BASIC ENGINEERING DESIGN DATA FOR ONSHORE FACILITIES

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CONTENTS

1. SCOPE

This specification recapitulates the site conditions and defines the basis of the Engineering Study for the Onshore Facilities of South Pars Field Development Phases 22, 23 & 24 project at Akhtar area in Iran for PARS OIL AND GAS CO.

2. PURPOSE

To provide a set of basic data regarding the site conditions and utilities availability conditions which are necessary for the onshore facilities design.

This document applies to all the parties which are involved in the onshore facilities design.

This information is provided as a convenient summary for reference purposes. It is based on information and data extracted from various sources. Users of this information are responsible for validating said data. Parameters defined herein are subject to confirmation, validation and revision and if required by the development of the design.

3. PLANT SITE CONDITIONS

3.1 GEOGRAPHICAL DATA

Most of the constraints and definitions of the previous phases of South Pars development Project have been re-applied to South Pars 22,23&24. All these data shall be confirmed during detailed engineering.

3.1.1 Location

The site is located on the Persian Gulf sea shore in the Bushehr province of IRAN Akhtar Area.

The co-ordinates of the area sides are (in U.T.M. system):

Corner	***Phases 22,23 and 24***	
	Easting	***Northing***
A	622699.99	3063320.22
B	623112.92	3064327.77
C	623315.98	3064243.47
D	623590.83	3064166.91
E	624401.40	3063952.06
F	625094.37	3063812.54
G	624610.58	3062576.42

The terrain is sloped. The elevation varies between +7 M.S.L. in the South to about +20 M.S.L. in the North.

The plant area will be terraced in order to make horizontal shelves. The finished grade levels of main platforms, after terracing are the following (Based on the Mean Sea Level):

UNITS LOCATED ISBL

- List of Plants located at the lower level platform : + 9,00 M.S.L.

Unit 100-1/U100-2- Slug Catchers and reception Facilities

Unit 129- Waste Effluent Disposalit

Unit 140- Flare and Blow down Drum

Unit 141- Utilities and offsite Drain

Unit 142- Burn Pit

Unit 147- LPG Propane Refrigeration & storage tank

Unit 148- Butane Refrigeration Treatment & storage tank

Unit 176- Substation SS11 / ITR13

- Site Toilet

- Flare Stacks

- List of Plants located at the lower level platform : + 12,00 M.S.L.

Unit 107-NGL Fractionation

Unit 113- Caustic Regeneration

Unit 114- Propane Treatment and Drying/Package

Unit 115- Butane Treatment and Drying

Unit 116-Ethane Treatment & Drying

Unit 130 – Fire Water Area

Unit 131 – Diesel Storage

Unit 176 – Main Substation SS1 & SS12 / ITR12

Unit 176 – Substation SS10 / ITR10

Unit 176- Substation SS9 / ITR9

Unit 163 – Fire Fighting Building

Unit 165 –Buildings:

1-Indoor/Outdoor Warehouses

2- Workshop

3- Indoor warehouse

4- Mainworkshop

5- Outdoor warehouse

- Site Toilet

- List of Plants located at second level platform : + 15,00 M.S.L.

Unit 100-1/2- Reception Facilities

Unit 102- MEG Regeneration, Injection And Storage

Unit 103-1/2- Condensate Stabilisation

Unit 109- Sour Water Stripping

Unit 110-Back up Stabilisation

Unit 111- Propane Refrigeration

Unit 121- Steam Generation

Unit 122- Fuel Gas

Unit 123- Instrument and Service air

Unit 124- Nitrogen & Generation System

Unit 126/B- Sea Water Desalination Distribution Network

Unit 127 – Water Treatment Area

Unit 128- Potable Water

Unit 132- Cooling Water

Unit 161- Control Room

Unit 165 –Buildings:

1- Administration building

2- Canteen 1

3- Canteen 2

4- Contractor building

5- Control building

6- Gate houses

7- Laboratory

8- Security building

9- Vehicle maintenance

10- Telecommunication building

11- Site toilet

12- View gallery

Unit 176 – Substation SS2 / ITR1& ITR2

Unit 176 – Substation SS3 / ITR3 & ITR4

Unit 176 – Substation SS5 / ITR7 & ITR8

Unit 176 – Substation SS6 / ITR11

Unit 176 – Substations

- List of Plants located at the lower level platform : + 20,00 M.S.L.

Unit 101-Gas Treating

Unit 104-Dehydration and Demercurisation

Unit 105-Ethane recovery

Unit 106-Export gas and Metering

Unit 108-Sulphure Recovery and Tail Gas Treatment unit

Unit 112- DMC Unit

Unit 131- Diesel Tank

Unit 143- Condensate Storage Tank (143-T-101A/B/C/D)

Unit 143- Off spec Condensate Storage Tank

Unit 144-Sulphure Storage And Solidification

Unit 145- Propane Refrigerant Storage

Unit 146- Chemical Storage

Unit 176 – Substation SS4 / ITR5 & ITR6

- Site Toilet
- Switch Room
- Gate houses

UNITS LOCATED OSBL:

-Unit 125/A- Sea water Intake facility at level : + HOLD M

-Unit 126/A- Sea Water Desalination at level : +HOLD M

- HP/MP/LP flares and burning pit shall be located on the phases 22, 23 & 24 (HOLD) :

142-X-101	Burn Pit
140-X-102	LP Flare Phase 22
140-X-202	LP Flare Phase 23
140-X-101,140-X-103	HP & MP Flare Phase 22
140-X-201,140-X-203	HP & MP Flare Phase 23
147-X-101	LPG Flare

3.1.2 Angular Relation Between Plant North and True North

22.031° *(between plant north and true north)*

3.1.3 Geographical Reference System (to be confirmed by client)

The various geodetic systems that are used for the South Pars Field Development Project Phases 22, 23& 24, as well as the data to shift the systems, are detailed hereafter.
For the Onshore Facilities of the South Pars Field Development Phases 22, 23& 24, the onshore datum RASSADIRAN defined in paragraph c) hereafter shall be used.

a) OFFSHORE DATUM used by NIOC - for SOUTH PARS FIELD.

Datum name: EUROPEAN DATUM 1950 -1977 (ED 50-ED 77)
Origin of datum: POSTDAM (official datum used by the National Cartographic Centre of IRAN (NCCI).

