

- IDC: Inter-Discipline Check**
IFC: Issued For Comment
IFA: Issued For Approval
AFD: Approved For Design
AFC: Approved For Construction
AFP: Approved For Purchase
AFQ: Approved For Quotation
IFI: Issued For Information
AB-R: As-Built for CLIENT Review
AB-A: As-Built –Approved

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053 - 073- 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 2 از 19	
	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	W007S	PEDCO	110	HV	CN	0001		D01

REVISION RECORD SHEET

PAGE	D00	D01	D02	D03	D04
1	X	X			
2	X	X			
3	X	X			
4	X	X			
5	X	X			
6	X	X			
7	X	X			
8	X	X			
9	X	X			
10	X	X			
11	X	X			
12	X	X			
13	X	X			
14	X	X			
15	X	X			
16	X	X			
17	X	X			
18	X	X			
19	X	X			
20	X				
21	X				
22	X				
23	X				
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					

PAGE	D00	D01	D02	D03	D04
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
90					
91					
92					
93					
94					
95					
96					
97					
98					
99					
100					
101					
102					
103					
104					
105					
106					
107					
108					
109					
110					
111					
112					
113					
114					
115					
116					
117					
118					
119					
120					
121					
122					
123					
124					
125					
126					
127					
128					
129					
130					

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053 - 073- 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 3 از 19	
	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	W007S	PEDCO	110	HV	CN	0001		D01

CONTENTS

1.0	INTRODUCTION.....	4
2.0	SCOPE.....	4
3.0	NORMATIVE REFERENCES.....	5
3.1	LOCAL CODES AND STANDARDS.....	5
3.2	INTERNATIONAL CODES AND STANDARDS.....	5
3.3	ENVIRONMENTAL DATA.....	5
4.0	HVAC CALCULATION.....	6
4.1	DESIGN WEATHER PARAMETERS:.....	6
4.2	CONSTRUCTIONS U-VALUE:.....	8
4.3	SPACE INPUT DATA:.....	9
4.4	SYSTEM INPUT DATA:.....	11
4.5	AIR SYSTEM DESIGN LOAD SAMMARY:.....	14
4.6	ZONE DESIGN LOAD SAMMARY:.....	15
4.7	SPACE DESIGN LOAD SAMMARY:.....	16
4.8	SYSTEM PSYCHROMETRICS:.....	17
5.0	EQUIPMENT SELECTION.....	18
5.1	AIR CONDITIONING UNIT.....	18
5.2	EXHAUST FAN SELECTION.....	18
5.2	SAND TRAP LOUVER SELECTION.....	18

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک							 شرکت توسعه و پارس  HIRGAN ENERGY	
شماره پیمان: 053 - 073- 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 4 از 19	
	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	W007S	PEDCO	110	HV	CN	0001		D01

1.0 INTRODUCTION

Binak oilfield in Bushehr province is a part of the southern oilfields of Iran, is located 20 km northwest of Genaveh city.

With the aim of increasing production of oil from Binak oilfield, an EPC/EPD Project has been defined by NIOC/NISOC and awarded to Petro Iran Development Company (PEDCO). Also PEDCO (as General Contractor) has assigned the EPC-packages of the Project to "Hirgan Energy - Design and Inspection" JV.

GENERAL DEFINITION

The following terms shall be used in this document.

CLIENT:	National Iranian South Oilfields Company (NISOC)
PROJECT:	Binak Oilfield Development – General Facilities
GENERAL CONTRACTOR (GC):	Petro Iran Development Company (PEDCO)
EPC CONTRACTOR:	Joint Venture of :Hirgan Energy – Design & Inspection(D&I) Companies
VENDOR:	The firm or person who will fabricate the equipment or material.
EXECUTOR:	Executor is the party which carries out all or part of construction and/or commissioning for the project.
THIRD PARTY INSPECTOR (TPI):	The firm appointed by EPD/EPC CONTRACTOR(GC) and approved by CLIENT (in writing) for the inspection of goods.
SHALL:	Is used where a provision is mandatory.
SHOULD:	Is used where a provision is advisory only.
WILL:	Is normally used in connection with the action by CLIENT rather than by an EPC/EPD CONTRACTOR, supplier or VENDOR
MAY:	Is used where a provision is completely discretionary.

