



Petrochemical Industries
Design & Engineering Co.
PROJ. NO. : 1205



DENA METHANOL PLANT

COVER SHEET

OWNER :
SABALAN PETROCHEMICAL
INDUSTRIES CO.
PROJ. NO. : 89/S-G/102

ENGINEERING STANDARD SPECIFICATION
FOR

**AMBIENT AND SITE CONDITION
&
UTILITY DATA**

DOCUMENT NO : **1205-00-PR-ESS-101**

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1. GENERAL

The following ambient, site condition and utility data shall apply to the DENA METHANOL PLANT located at Assaluyeh, south of Iran.

2. SITE INFORMATION

2.1. Location

The subject PLANT is located at Bandar Assaluyeh North of Persian Gulf, south of IRAN.

2.1.1. Geographical and BATTERY LIMITS Coordinates

The COMPLEX shall be located between the following coordinates:

- 1- X=650788.55
Y=3052180.4
- 2- X=651025.75
Y=3051884.8
- 3- X=651169.89
Y=3052000.43
- 4- X=650932.68
Y=3052296.05

2.2. Site Conditions

2.2.1. Soil

Preliminary geotechnical and soil investigation data and information are given as below:

2.2.2. Elevation

34.0 Meter above sea level

2.2.3. Bench Marks

Sufficient number of benchmarks shall be provided at the selected site.

2.3. Climatic Condition/ preliminary Meteorological Data

2.3.1. Temperature

Maximum recorded temperature:	52°C
Minimum dry bulb temperature (winter):	5 °C
Winterizing temperature:	not to be considered
Max. Wet bulb temperature (summer):	33°C
Max. Dry bulb temperature (summer):	48°C
Dry bulb temperature for design of air cooler:	50°C

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Max temperature for mechanical, civil and structural design (summer): 55°C

Max temperature for EQUIPMENT exposed to sunlight (design): 85°C

Max. Outdoor: 48°C

Max. Indoor: 45°C

Soil temperature for cable selection:°C

2.3.2. Humidity

- Ambient Air Relative Humidity:
 - a) Maximum in summer 76%
 - b) Minimum in winter 74%
- Design relative humidity:
 - Air condition space:
 - Outdoor
 - At Max. Temp. (Summer) 65%
 - At Min. Temp. (Winter) 100%
 - Electrical Equipment: 65%

2.3.3. Barometric Pressure

The barometric pressure as site varies between 990 up to 1100 mbar

2.3.4. Wind

- a) Shape factor:
 - refer to building standards as per contractual codes & Standards
 - Note:** Wind design criteria to be used on the UBC. Code
- b) Maximum wind velocity (up to 10m elevation):
 - structure calculation: 125km/h
 - flare thermal radiation: 16m/sec
- c) prevailing wind direction from NW for mechanical and civil design purpose shall be considered from all directions

2.3.5. Rainfall and snow Precipitation

- a) Design rainfall values:
 - 3 minutes: 17 mm
 - 10 minutes: 24 mm
 - 1 hour: 40 mm
 - 24 hour: 70 mm
- b) Design snow load 25k/m²

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c) Rainfall value for sewer design

40mm/hr.

2.3.6. Earthquake (seismic factor)

Earthquake shall be considered for ZONE 4 as per UBC (uniform Building Code)

2.3.7. Design Data for Air Conditioning

The following data shall be considered for design of air-conditioned areas (offices and control rooms).

1. Summer

- i. Indoor required temperature: $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- ii. Relative humidity: $50\% \pm 5\%$

2. Winter

- i. Indoor required temperature: $22^{\circ}\text{C} \pm 1^{\circ}\text{C}$
- ii. Relative humidity: $45\% \pm 5\%$

2.3.8. Other Data

- a. Frost line based on : Not applicable
- b. Sea breeze: To be considered (e.g. for electrical & instrument equipment and painting, etc.)
- c. Thunder and lightning : To be considered
- d. Sandstorm : To be considered
- e. Transportation:
 - iii. Max weight: up to 96 tons
 - iv. Max load per axle: 12 tons
 - v. Max height: 5.2 m
 - vi. Max width: 5 m
 - vii. Max length: 50m
- f. Pollution:
 - i. Surface and underground fresh water pollution shall be avoided.
 - ii. Any undue air pollution due to proximity of site to a major city shall be avoided.
- g. Direction of Mecca To be considered

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3. UTILITY DATA

Utilities required for the PLANT shall be supplied from the centralized utility units outside BATTERY LIMIT or produced within the PLANT.