Spheroid: INTERNATIONAL 1924 (HAYFORD 1909)

Semi major axis	a	=	6 378 388.000
Semi minor axis	b	=	6 356 911.946
Inverse flattening	1/f	=	297.000
Eccentricity squared	e2	=	0.006 722 670

Projection: UNIVERSAL TRANSVERSE MERCATOR (UTM)

Zone	:	=	39
Central meridian	:	=	51° East
Latitude of origin	:	=	Equator

False Easting	:	=	500 000,00
False Northing	:	=	0
Scale Factor on C.M.:		=	0.9996

b) ONSHORE DATUM USED by NIOC along the NORTH COAST LINE of the PERSIAN GULF:

Datum name: FINAL DATUM 1958 (FD 58)

Origin of datum: Triangulation established by the oil Contractor.

Spheroid: CLARKE 1880 RGS

Semi major axis	a	=	6 378 249.145
Semi minor axis	b	=	6 356 514.870
Inverse flattening	1/f	=	293.465
Eccentricity squared	e2	=	0.006 803 511 28

Projection CONFORMAL CONIC LAMBERT

Zone	:	=	LAMBERT IRAN -IRAQ
Longitude of origin	:	=	45° East of Greenwich
Latitude of origin	:	=	32° 30’ North
False Easting	:	=	1 500 000.00 m
False Northing	:	=	1 166 200.00 m
Scale factor at origin	:	=	0.998 786 407 8
Standard Parallels	L1		29° 39’ 18.385” N
	L2		35° 18’ 52.628” N

c) ONSHORE DATUM used by NIOC & RASSADIRAN for the TAHERI REFINERY :

Datum name: RASSADIRAN

Origin of datum: RASSADIRAN polygonation from KANGAN

Spheroid: INTERNATIONAL 1924

Projection NAKHL E TAQI oblique MERCATOR

Latitude of central point	:	=	27° 31’ 07.7837” N
Longitude of central point	:	=	52° 36’ 12.7410” E
False Easting	:	=	658 377.437 m
False Northing	:	=	3 044 969.194 m
Azimuth of rotated meridian	:	=	+0° 34’ 17.9803”

Scale along rotated meridian : = 0.999 895 934

d) GPS SATELLITE DATUM used for POSITIONING :

Datum name: INTERNATIONAL TERRESTRIAL REFERENCE FRAME (ITRF)

Spheroid: WGS 1984 (GRS 1980)

Semi major axis	a	=	6 378 137.000
Semi minor axis	b	=	6 356 752.314
Inverse flattening	1/f	=	298.257 223 6
Eccentricity squared	e2	=	0.006 694 380

e) DATUM SHIFTS: 3 translation parameters calculated by GEOID during March 1998 geodetic survey.

From ITRF (WGS 84)	From ITRF (WGS 84)	From ITRF (WGS 84)
To: ED50-ED77 (C 386marker)	To: RASSADIRAN	To: Final Datum 1958
Delta X = +122.89 (plus)	Delta X = +133.63 (plus)	Delta X = +241.54 (plus)
Delta Y = +159.08 (plus)	Delta Y = +157.50 (plus)	Delta Y = +163.64 (plus)
Delta Z = +168.74 (plus)	Delta Z = +158.62 (plus)	Delta Z = -396.06 (minus)

Note: The above parameters are valid for the KANGAN district only.

The 7 parameters datum shift from WGS 84 to ED 77 published by NCCI for the whole territory of

IRAN is as follows:

DX = + 110.33 DY = +97.73 DZ = +119.85 RX = - 0.3423 RY = -1.1634 RZ = -0.2715

DK = 1.0000 ppm

f) EXAMPLE OF TRANSFORMATION :

Marker TOTAL 1	**Datum ITRF (WGS 8)**	**Datum ED50-ED77**	**Datum RASSADIRAN**	**Datum FINAL DATUM 1958**
Latitude	27° 31’ 03.882” N	27° 31’ 08.154” N	27° 31’ 07.784” N	27° 30’ 57.607” N
Longitude	52° 36’ 13.124” E	52° 36’ 13.087” E	52° 36’ 12.741” E	52° 36’ 09.753” E
Height / Spheroid	60.13 m			

Projection UTM zone 39 C.M. 51° E

Easting	658 382.79	658 386.78	658 377.44	
Northing	3 044 805.62	3 044 980.72	3 044 969.19	
Height /MSL		84.81	84.81	

Projection NAKHL E TAQI Oblique MERCATOR:

Easting			658 377.44	
Northing			3 044 969.19	

Projection LAMBERT IRAN:

Easting				2 252 386.0
Northing				640 556.0

3.2 GEOTECHNICAL DATA (TO BE CONFIRMED BY CLIENT)

Detailed Geotechnical data is given in the following report: "Geotechnical study of the site for South Pars Field Development Phases 22, 23& 24. PEY-KAV consulting engineers April 2008

3.2.1 Ground Water Level

The ground water table encountered in some bore holes as below

- Depth 30.5^{m} and 40 ^{m} of boreholes located in elevation 40m and 18 m of specified area for Condensate tanks.
- Depth to and 11m from existing ground level of boreholes located in butane and propane storage tanks.
- And finally in some boreholes of remained area as below

BH 18	Depth 16.7m	BH 40	Depth 12.5m
BH 29	Depth 12.3m	BH 41	Depth 17.2m
BH 31	Depth 17.1m	BH 42	Depth 18m
BH 35	Depth 20.5m	BH 43	Depth 18m
BH 37	Depth 17.5m	BH 44	Depth 15.3m
BH 38	Depth 19.2m	BH 45	Depth 10.7m
BH 39	Depth 17.6m	BH 50	Depth 9.7m

3.2.2 SOIL CONDITIONS (according to existing development phases)

(Source is phases 15 &16 and to be finalized later)

♦Soil characteristics

The sedimentation of this plain is a complex mixture of alluvial deposits on the piedmont, river deposits and alluvial terraces belonging to the quaternary period.

Thickness of these deposits is variable and the depth to the bedrock is estimated to be greater than 50 m.

The complex mixture of the alluvial deposits has a gradation consisting of angular to sub-angular gravels with a limestone origin seen in a matrix of silt, and sand. At the foothill on the north of the site there is an abundance of cobbles and boulders that have a limestone and anhydrite origin. These large size materials are sub-rounded to sub-angular and clearly show that they are transported by flood flows.

Characteristics of this soil for design purpose are as follows:

- Apparent angle of internal friction φ = 37 degrees
- Coefficient for apparent cohesion C = 87 kN/m^2
- Bulk Unit Weight
  - Wet γ = 20.00 kN/m^3
  - Dry γ = 19.5 kN/m^3

♦ Soil aggressivity

- chloride content is:

– in soil = between 0.003 and 0.013% (Cl^{--})

– in water = ----------

- the sulphate content is:

– in soil

* water soluble sulphate content = from 0.06 to 0.42% (SO4- -)

– in water = ----------

♦ Soil permeability

Average permeability of soil layers is estimated to be 0.00013 cm/sec.

