vendor to guarantee the required power conditions.