2.0 SCOPE

This document covers minimum necessary requirements for basis of design and main equipment's to be used for the Heating, Ventilating, Air-Conditioning and pressurizing and plumbing system for buildings for project

	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053 – 073– 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 5 از 19	
	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	W007S	PEDCO	110	HV	CN	0001		D01

3.0 NORMATIVE REFERENCES

3.1 LOCAL CODES AND STANDARDS

- IPS Iranian petroleum standards
- INBC Iranian National Building Code

3.2 INTERNATIONAL CODES AND STANDARDS

- ASTM American Society for Testing Materials Relevant Parts
- API 610 Centrifugal Pumps for General Refinery Service, 10th Edition
- ISO 15156 Petroleum and Natural Gas Industries. Materials for use in H2S Containing Environments in Oil and Gas Production
- AMCA Air Movement and Control Association
- ANSI American National Standards Institute.
- ASHRAE American Society of Heating, Refrigeration and Air-conditioning Engineer
- ASTM American Society for Testing and Material
- BOCA Building Officials and Code Administrators international
- BS British Standards
- CIBSE Chartered Institute of Building Services Engineers.
- NFPA National fire protection association
- SBCCI Southern Building Code Congress International
- SMACNA Sheet Metal and Air Conditioning Contractors' National Association
- AWWA American Water Works Association
- ASME The American Society of Mechanical Engineers

Note: The latest issued or revised edition of all above mentioned codes and standards shall be considered as reference.

3.3 ENVIRONMENTAL DATA

Refer to "Process Basis of Design; Doc. No BK-GNRL-PEDCO-000-PR-DB-0001 .

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053 - 073 - 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S								شماره صفحه: 6 از 19
	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	
	BK	W007S	PEDCO	110	HV	CN	0001	D01	

4.0 HVAC CALCULATION

4.1 DESIGN WEATHER PARAMETERS:

DESIGN PARAMETERS:

City Namebink

Location.....IRAN

Latitude.....30.3

Deg.Longitude.....-50.2

Deg.Elevation10.0 m

Summer Design Dry-Bulb.....41.0 °C

Summer Coincident Wet-Bulb.....30.5 °C

Summer Daily Range.....15.0

°K Winter Design Dry-Bulb.....6.0 °C

Winter Design Wet-Bulb.....6.0 °C

Atmospheric Clearness Number.....1.00

Average Ground Reflectance.....0.20

Soil Conductivity.....1.385

W/(m-°K)Local Time Zone (GMT +/- N hours).....-1.0 hours

Consider Daylight Savings Time.....No

Simulation Weather Data.....none N/A

Current Data is.....User Modified

Design Cooling Months.....January to December

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک							
شماره پیمان: 053 - 073 - 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 7 از 19
	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	
	BK	W007S	PEDCO	110	HV	CN	0001	D01

DESIGN DAY MAXIMUM SOLAR HEAT GAINS

(The MSHG values are expressed in W/m²)