•Soil electrical resistivity : inside plant 81.7 ohm.m, outside plant 164 ohm.m

3.3 METROLOGICAL DATA

Weather conditions tables for Kangan area during year 1991 - (NIOC)

(Source: Environmental Conditions-Phase 4 & 5)

3.3.1 Air Temperature

Month	Air Temperature In Degrees °C									
	Means Of							Ground		
	Max °C	Min °C	Mean Daily °C	Highest °C	Date (Day)	Lowest °C	Date (Day)	Mean °C	Lowest °C	Date (Day)
January	17,4	8,2	12,8	23,5	21	2,8	28	6,4	1,0	29
February	17,8	8,0	12,9	23,2	26	2,0	11	5,8	-1,0	11
March	21,9	11,3	16,6	28,5	22	5,6	9	9,6	3,0	9
April	31,2	17,2	24,2	36,0	28	10,5	14	15,1	9,0	14
May	35,1	21,2	28,1	40,0	31	16,0	7	19,4	14,0	7
June	40,0	25,0	32,5	44,4	2	22,0	6	23,2	20,0	6
July	40,1	25,7	32,9	46,0	31	23,0	16	24,1	21,0	16
August	39,6	25,6	32,6	47,0	1	23,0	19	23,9	21,0	31
September	35,6	22,3	29,0	41,0	8	19,0	29	21,0	19,0	29
October	32,6	18,4	25,5	37,0	12	14,0	25	16,9	13,0	26
November	25,8	12,2	19,0	31,5	1	9,0	28	10,1	7,0	28
December	18,1	10,0	14,0	23,0	12	4,0	31	9,5	3,0	23
Year	29,6	17,1	23,3	47,0		2,0		19,4	-1,0	

3.3.2 Air Relative Humidity and Cloud Cover

Month	Mean vapour pressure	Means of relative Humidity an hour				Bright Sun Shine (hr)	N° of Observation
		03	09	15	Total		
January	11,32	91	62	70	72	**	155
February	10,40	82	52	61	63	174,1	140
March	**	87	50	56	62	220,3	155
April	**	47	27	32	33	250,8	150
May	12,64	39	24	29	29	329,7	155
June	16,16	35	23	31	29	336,2	150
July	22,97	47	36	50	42	332,1	155
August	25,09	53	38	61	49	326,6	154
September	18,21	50	35	43	43	271,1	150
October	11,33	45	21	39	33	276,2	155
November	10,33	62	29	52	45	272,8	150
December	13,08	90	71	82	78	155,7	155
Year	15,15	60	62	50	48	2946	1824

3.3.3 Precipitation

Month	Total	Most In a day	Date	Precipitation							Dust-storm	Haze	Thunder-storm	Frost	Fog
				Trace	GT 1 mm	GT 10 mm	Total	Rain	Snow	Hail					
January	193,0	110,0	14	2	7	2	11	5	0	0	0	14	1	0	2
February	82,4	51,0	28	0	5	1	11	5	0	1	1	17	2	0	0
March	52,6	27,0	7	1	3	2	8	2	0	0	2	16	2	0	1
April	0,2	0,2	10	1	0	0	2	0	0	0	6	8	0	0	0
May	0,0	0,0	**	0	0	0	0	0	0	0	15	8	0	0	0
June	0,0	0,0	**	0	0	0	0	0	0	0	12	12	1	0	0
July	0,0	0,0	**	0	0	0	0	0	0	0	23	6	0	0	0
August	0,0	0,0	**	0	0	0	0	0	0	0	25	1	0	0	0
September	13,0	13,0	28	1	1	1	2	0	0	0	10	5	1	0	0
October	0,0	0,0	**	0	0	0	0	0	0	0	4	10	0	0	0
November	0,0	0,0	**	0	0	0	0	0	0	0	1	7	0	0	0
December	245,0	79,0	7	0	12	7	14	3	0	0	3	3	6	0	4
Year	586,3	110		5	28	13	48	15	0	1	102	107	13	0	7

3.3.4 Atmospheric Pressure

	Mean Pressure (millibar)		Mean Temperature °C		
Month	Station level	Sea level	Dry bulb	Wet bulb	Dew point
January	950,7	**	13,6	10,9	8,2
February	950,6	**	13,9	10,3	6,3
March	**	**	17,7	13,3	**
April	**	**	26,2	16,7	**
May	933,8	1006,2	30,4	18,4	9,4
June	929,1	1000,2	34,8	21,5	13,3
July	926,3	997,3	34,5	24,1	19,1
August	928,1	999,3	33,5	24,6	20,2
September	934,1	1006,5	30,3	20,9	14,8
October	939,4	1013,2	27,0	16,6	8,2
November	942,8	1018,4	20,4	13,4	6,8
December	942,7	1019,6	14,6	12,4	10,5
Year	937,0	1009,6	24,8	16,3	11,7

** Unknown

3.3.5 Wind Conditions

		North wind		North East wind		East wind		South East wind		South wind		South West wind		West wind		North West wind		Wind speed distribution (m/sec)									Fastest Wind			
Month	N° calm	Number	Mean of	Number	Mean of	Number	Mean of	Number	Mean of	Number	Mean of	Number	Mean of	Number	Mean of	Number	Mean of	01-03	04-06	07-10	11-16	17-21	22-27	28-33	34-40	40 and	Direction	Speed	Day	Time
January	89	1	2	15	3	6	3	3	4	27	4	3	4	8	4	3	4	30	36	0	0	0	0	0	0	0	190	7	11	**
February	72	2	4	11	3	16	3	1	2	22	5	1	5	9	4	6	6	31	29	8	0	0	0	0	0	0	190	10	21	**
March	69	2	4	21	3	6	4	4	4	15	5	10	4	16	4	12	6	37	38	11	0	0	0	0	0	0	190	10	29	12
April	59	6	6	7	3	3	4	1	2	19	6	8	4	24	5	23	5	25	53	12	0	0	0	0	0	0	190	12	11	12
May	32	1	7	0	0	0	0	2	2	4	3	12	5	44	5	60	6	18	74	30	0	0	0	0	0	0	290	13	14	9
June	35	2	4	8	4	2	5	3	4	35	6	19	5	15	4	31	6	27	60	28	0	0	0	0	0	0	190	10	21	15
July	62	0	0	4	3	2	4	0	0	69	6	17	5	7	4	4	5	13	50	30	0	0	0	0	0	0	190	10	18	15
August	62	0	0	2	3	2	2	0	0	62	7	20	6	4	4	2	5	10	37	43	0	0	0	0	0	0	190	12	8	15
September	53	0	0	4	4	2	5	2	6	64	7	14	4	6	5	5	7	15	39	42	0	0	0	0	0	0	70	13	27	**
October	1	0	8	12	4	4	3	1	3	38	6	13	5	8	4	9	5	21	49	16	0	0	0	0	0	0	190	10	15	12
November	72	0	0	12	3	4	3	0	0	35	5	14	4	5	5	8	5	25	48	5	0	0	0	0	0	0	260	9	16	**
December	79	2	4	29	4	9	3	1	6	21	5	2	6	8	4	4	3	35	38	3	0	0	0	0	0	0	170	13	14	9