The following specifications to be considered for the utilities coming from said utility units for the purpose of process and mechanical design of the PLANT.

3.1. Steam

Steam shall be produced and consumed inside the plant as far as possible during normal operation.

3.1.1. High High Pressure Superheated Steam

This level of steam will not be available from OSBL and will be produced and consumed inside the PLANT.

Process Design:		
• Pressure bar g	Max	.....
	Norm	98.0
	Min	.....
• Temperature °C	Max	.....
	Norm	454
	Min	.....
Mechanical Design:		
• Pressure bar g		112
• Temperature °C		490

Fouling factor for HHP Steam Services ($m^2 \cdot ^\circ C/W$) 0.00020

3.1.2. High pressure superheated steam

HP steam will be available from OSBL for start-up and shut down. Limited amount in normal operating condition can be supplied as import steam to the PLANT (if required).

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High Pressure Superheated Steam Import (for Start Up) from O.S.B.L.

Process Design:		
• Pressure bar g	Max	42.0
	Norm	
	Min	39.9
• Temperature °C	Max	.....
	Norm	418
	Min	.....
Mechanical Design:		
• Pressure bar g		47
• Temperature °C		470

High Pressure Superheated Steam Export (header) I.S.B.L.

Process Design:		
• Pressure bar g	Max	47.0
	Norm	42.0
	Min	38.0
• Temperature °C	Max	430
	Norm	420
	Min	400
Mechanical Design:		
• Pressure bar g		47
• Temperature °C		470

Fouling factor for HP Steam Services (m².°C/W) 0.00025

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Minimum Steam Quality:

Composition :		
Ammonia,	ppm(wt)	<1
Volatile Alkalizing Amines,	ppm(wt)	<15
Methanol,	ppm(wt)	<4
CO ₂ ,	ppm(wt)	<2
Silica as SiO ₂	ppm(wt)	<0.02
Fe,	ppm(wt)	<0.02
Cu,	ppm(wt)	<0.03
Na+K,	ppm(wt)	<0.02
Conductivity,	μS/CM	<1

3.1.3. Medium Pressure Steam

This level of steam will not be available from OSBL and will be produced and consumed inside the PLANT.

Process Design:		
• Pressure bar g	Max	.....
	Norm	32.7
	Min	.....
• Temperature °C	Max	240
	Norm	300
	Min	.....
Mechanical Design:		
• Pressure bar g		45.0
• Temperature °C		300

Fouling factor for MP Steam service (m².°C/W) 0.00025

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3.1.4. Low Pressure Steam

This level of steam will not be available from OSBL.

Process Design:		
• Pressure bar g	Max	8.0
	Norm	7.0
	Min	6.5
• Temperature °C	Max	.....
	Norm	189
	Min	.....
Mechanical Design:		
• Pressure bar g		9.5
• Temperature °C		340

Fouling factor for LP Steam Services ($m^2.^{\circ}C/W$) 0.00025

3.2. Turbine Condensate

Turbine condensate from surface condensers will be returned to B.L. of process area at the following conditions.

This condensate is processed through polisher unit at utility area, and returned as demine water to the plant.

