

هدف در این پروژه طراحی یکی از سکوه‌های پارس جنوبی در منطقه خلیج فارس است. مشخصات این سکو عبارت است از.

سکو چهار پایه و نگه دارنده عرشه استخراج نفت بوده و عمر مفید آن 25 سال است.

### هدف تحلیل

✓ تعیین مقدار حداکثر نیروی برشی پایه در هر دو شرایط

✓ طراحی یک نمونه مهار بند، قسمتی از Leg و یک نمونه از اتصالات

# 1 DRAWINGS

Pile/Leg : Grouted

## 2 SITE PROPERTIES

### 2.1 Water Density

The water density is considered 1025 kg/m<sup>3</sup>.

### 2.2 Water Depth and Tidal Ranges

The platform is located in 62.30 m water depth from (LAT). The design water levels and tidal range for one and 100 years return periods are summarized in Table 1.

**Table 1** Water depth and surface fluctuation (m)

Description	One Year	100 Years
Water Depth (from LAT)	62.30	62.30
Storm Surge	1.10	1.20
Possible Subsidence	0.5	0.5
Uncertainty Allowance	0.5	0.5

Max. Water Depth = Water Depth (from LAT) + HAT + Storm Surge + Subsidence + Uncertainty allowance

Min. Water Depth = Water Depth (from LAT) - Uncertainty Allowance

### 2.3 Scour

### 2.4 Corrosion Allowance

A corrosion thickness allowance of 4mm (during 25 years of service life) shall be considered to the members of the jacket structure located in the splash zone.

No corrosion thickness allowance shall be considered for the structural members located below and above the splash zone.

### 2.5 Marine Growth Profile

Marine growth profile is as Table 2. The specific weight of the marine growth in air is assumed equal to 14kN/m<sup>3</sup>.

**Table 2** Marine growth measured thickness

Elevation	Profile(mm)
EI (+)2.0 to EI (-)6.0m	75
EI (-)6m to mud-line	50

### 2.6 Splash Zone

The splash zone ranges are in accordance with jacket drawings (Appendix 1).

## 2.7 Hydrodynamic Coefficients

Inertia and drag coefficients shall be generally defined as in Table 3. For the In-place condition modeling, the wave kinematics factor should be taken as 0.9 (API RP 2A). The current blockage factors for the four legged structure as per API RP 2A are as follows:

End-on	0.80
Diagonal	0.85
Broadside	0.80

**Table 3** Hydrodynamic coefficients for tubular members (In-place analysis)\*

Surface Conditions	$C_m$	$C_d$
Clean Steel	1.6	0.65
Marine Growth Fouled (with Anodes)	1.2	1.1
Marine Growth fouled (without Anodes)	1.2	1.05

## 2.8 Soil Data

Soil data are as attached appendix 2.

## 2.9 Seismic Data

The design response spectrum as per API-Figure C2.3.6-2 Soil Type C with 5% critical damping shall be used for the seismic analysis. The peak ground accelerations are summarized in Table 4.

**Table 4** Seismic peak ground horizontal accelerations

Analysis Seismicity level	Peak Ground Horizontal Acceleration
Strength Level (SLE) - 100 Year Return Period	0.07 g
Rare Intense-(Ductility)-500 Year Return Period	0.14 g

## 3 METOCEAN DATA

Below metocean data shall be used for In-place analysis.

### 3.1 Wave Data

The design wave height and wave period are summarized in tables below.

**Table 5** 1-year wave data

Description	(N)	(NE)	(E)	(SE)	(S)	(SW)	(W)	(NW)
Maximum Wave Height $H_{max}$ (m)	4.8	5.3	5.4	4.4	4.1	4.5	7.0	7.4
Associated Period $T_{ass}$ (s)	6.9	7.3	7.4	6.6	6.4	6.7	8.3	8.6
Significant Wave Height $H_s$ (m)	2.4	2.7	2.8	2.2	2.1	2.3	3.6	3.8

**Table 6** 100-year wave data

Description	(N)	(NE)	(E)	(SE)	(S)	(SW)	(W)	(NW)
Maximum Wave Height $H_{max}$ (m)	7.1	7.9	8.1	6.5	6.1	6.7	10.4	11.0
Associated Period $T_{ass}$ (s)	8.4	8.9	9.0	8.1	7.8	8.2	10.2	10.5
Significant Wave Height $H_s$ (m)	3.7	4.1	4.2	3.4	3.1	3.5	5.5	5.8

### 3.2 Current Data

The directional current velocities at mid-depth are given in tables below.