3.3.6 Storm Wind Speed/Duration Characteristics

(Source A.H. Glenn & Associates Report)

Vicinity 26° 46’ 20” N, 52° 05’ 59” E : South Pars Gas Field - Persian Gulf = Annual

(offshore data) return period years	3 seconds gust (m/s)	15 seconds gust (m/s)	1 minute (m/s)	0.5 Hour (m/s)
1	26.5	24,4	22,7	18,8
10	34,7	32,0	29,7	24,6
100	43,0	39,6	36,7	30,4

Note: max. speed of all directions at 10 m.

4. BASIS OF THE ENGINEERING STUDY

4.1 GENERAL

4.1.1 Units of Measure

As a general rule, the SI metric system of units shall be used and particularly:

- ♦ Pressure (gauge) bar g
- ♦ Pressure (absolute) bar a
- ♦ Mass kg
- ♦ Length m & mm except the pipes diameter for which “inches” are allowed
- ♦ Liquid relative density sp. gr. T°C/15°C
- ♦ Liquid absolute density kg/m^3 at 15°C
- ♦ Vapor flowing density kg/m^3
- ♦ Flow rates
- – Mass kg/h
- – Vapor kg/h
- – Liquid m^3/h
- ♦ Normal conditions
- – Vapor Nm^3 (m^3 at 0°C & 1.013 bar a) or S m^3 vapor (at 15°C & 1.013 bar a)

– Liquid Std	m^3 (m^3 at 15°C)
♦ Specific enthalpy	kJ/kg
♦ Heat rate	MW
♦ Gross calorific value	kJ / kg
♦ Viscosity (kinematic)	m Pa.s

For complete list of SI-Units refer to ISO 31-0

In addition to the above units, the following units shall be used for material balance purposes:

- Vapor flow rate = MMSCFD Million Standard cubic feet per day (at 15°C & 1.013 bar.a).
- Liquid flow rate = SBLPD or SBOPD Standard barrel of liquid, or of oil, per day (at 15°C & 1.013 bar.a.).
- Temperature = °F
- Pressure (absolute) = Psia

4.1.2 Codes and Standards

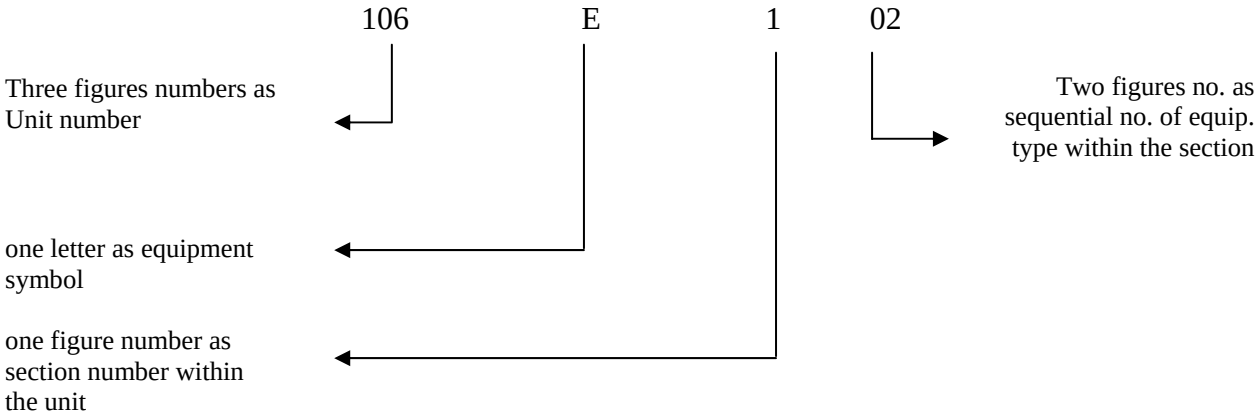
The applicable codes and standards are generally listed in the Project Procedure n° DB 2224 999 P332 203 “List of Applicable Codes and Industry Standards”

4.1.3 Service Life

The design service life of the onshore plant is 25 years.

4.1.4 Equipment Designation

The main equipment of the plant shall be identified by means of an item number made in the following format:



For complete list of units and equipment symbols, refer to Project Procedure n° DB -2224-999-P-332-201 “Equipment and Engineering Documents Identification and Numbering.”

4.2 SEISMIC DESIGN CONDITIONS

♦ The following parameters coming from the “Onshore Seismicity Report - BRGM - Jan. 1998”, will be used to define the seismic source at the soil surface (free field):

– Peak ground horizontal acceleration PGA = 0.35g.

– soil response spectrum (horizontal) as given in the Uniform Building Code 1997 edition for soil profile Sc and seismic source type B

– peak ground vertical acceleration 2/3 X 0.35g.site shall be assigned to seismic zone 4, as defined in UBC 1997. Near source factors as defined in UBC 1997 will be assigned the following values; Na = 1.0 - Nv = 1.0.

4.3 DESIGN CONDITIONS

4.3.1 Ambient Air Temperature:

– Max dry bulb temperature in summer	= 48 °C
– Min dry bulb temperature in winter	= +2 °C
– Max. temperature reached in the sunshine for black exposed surface	= 85 °C

4.3.2 Design Air Temperature For Process Air-Coolers:

Air temperature to be used for process air-cooler design

– Summer = +48 °C

– Winter =+37 °C

– Minimum air temperature for fan power design calculation = +5 °C

4.3.3 Design Air Conditions for Gas Turbine, Diesel Engine and Air Compressor:

- Temperature = 48 °C
- Relative humidity = 65%

4.3.4 Design Temperature for Air Conditioning:

– Outdoor temperature:

- Maximum (summer) = +44 °C
- Minimum (winter) =+5 °C

– Day/night temperature fluctuation.