Composition:

○ PH		5.5-8.5
○ Sodium as Na	ppm max	0.2
○ Fe as Fe	ppm max	0.3
○ Cu as Cu	ppm max	0.3
○ Silica as SiO ₂	ppm max	1
○ Organic material	ppm max	15
○ Oil	ppm max	8
○ Conductivity	μS/CM max	10

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Process Design:		
• Pressure bar g	Max	
	Norm	5.0
	Min	4.0
• Temperature °C	Max	60
	Norm	52
	Min	45
Mechanical Design:		
• Pressure bar g		7.0
• Temperature °C		85

Fouling factor for Steam condensate (m².°C/W) 0.00025

3.3. Instrument Air and Plant Air (From OSBL)

Instrument air and Plant air will be available at plant B.L. having the following characteristics:

Instrument Air

Process Design:		
• Pressure bar g	Max	8.7
	Norm	8.3
	Min	7.5
• Temperature °C	Max	48
	Norm	.....
	Min	Ambient
Mechanical Design:		
• Pressure bar g		14
• Temperature °C		85
Dew Point °C @ Atmospheric Pressure		-40

Note: Free from dust, water droplets and oil.

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3.4. Plant Air

Process Design:		
• Pressure bar g	Max	9.3
	Norm	9.1
	Min	7.5
• Temperature °C	Max	48
	Norm	.....
	Min	Ambient
Mechanical Design:		
• Pressure bar g		14.0
• Temperature °C		85

3.5. Nitrogen (From OSBL)

Nitrogen will be available at plant B.L. having the following characteristics:

Dew Point °C @ atm.		-70
Purity, mol %		
• N2 Content, vol %	Min	99.9
• O2 Content, ppm	Max	2
• CO Content, ppm	Max	10
• CO ₂ Content, ppm	Max	10
• Oil Content		nil
• S Content by weight, ppm	Max	0.2
• Water Content, ppm	Max	1

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Process Design:		
• Pressure bar g	Max	8.7
	Norm	8.7
	Min	7.5
• Temperature °C	Max	48
	Norm	
	Min	Ambient
Mechanical Design:		
• Pressure bar g		16
• Temperature °C		85

3.6. Demineralized water (From OSBL)

Demine water, having the following characteristics and compositions, is available at B.L. It is mainly used for HPS steam generation.

DM Water Analysis

PH	6.5-8.5
Fe	<0.02 mg/Lit
Cu	<0.01 mg/Lit
Chloride	<0.01 mg/Lit
Silica	<0.02 mg/Lit
Total dissolved solids	<1.0 mg/Lit
Conductivity (micro ohm/cm)	<2.0

Process Design:		
• Pressure bar g	Max	6.0
	Norm	5.0
	Min	4.2
• Temperature °C	Max	48
	Norm	.....
	Min	Ambient
Mechanical Design:		
• Pressure bar g		14.0
• Temperature °C		85

Fouling factor (m². °C/w) 0.00020

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3.7. Boiler Feed Water (BFW)

The BFW shall be produced and consumed inside the PLANT and is not available from OSBL. Demineralized water will be supplied as make-up from OSBL for the production of BFW and necessary polishing unit, physical and chemical treatment and air removal for BFW production need to be considered inside the PLANT by LICENSOR.

Fouling factor for BFW Services ($\text{m}^2 \cdot ^\circ\text{C}/\text{W}$) 0.00020

3.8. Cooling Water Make Up (From OSBL)

Closed loop water as cooling media:

Closed loop cooling water, not corrosive to carbon steel and copper alloys, free of suspended solids and biological solids and biological growth, to be circulated inside the Plant.

Water Analysis

PH	7.5
Chloride (as cl)	max .10 ppm

Process Design:		
• Pressure bar g	Max	6.8
	Norm	4.4
	Min	4.0
• Temperature $^\circ\text{C}$	Max	48
	Norm	.....
	Min	Ambient
Mechanical Design:		
• Pressure bar g		15
• Temperature $^\circ\text{C}$		65

- Circulating Cooling Water

Cooling Water Supply Pressure Bar, A	5.5
Cooling Water Return Pressure Bar, A	2.5
Design Pressure	8.5 bara
Design Temperature, $^\circ\text{C}$	85
Cooling Water Supply Temperature, $^\circ\text{C}$	38
Cooling Water Return Temperature, $^\circ\text{C}$	maximum 48
Fouling Factor (water side) $\text{m}^2 \cdot ^\circ\text{C}/\text{w}$	0.00030

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3.9. Fire Water (From OSBL)

Fire water shall be supplied at the B.L of the PLANT from the fire water pump house. At normal condition, fire water ring(s) and accessories will be filled and kept by desalinated water. During fire case, first desalinated water will be used for short period and sea water will be as back up and in case of continuation of fire, sea water will be introduced to the fire fighting system.