**Table 7** 1 year return period current profile (m/s)

Return Period	(N)	(NE)	(E)	(SE)	(S)	(SW)	(W)	(NW)
Surface (m/s)	0.78	1.04	1.17	0.65	0.52	0.78	0.65	0.65
Mid-Depth (m/s)	0.26	0.65	0.65	0.26	0.26	0.52	0.65	0.39
1.0m Above Seabed (m/s)	0.26	0.13	0.26	0.13	0.26	0.39	0.39	0.26

**Table 8** 100 year return period current profile (m/s)

Return period	(N)	(NE)	(E)	(SE)	(S)	(SW)	(W)	(NW)
Surface (m/s)	0.78	1.17	1.3	0.78	0.52	0.91	0.78	0.78
Mid-Depth (m/s)	0.39	0.65	0.65	0.26	0.26	0.65	0.65	0.39
1.0m Above Seabed (m/s)	0.26	0.13	0.26	0.13	0.26	0.39	0.39	0.26

### 3.3 Wind Data

The wind speed (at 10 meters above mean water level) and averaging occurrence periods are summarized in below Tables. The one minute sustained wind should be considered for total static superstructure wind loads

**Table 9** 1-year returns period wind speed (m/s)

Return Period	N	NE	E	SE	S	SW	W	NW
1 Hour Mean	16.0	16.0	17.0	15.0	13.0	14.0	19.0	20.0
1 Minute Sustained	19.0	18.0	20.0	17.0	15.0	16.0	23.0	24.0
3 Seconds Gust	23.0	22.0	24.0	21.0	19.0	20.0	27.0	29.0

**Table 10** 100-year return period wind speed (m/s)

Return Period	N	NE	E	SE	S	SW	W	NW
1 Hour Mean	21.0	21.0	22.0	19.0	17.0	19.0	26.0	27.0
1 Minute Sustained	25.0	24.0	26.0	23.0	20.0	22.0	30.0	31.0
3 Seconds Gust	30.0	29.0	31.0	27.0	25.0	26.0	36.0	38.0

Shape coefficients for perpendicular wind approach angles with respect to each projected area should be considered as follows (API RP 2A):

Beams	1.5
Sides of buildings	1.5
Cylindrical sections	0.5
Overall projected area of platform	1.0

## 4 FUNCTIONAL DATA

This section defines the functional loads, which shall be considered for the design of the platform.

### 4.1 Materials

Material Properties shall be set based on following Tables.

**Table 11** Material properties of topside and jacket structure

Item	Material	Yield Strength (MPa)	Tensile Strength(MPa)
Main structure tubular > 20"	EN 10025 S355J0	355	490
Main structure tubular ≤ 20"	API 5L X52 SR4/SR5	360	455
Node cans	EN 10025 S355K2 Z35	335	490
Piles	EN 10025 S355J0	355 (t ≤ 25 mm)	490
	EN 10025 S355J0	345 (25 < t ≤ 50 mm)	
Plates	EN 10025 S355J0	345 (25 < t ≤ 50 mm)	490
Mud mats	EN 10025 S275J0	275 (t ≤ 25 mm)	410
Boat Landing	API 5L X52 SR4 & SR5	360	455
	EN 10025 S275J0	275	410
Hot Rolled Shapes	EN 10025 S355J0	355 (Height ≥ 220mm)	490
	EN 10025 S275J0	275 (Height < 220mm)	410
Pedestal Crane	EN 10025 S355K2	345 (25 < t ≤ 50 mm)	490
Beam	EN 10025 S355J0	355 (t ≤ 15 mm)	490
Stiffeners	EN 10025 S355K2	345 (15 < t ≤ 50 mm)	490

**Table 12** Material properties

Young's Modulus	200 GPa (29×10 <sup>6</sup> psi)
Poisson's Ratio	0.26
Shear Modulus	80 GPa

### 4.2 Dead Loads

All steel members that are modeled in the software are given a density of 7850 kg/m<sup>3</sup>. A contingency factor may be applied to the self-generated weight. For the tertiary steelworks which are not directly modeled by the software such as deck stringers, handrails, gratings, etc. appropriate equivalent blanket loads shall be considered. The following unit dead loads of non-modeled members in the platform should be applied on the model.

**Table 13** Unit dead loads of non-modeled items

Items	Global Values
Handrails	0.30 (KN/m)
Gratings	0.60(KN/m <sup>2</sup> )
Stair Case with Supplements	2.00 (KN/m)

Equipment Loads will be derived from the drawings. Equipment packages with an operating weight of 5 tonne or greater should be considered in the structural loading for the in service condition. Smaller equipment packages, piping bulks, E/I bulks and etc. should be modeled as blanket uniformly distributed loads.

### 4.3 Live Loads

Live loads shall include the weight of consumables/fluids in tanks and pipes and the equipment dry and operating loads. The loading input will be broken down into Equipment Bulks and Piping Bulks loads. In addition to the above loading the short duration live loads are considered separately. The blanket live loads presented in Table 14 should be applied.

**Table 14** Blanket uniformly distributed live loads in topside's areas]

Zone Considered		For the Structure as a Whole (KN/m <sup>2</sup> )
Free Area		2
Living Quarter Area		2.0
Walkways and Walking Platforms (Except Emergency Exits)		1
Stairways (Except Emergency Exits)		0
Storage	Storage Floors - Heavy	8
	Storage Floors - Light	4
	Lay-Down Areas	5
	Non-Attributed Areas	3

#### Contingency Factors

The following contingency factors shall be used (Table 15).

**Table 15** Contingencies for structural assessment

Class Discipline	Weight Contingency
Main Jacket Structure	10%
Secondary Non-Modeled Jacket Structure	10%
Main Topside Structure	10%
Topside Equipment	15%
Piping	15%
Electrical	15%
Instrumentation	15%