- Maximum (summer) =+15 °C
- Minimum (winter) =+8 °C

4.3.5 Design Air Temperature for Electrical Equipment:

– Outdoor temperature:

- Maximum =+48 °C
- Minimum = + 5 °C

– Indoor temperature:

- Maximum = +40 °C.
- Minimum = +10 °C

4.3.6 Design Thermal Variation (ΔT) for Structural Calculation:

±22°C

4.3.7 Design Relative Humidity for Air Conditioning:

– Outdoor relative humidity

- At maximum temperature (summer) = 65%
- At minimum temperature (winter) = 100%

4.3.8 Relative Humidity for Electrical Equipment Design:

80%

4.3.9 Ambient Air Quality:

Tropical, dusty, humid and saliferrous with maximum average content (which can be locally exceeded):

H_2S = 10 ppm.

SO_2 = 5 ppm.

4.3.10 Design Velocity and Direction of Prevailing Wind

– Prevailing wind for design purpose

From North West (to be confirmed)

– Wind velocity at 10m above ground level for

- Structure calculation

In case of structural design as per UBC 97 the following parameters shall be used:

- basic wind speed : 34.7 m/s
- exposure : D
- importance factor : as per UBC table 16.K

- Flare thermal radiation = 16.0 m/s

– Wind velocity for thermal calculations = 5 m/s

4.3.11 Design for Rainfall Values

Rainfall values for 100 year return period (Source: Environmental Conditions Phase 1).

Duration	Maximum Intensity (mm/hr)
5 minutes	480
10 minutes	360
15 minutes	284
30 minutes	186
1 hour	109
24 hours	(1)

Note 1 : MAXIMUM RAINFALL FOR 24 HOURS: 155 mm

4.3.12 Solar Radiation

– Solar radiation (maximum) = *1.04* kW /m^2.

4.3.13 Design Barometric Pressure

– Maximum = 1010 mbar

– Minimum = 990 mbar

4.4 OCEANOGRAPHIC DESIGN CONDITIONS

(Source: Environmental Conditions-Phase 4 & 5 : to be confirmed by client for phases 22~24)

4.4.1 Sea Water Temperature at Intake

Maximum	35 °C
Minimum	13 °C

4.4.2 Tidal Movement

Highest astronomical tide (HAT)	1.9 m
Lowest astronomical tide (LAT)	0.0 m
Storm tide	0.3 m
Total tide	2.2 m.

4.4.3 100 Year Wave Data (at water depth of 20 m)

Total height of wave	11.8 m

Crest elevation above still water	8.0 m
Crest elevation at LAT	10.2 m
Wave length	151.5 m
Wave period	10.7 m

4.4.4 Current Speed at Harbour Location (100 Year return period)

Current speed at depth

Percent Depth	m/s
0%	1.2
10%	1.2
20%	1.2
30%	1.1
40%	1.1
50%	1.1
60%	1.0
70%	1.0
80%	1.0
90%	0.9
100%	0.9

4.4.5 Thickness of Marine Growth for Environmental Loading

Elevation with reference to LAT, m	Thickness on radius, m
+2.0	0.075
-6.0	0.075
At sea bed	0.050

Thickness between indicated levels to be estimated by linear interpolation.

4.5 ENVIRONMENTAL SPECIFICATIONS

4.5.1 Emissions to Atmosphere

The emissions reported in the tables are taken from «Engineering Standard for Air pollution Control» IPS-E-SF-860. The emissions are expressed as concentrations to facilitate monitoring. Dilution of air emissions or effluents to achieve these values is unacceptable.
All of the maximum levels should be achieved for at least 95% of the time that the plant or unit is operating, to be calculated as a proportion of annual operating hours.

4.5.2 Emission Standards

Parameter	Maximum value
Carbon monoxide	1000 ppm
Hydrogen sulfide	5 (mg/m3)
Sulfur oxides	800 (ppm)
Particles	50 (mg/m3)
Hydrocarbon	20% opacity
Photochemical	30 mg/m3
Non photochemical	300 mg/m3
Nitrogen oxide	320 (ppm)
Max O2 in flue gas	3% vol

4.5.3 Odours

The odour shall not be offensive at receptor end. Hydrogen sulfide at the property boundary shall be less than 5mg/m3.

4.5.4 Waste Water

4.5.4.1 LIQUID DISCHARGE STANDARDS

The limit of liquid discharge is reported in table 4.B - Environmental Job Specification "RP-2224-999-6200-008"

4.5.5 Noise Limitations

4.5.5.1 PLANT LIMITS

The noise limitation detailed in pages 7,8 of the document Noise Control Job specification "RP-2224-999-6200-009".

4.5.5.2 PLANT BOUNDARY LIMITS

The noise level at the plant boundary shall not exceed 70 dB(A).

The flare system design shall be such that the maximum acceptable heat radiation (including solar Radiation: 1.04 kW/m2) in case of flaring shall not exceed the values listed in the following table:

4.5.6 Flare Radiation Limit

MAXIMUM ACCEPTABLE HEAT RADIATION IN CASE OF FLARING

Location	Radiation levels (kW/m²)	
	Continuous Flaring	Emergency Flaring
Anywhere people have access (1)	9.5	9.5
Between flares stacks and liquid burners	3.2	4.7
Free access road	3.2	4.7
Flare drum/ignition package	3.2	4.7
Process equipment	3.2	4.7
Storage	3.2	4.7
Restricted area	3.2	4.7
Permanently manned area	1.6	2.0

(1) Exposure should be limited to a few seconds sufficient for escape only

4.5.7 Safety

♦ Active Fire Fighting:

as per Project Job Specification n° RP 2224 999 1900 002

♦ Fire and Gas detection:

as per Project Job Specification n° RP 2224 999 1900 003

♦ Hazardous Area Classification:

as per Project job Specification n° RP 2224 999 1900 004

♦ Personnel Protection:

- Unprotected surface max. temperature: 70° C
- Toxic gases criteria (ppm) as per following table:

	H_2S	**SO_2**	**CO**	**CO_2**	**CI_2**
TLV-TWA	5	2	50	5000	0.5
TLV-STEL	10	5	400	15000	1
IDLH 30 mns	300	100	1500	40000	30
LC1 60 mns	450	500	3000	N/A	120
LC1 30 mns	600	650	5000	N/A	160

4.6 RAW MATERIALS AND PRODUCTS

Refer to project procedure n° DB 2224 999 P312 202 “Procee Basis Of Design And Overall Process Description”

4.7 UTILITIES

4.7.1 Water

4.7.1.1 DISTRIBUTION SYSTEMS

Desalinated water produced from sea water feeds, eventually after treatment, is used in the following systems:

- Drinking water
- Fire water
- Utility water
- Demineralized water
- Chilled cooling water (restricted use to machine cooling)
- Boiler Feed water (HP and LP levels)