Process Design:		
• Pressure bar g	Max	.....
	Norm	10.0
	Min	6.0*
• Temperature °C	Max	48
	Norm	Ambient
	Min	Ambient
Mechanical Design:		
• Pressure bar g		17.0
• Temperature °C		65

* At most remote hydrant.

3.10. Potable Water and Service Water (From OSBL)

Potable Water:

Process Design:		
• Pressure bar g	Max	6.0
	Norm	5.2
	Min	4.7
• Temperature °C	Max	35
	Norm	.....
	Min	5
Mechanical Design:		
• Pressure bar g		12.0
• Temperature °C		65

Potable Water Composition will be as internationally accepted drinking water.

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Service Water:

Process Design:		
• Pressure bar g	Max	6
	Norm	5.2
	Min	4.9
• Temperature °C	Max	35
	Norm	Ambient
	Min	5
Mechanical Design:		
• Pressure bar g		12
• Temperature °C		65

Service water shall be supplied from the B.L of the PLANT as back-up source. Normally, service water shall be supplied from CW blow down line inside the B.L.

3.11. Safety Showers & Eye Washes

Process Design as NFPA recommendation

Mechanical Design as potable water

3.12. Electricity

Electricity is to be generally supplied at 20000 V, 3 phases, 3 wires 50HZ. The standard voltage ratings for various utilization loads are as follows:

Item No	AC/DC	Rated Voltage	Phase/Wire
1. Motors			
above 2500KW	AC	11000/20000	3/3
≥150KW and ≤2500KW	AC	6000V	3/3
0.2KW to below 150KW	AC	400V	3/3
below 0.2KW	AC	230V	1/2
2. Construction & Maintenance	AC	230/400V	1/2 3/4
3. Lighting Fixtures	AC	230V	1/2
4. Emergency Lighting Fixtures	AC	230V	1/2
5. Instruments	AC	110V	1/2
6. Controls for HV & MV Switchboards	DC	110V	-
7. Controls for LV Switchboards	AC	230V	1/2
8. Expected short circuit level	500 MVA at 20 KV Supply		

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3.13. Fuels

3.13.1. Natural Gas

Natural Gas Feed shall be also used as fuel in the plant.

Component	Specification	Unit
C1	80 (MIN)	Mol %
C2	12 (MAX)	Mol %
C3	4 (MAX)	Mol %
C4	1 (MAX)	Mol %
C5+	0.6 (MAX)	Mol %
N2	6.0 (MAX)	Mol %
CO2	1 (MAX)	Mol %
H2S	6 (MAX)	mg/Sm3
R-SH	16 (MAX)	mg/Sm3
Total Sulphure	100 (MAX)	mg/Sm3
Water dew point at 44 barg	-10 (MAX)	°C
HC dew point at 55 barg	-10 (MAX)	°C
Gross Heating Value	8900 to 10000	kcal/Sm3

Delivery condition at gas station B.L.:

Process Design:		
• Pressure bar g	Max	62
	Norm	58.6
	Min	54.5
• Temperature °C	Max	37
	Norm	
	Min	25
Mechanical Design:		
• Pressure bar g		69
• Temperature °C		85

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3.13.2. Gas Oil (Only for Diesel Engines)

Viscosity, Kinematic cSt @ 37.8°F	2.0-5.5
Gravity Specified@ 60/60°	0.82-0.86
Flash point, (min.) °C	54.5
Cloud point, (max.) °C	1.7
Pour point, (max.) °C	-3.9
Diesel index. (min)	55
Cetane index (min.)	50
Heat Value, (gross) Kj/kg	44,665
Acidity mgkoH/Fr	trace
Sulphur, Total (max.) %Wt	1.0
Vanadium, ppm	Nil
Sodium & Potassium ppm	0.40
Carbon Residue (max.) % Wt	1.10
Ash (max.) % Wt	0.01
Water & Sediment (max.) % Vol.	0.05