4.7.1.2 OPERATING CONDITIONS AT PRODUCER'S BATTERY LIMIT

System	Temperature (°C)			Pressure (bar g)		
	Min.	Norm.	Max.	Min.	Norm.	Max.
Desalinated water (from unit 126A)		45	50		10.7 (2)	12.8 (2)
Desalinated water (from unit 126B)		45	50		10.7	14(3)
Drinking water		30			11.4	11.4(3)
Fire water		45	50		11.4	16
Utility water		30	50		11.4	11.4(3)
Demineralized water		45			8	14(3)
Chilled cooling water supply	-	30	-	6	8.4(2)	13.2(2)
Chilled cooling water return	-	40	-	1	1.4(2)	7(2)
HP Boiler Feed water	-	115	<150	-	71.1	-
LP Boiler Feed water	-	115	<150	-	23.1	-
Sea water supply (from S.W. Intake)	13	-	35	-	12.7(2)	14.5(2)
Cold condensate	-	60	-	-	37.7	-

(1) Gravity Flow
(2) To Be Finalized Later.
(3) will be finalized after receiving pump data.

4.7.1.3 OPERATING CONDITIONS AT USER'S BATTERY LIMIT

System	Temperature (°C)			Pressure (bar g)		
	Min.	Norm.	Max.	Min.	Norm.	Max.
Desalinated water (From 126A)(2)		45	50		5(2)	6(2)
Desalinated water (From 126B)(2)		45	50		7	13.2(3)
Drinking water		30		2	7	11.4(3)
Fire water		45	50	8		12
Utility water		30		2	7	11.4(3)
Demineralized water		45	50	-	7.5	14(3)
Chilled cooling water supply	-	30	-	2.7	4.6	9.4
Chilled cooling water return	-	40	-	2.0	3.9	6.3
HP Boiler Feed water (4)	-	115	<150	58	60	61
LP Boiler Feed water	-	115	<150	-	10.5	13
HP Boiler Feed water in unit 108		115	120	58	60	61
Sea water supply (from S.W Intake) (2)	13	-	35	4.5	4.5	12.7
Sea water return	-	-	40	0	3	4
Cold condensate (1) (2)	-	60	-	-	35	-

(1) Water of steam condensate quality to be used in process units for LP steam de-super-heating or as process water make-up.

(2) To Be Finalized Later

(3) Will be finalized after receiving pump data

(4) data from control valve vendor in unit 121

4.7.1.4 MECHANICAL DESIGN CONDITIONS

System	Temperature (°C)(3)	Pressure (bar g)(3)
Desalinated water (ISBL)	85 (2)	14
Drinking water	60	14.5
Fire water	85 (2)	16
Utility water	85 (2)	14.5
Demineralized water	85 (2)	14
Chilled cooling water	60	15.3
HP Boiler Feed water	150	87.8
LP Boiler Feed water	150	30.2
Sea water (from S.W. Intake) (3)	60	16
Cold condensate (1) (3)	135	47.1

(1) maximum skin temperature reached by a black surface exposed in the bright sunshine.

(2) pipe line shall be protected against sun exposition.

(3) To Be Finalized Later

4.7.1.5 WATER ANALYSIS OR SPECIFICATION (3)

	Analysis	Specification				
Quality	Sea water (2)	Desalinated water	Demineralised water	Boiler feed water	Drinking& utility water (1)	Fire water
Origin	Pumping station	Desalination units	Polishing unit	Deareator	Remineralisation and chlorination unit	Desalinisation units
Ca^{++}	(g/l) 0.46	(ppm) 0.1		(ppm) 0.1	(ppm) 40.0	(ppm) 0.1
Mg^{++}	(g/l) 1.53	(ppm) 0.3		(ppm) 0.3	(ppm) 0.3	(ppm) 0.3
Na^{+}	(g/l) 12.29	(ppm) 3.0	(ppm) < 0.05	(ppm) <	(ppm) 23.0	(ppm) 3.0
Fe^{++}	nil		(ppm) < 0.02	0.05		
Ba^{++}	nil					
CI	(g/l) 22.65	(ppm) 6.0			(ppm) 76.0	(ppm) 6.0
SO_4--	(g/l) 3.21				(ppm)	
CO_3H	(g/l) 0.11				(ppm) 30.0	
CO_3—	(g/l) 0.02					
Primary salinity	(ppm) 79.02					
Secondary salinity	(ppm) 20.64					
Secondary alkalinity	(ppm) 0.34					
Specific gravity at 15°C	(g/cm^3) 1.023					
pH	8.2		6.5 to 7.5		6.5 – 8.0	
Viscosity (cP)	1.05			> 9		
Resistivity at 20° C (ohm-m)	0.18	500	50000	500	24	500
Total salt content	(g/l) 37.41					6
Dissolved oxygen (ppm)	8 – 10	6	6	Nil	7.5 Nil	
Suspended solids	(g/l) 0.092	Nil	Nil		(ppm) 200-300	Nil
Total dissolved solid	(g/l) 45.56	(ppm) 10	(ppm) < 0.01	Nil (ppm) 10		(ppm) 10

(1) Specification in accordance with OMS requirements

4.7.2 Steam

4.7.2.1 STEAM DISTRIBUTION SYSTEMS

- HP saturated steam
- LP saturated steam

4.7.2.2 OPERATING CONDITIONS AT PRODUCER'S BATTERY LIMITS

System	Temperature (°C)			Pressure (bar g)		
	Min.	**Norm.**	**Max.**	**Min.**	**Norm.**	**Max.**
HP Saturated	270	274	300	41.5	43.0	43.5
LP Saturated	175	185	210	4.5	5.5	6.0

Note: HP and LP saturated steam networks are actually slightly superheated to avoid condensing in the networks.

4.7.2.3 OPERATING CONDITIONS AT USER'S BATTERY LIMIT

System	Temperature (°C) (1)			Pressure (bar g) (1)		
	Min.	**Norm.**	**Max.**	**Min.**	**Norm.**	**Max.**
HP Saturated	260	264	290	40.0	41.5	42.0
LP Saturated	155	165	190	3.5	4.5	5.0

(1) To Be Finalized Later

4.7.2.4 MECHANICAL DESIGN CONDITIONS

System	Temperature (°C) (1)	Pressure (bar g) (1)
HP Saturated	330	55
LP Saturated	270	8

(1) To Be Finalized Later

4.7.3 Compressed air / Inert gas

4.7.3.1 DISTRIBUTION SYSTEMS

- Service air
- Instrument air
- Nitrogen

4.7.3.2 OPERATING CONDITIONS AT PRODUCER'S BATTERY LIMIT

System	Temperature (°C)			Pressure (bar g)		
	Min.	Norm.	Max.	Min.	Norm.	Max.
Service air	20	60	65	-	8	9.1
Instrument air	20	60	65	-	8	9.1
Nitrogen	10	57	65	6.7	7.7	9

4.7.3.3 OPERATING CONDITIONS AT USER BATTERY LIMIT

System	Temperature (°C)			Pressure (bar g)		
	Min.	Norm.	Max.	Min.	Norm.	Max.
Service air	20	60	65	*6*	*7*	*8*
Instrument air	20	60	65	(1) 4.5	7.5	9.0
Nitrogen	10	57	65	-	6 (2)	-

(1) Minimum allowable instrument air pressure by selected equipment

(2) To be finalized later

4.7.3.4 MECHANICAL DESIGN CONDITIONS

System	Temperature (°C)	Pressure (bar g)
Service air	85 (1)	11.0
Instrument air	85 (1)	11.0
Nitrogen	85 (1)	11.0

(1) Maximum skin temperature reached by a black surface exposed in the bright sunshine.

4.7.3.5 OTHER CHARACTERISTICS

Service air

Same characteristics as Instrument air

Instrument air

- Dew point at operating pressure: -10°C maximum at 9 barg.
- Oil content: nil
- Max. particle size: 5 μ.

Nitrogen

- Oxygen: 10 ppm vol. Maxi.
- Carbon dioxide: 1 ppm vol. Maxi
- Water content: 1 ppm vol. Maxi
- Free of oil and other hydrocarbons

4.7.4 Gaseous Fuels

4.7.4.1 DISTRIBUTION SYSTEMS

- HP fuel gas
- LP fuel gas
- HHP fuel gas

4.7.4.2 OPERATING CONDITIONS AT PRODUCER'S BATTERY LIMIT

System	**Temperature (°C)**			**Pressure (bar g)** (2)		
	Min.	**Norm.**	**Max.**	**Min.**	**Norm.**	**Max.**
HP fuel gas	-	46	-	22.5	23	26
LP fuel gas	-	40	-	6.5	7.0	7.5
HHP fuel gas						

4.7.4.3 OPERATING CONDITIONS AT USER'S BATTERY LIMIT

System	Temperature (°C) (2)			Pressure (bar g) (2)		
	Min.	Norm.	Max.	Min.	Norm.	Max.
HP fuel gas	-	46	-	20.5	21	24
LP fuel gas	-	40	-	5.0	5.5	6.0
HHP fuel gas						

4.7.4.4 MECHANICAL DESIGN CONDITIONS

System	Temperature (°C)	Pressure (bar g) (2)
HP fuel gas	85 (1)	31
LP fuel gas	85 (1)	8.5
HHP fuel gas		

(1) Maximum skin temperature reached by a black surface exposed in the bright sunshine.

(2) To be finalized later

4.7.4.5 OTHER CHARACTERISTICS (3)

Physical properties	HP Fuel Gas Winter case	LP Fuel Gas Winter case	HHP Fule Gas
Low Heating Value (kJ/kg)	45678	45678	
Gross Heating Value (kJ/kg)	50660	50660	
Density, at conditions(Kg/m^3)	15.865	5.282	
Ignition Temperature (°C)	N/A	N/A	
Wobbe Index (MJ/Nm^3)	50.22	50.22	
Molecular Weight	17.04	17.04	
HC Dew Point (°C)	-92.43 (1)	-106.57 (2)	
Water Dew Point (°C)	-195.0 (1)	-195.0 (2)	
Water Content (ppm vol.)	0	0	

Chemical content (%mol) dry basis			
CO2	0.68	0.68	
N2	3.81	3.81	
Methane	93.39	93.39	
Ethane	2.04	2.04	
Propane	0.061	0.061	
I-butane	0.0023	0.0023	
N-butane	0.0017	0.0017	
C5+	1.13e-4	1.13e-4	
Mercaptans	5.0e-5	5.0e-5	
COS	2.3e-5	2.3e-5	
H2S	1.19e-4	1.19e-4	

Physical properties	HP Fuel Gas Summer case	LP Fuel Gas Summer case	HHP Fule Gas
Low Heating Value (kJ/kg)	45689	45689	
Gross Heating Value (kJ/kg)	50715	50715	
Density, at conditions (Kg/m3)	15.86	5.28	
Ignition Temperature (°C)	N/A	N/A	
Wobbe Index (MJ/Nm3)	51.57	51.57	
Molecular Weight	17.04	17.04	
HC Dew Point (°C)	-92.3 (1)	-106.5 (2)	
Water Dew Point (°C)	-190.3 (1)	-193.3 (2)	
Water Content (ppm vol.)	0	0	

Chemical content (%mol) dry basis			
CO2	0.68	0.68	
N2	3.81	3.81	
Methane	93.43	93.43	
Ethane	2.01	2.01	
Propane	0.058	0.058	
I-butane	2.27e-3	2.27e-3	
N-butane	1.68e-3	1.68e-3	
C5+	1.15e-4	1.15e-4	
Mercaptans	4.9e-5	4.9e-5	
COS	2.2e-5	2.2e-5	
H_2S	1.17e-4	1.17e-4	

Physical properties	HP Fuel Gas C2 Reject case	LP Fuel Gas C2 Reject case	HHP Fule Gas
Low Heating Value (kJ/kg)	45548	45548	
Gross Heating Value (kJ/kg)	50505	50505	
Density, at conditions (Kg/m^3)	14.8	4.45	
Ignition Temperature (°C)	N/A	N/A	
Wobbe Index (MJ/Nm^3)	52.22	52.22	
Molecular Weight	17.61	17.61	
HC Dew Point (°C)	-79.5 (1)	-97.6 (2)	
Water Dew Point (°C)	-190.4 (1)	-193.5 (2)	
Water Content (ppm vol.)	0	0	

Chemical content (%mol) dry basis			
CO_2	0.83	0.83	
N_2	3.66	3.66	
Methane	89.69	89.69	
Ethane	5.73	5.73	
Propane	0.08	0.08	
I-butane	2.18e-3	2.18e-3	
N-butane	1.61e-3	1.61e-3	
C5+	1.1e-4	1.1e-4	
Mercaptans	4.8e-5	4.8e-5	
COS	1.15e-5	1.15e-5	
H_2S	3.1e-4	3.1e-4	

Physical properties		Black Start-up gas (3)(4)
Gross Heating Value (Mj/Scm)	(min/max)	3565/4394
HC Dew Point (°C) at 55 barg	(max)	-10
Water Dew Point (°C) at 44 barg	(max)	-10
Temperature (°C)	(max)	55
Chemical content (% mol)		
CO_2	(max)	1.0
N_2	(max)	6
Methane	(min)	80
Ethane	(max)	12
Propane	(max)	4
I-butane & N-butane	(max)	1
C5+	(max)	0.5
RSH as Mercaptans (mg/nm3)	(max)	15
Others	(max)	0.1
H_2S (mg/nm3)	(max)	5
Total Sulphur (as S) (mg/nm3)	(max)	100
Sulphur daily average (mg/nm3)	(max)	100

(1) @ 21 barg.

(2) @ 5.5 barg.

(3) Sales gas specification which shall be met by all phases of South Pars

(4) To be finailized later

4.7.5 Liquid Fuel

4.7.5.1 NATURE

Commercial diesel oil, used as fuel for diesel engines.

4.7.5.2 CHARACTERISTICS

(source: Utility design basis - phase 1)

			TEST METHOD
Specific gravity at	60/60 °F	0.820-0.860	D, 1298
FBP	°C 385 max		D, 86
Flash point	°F	130 min(1)	D, 93
Sulphur total	% wt	1.0 max	D, 129
viscosity kinematics at 100 °F	cS	2.0-5.5	D, 445
Cloud point	°F	35 max(2)	D, 2500
Pour point	°F	25 max(2)	D, 97
Carbon residue (on 10%bottoms)	% wt	0.10 max	D, 189
Ash	% wt	0.01 max	D, 482
Water & sediment	% vol	0.05 max	D, 2709
Diesel index		55 min	IP, 21
Cetane Index		50 min	D,976

Notes :

(1) Flash point specification shall be set at 135° F min until alternative arrangement for pipeline interface disposal is established.

(2) Cloud point and pour point specification shall be 40 & 30° F respectively from 21st March to 23rd September.

4.7.5.3 MECHANICAL DESIGN CONDITIONS

System	Temperature (°C)	Pressure (bar g)
Fuel for diesel motors	55 (1)	9.0(2)

(1) Maximum skin temperature reached by a black surface exposed in the bright sunshine.

(2) Pressure For Diesel Oil will be finalized later.

4.7.6 Electricity

Refer to Job specification n° RP 2224 999 1630 007.

4.8 FLARES

4.8.1 Collecting system

Gases set to safe disposal are gathered within the following specific networks and burned in the relevant flare.

- HP flare networks (wet and cold)
- MP flare networks (wet and cold)
- LP flare networks (wet and cold)
- LPG storage network

4.8.2 Flare networks operating conditions

SYSTEM	**Maximum back pressure (bar g)**(1)
HP Subheader, wet	12.5
HP Subheader, cold	12.5
MP Subheader, wet	2.0
MP Subheader, cold	2.0
LP Subheader, wet	0.3
LP Subheader, cold	0.3
LLP Subheader	0.06
LPG Storage header	0.060

(1) To be finalized later

4.8.3 Mechanical design conditions

System	Temperature (°C)	Pressure (bar g)
HP Subheader, wet	-46/150	14
HP Subheader, cold	-130/150	14
LP Subheader, wet	-29/220	3.5
LP Subheader, cold	-46/150	3.5
LLP Subheader	150	3.5
MP Subheader, wet	-46/220	3.5
MP Subheader, cold	-46/220	3.5
LPG Storage Header	-46/150	3.5

4.9 EQUIPMENT DESIGN

4.9.1 Process design

As per Project Procedure n° DB 2224 999 P312 205, “Process Sizing criteria.”

4.9.2 Piping

Refer to relevant discipline project Job Specification list.

4.10 TELECOMMUNICATION

Refer to General Specification n. RP 2 999 1530 002.

ATTACHMENT
Onshore Inlet/Outlet Process Conditions(7)

Fluid	State	Operating Conditions		Design Conditions		Line Characteristics		
	V= Vapor L = Liquid S = Solid	Temp °C	Pressure Bara	Temp °C	Pressure Bara	Dia. Inch	Rating lbs	Material
Feed gas from SPD 22 at Slug Catcher inlet	V + L + MEG sol. (50% wt)	10 (w) 25 (s)	75 up to 110 (1)	40	140	32"	900 ASME B31.8	CS +3mm CA
Feed gas from SPD 23 at Slug Catcher inlet	V + L+ MEG sol. (50% wt)	10 (w) 25 (s)	75 up to 110 (1)	40	140	32"	900 ASME B31.8	CS +3mm CA
Vent from Scraper 100-L-102	V					12"	900 ASME B31.8	CS +3mm CA
Vent from Scraper 100-L-202	V					12"	900 ASME B31.8	CS +3mm CA
Lean MEG at onshore facilities outlet to SPD 22	L MEG solution (70% wt)	70	200 (2)	85	234 (2)	4"	1500 ASME B31.8	CS+ 1.3mm CA
Lean MEG at onshore facilities outlet to SPD 23	L MEG solution (70%wt)	70	200 (2)	85	234 (2)	4"	1500 ASME B31.8	CS + 1.3mm CA
Stabilized condensate Tanker loading mode	L	46 max	12	85	20.1	30" undergroun d	300 ANSI ASME B31.8	CS + 1.3mm CA
Export gas Normal Operation	V	58	91	85	116/101	42"/56" Undergroun	900ANSI ASME	CS + 1.3mm CA

Fluid	State	Operating Conditions		Design Conditions		Line Characteristics		
	V= Vapor L = Liquid S = Solid	Temp °C	Pressure Bara	Temp °C	Pressure Bara	Dia. Inch	Rating lbs	Material
						d (3)	B 31.8	
IGAT No. 9 Sales gas import start up case	V	55	91	85	101	42"/56" underground	900 ANSI ASME B31.8	CS + 1mm CA
Ethane Product	V	40	22.3	85	40	12"	300 ANSI ASME B31.8	CS + 1mm CA
Propane Product	L	-42 (4)	2.5 (5)	-46/85	19.1	12" (6)	150 ANSI ASME B31.8	LTCS + 1mm CA
Butane Product	L	-6.1 (4)	2.5 (5)	-15/85	19.1	12" (6)	150 ANSI ASME B31.8	CS +1mm CA

Notes:

1) Line packing case
2) Pressure using a 4” piggy back line to offshore facilities. To be confirmed by Company
3) Sales gas exported trough 42" pipe at unit 106 outlet battery limit to mix with 56" IGAT sales gas network.
4) Conditions listed are as ship manifold during load.
5) Minimum condition at ship manifold
6) Size refers to jetty arms connection
7) To be finalized later