Month	N	NNE	NE	ENE	E	ESE	SE	SSE	S
January	76.4	76.4	104.1	335.1	577.4	722.3	796.4	786.7	764.0
February	88.0	88.0	230.9	458.1	662.9	773.4	774.9	717.7	674.9
March	100.7	108.6	368.7	585.3	707.6	758.3	705.1	595.4	528.1
April	113.1	256.3	472.2	642.7	716.0	679.9	580.0	422.9	334.5
May	124.2	353.9	534.8	663.8	694.2	620.4	475.0	290.9	209.6
June	157.8	384.6	558.6	667.1	676.8	585.8	428.0	240.6	172.3
July	127.6	344.7	537.1	656.3	678.1	598.4	463.4	281.6	203.3
August	118.2	248.3	466.5	623.6	687.8	654.3	558.9	407.2	322.5
September	104.5	113.3	336.6	555.0	683.3	716.4	681.4	580.5	517.4
October	90.9	90.9	201.8	462.7	636.7	736.7	756.5	701.7	660.0
November	77.8	77.8	98.3	345.3	551.3	718.6	773.6	774.1	756.1
December	71.4	71.4	71.4	269.7	530.8	696.4	785.4	795.0	786.8
Month	SSW	SW	WSW	W	WNW	NW	NNW	HOR	Mult
January	789.5	796.9	721.1	569.2	354.1	83.2	76.4	579.3	1.00
February	722.0	781.4	766.3	669.5	467.5	224.5	88.0	702.0	1.00
March	596.6	704.4	761.1	720.6	569.4	368.1	116.6	809.9	1.00
April	421.4	576.3	689.2	714.5	631.4	476.0	257.9	863.7	1.00
May	289.5	470.8	624.0	691.1	655.0	542.6	355.7	877.6	1.00
June	238.3	421.9	590.9	670.1	656.4	565.4	389.3	873.7	1.00
July	278.1	456.2	609.2	671.7	644.3	540.2	353.4	863.9	1.00
August	405.5	554.8	664.2	689.2	610.9	463.3	256.0	845.0	1.00
September	580.7	681.6	714.0	684.8	554.4	333.4	114.2	785.9	1.00
October	698.5	750.4	744.7	624.3	458.7	216.5	90.9	693.3	1.00
November	770.3	775.6	718.6	559.7	335.4	103.0	77.8	579.1	1.00
December	796.5	774.3	701.4	517.9	296.9	71.4	71.4	527.6	1.00

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053 – 073– 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 8 از 19	
	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	W007S	PEDCO	110	HV	CN	0001		D01

4.2 CONSTRUCTIONS U-VALUE:

External Wall

Wall Details

Outside Surface Color **Dark**
Absorptivity **0.900**
Overall U-Value **0.328** W/(m²-°K)

Wall Layers Details (Inside to Outside)

Layers	Thickness mm	Density kg/m ³	Specific Ht. kJ / (kg - °K)	R-Value (m ² -°K)/W	Weight kg/m ²
Inside surface resistance	0.000	0.0	0.00	0.12064	0.0
concrete block	200.000	608.7	0.84	0.35018	121.7
insulation	50.800	32.0	0.92	2.44598	1.6
face brick	100.000	2002.3	0.92	0.07504	200.2
Outside surface resistance	0.000	0.0	0.00	0.05864	0.0
Totals	350.800	-		3.05047	323.6

External Roof

Roof Details

Outside Surface Color **Dark**
Absorptivity **0.900**
Overall U-Value **0.4956** W/(m²-°K)

Roof Layers Details (Inside to Outside)

Layers	Thickness mm	Density kg/m ³	Specific Ht. kJ / (kg - °K)	R-Value (m ² -°K)/W	Weight kg/m ²
Inside surface resistance	0.000	0.0	0.00	0.12064	0.0
gypsum plaster	25.000	720.8	1.34	0.11111	18.0
block	200.000	608.7	0.84	0.23333	121.7
cement mortar	30.000	640.7	0.84	0.04160	19.2
Built-up roofing	50.000	1121.3	1.47	0.30733	56.1
insulation(rock wood)	50.000	2242.6	0.84	1.00000	112.1
terrazzo	25.400	0.0	0.84	0.14680	0.0
Outside surface resistance	0.000	0.0	0.00	0.05864	0.0
Totals	380.400	-		2.01945	327.2

DOOR (1.0 x 2.5)

Door Details:

Gross Area **2.5** m²
Door U-Value **5.8** W/(m²-°K)

Glass Details:

Glass Area **0.0** m²
Glass U-Value **3.293** W/(m²-°K)
Glass Shade Coefficient **0.880**
Glass Shaded All Day? **No**

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053-073-9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S								شماره صفحه: 9 از 19
	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	
	BK	W007S	PEDCO	110	HV	CN	0001	D01	

DOOR (2x 3)

Door Details:

Gross Area 6.0 m²
Door U-Value 5.8 W/(m²-°K)

Glass Details:

Glass Area 0.0 m²
Glass U-Value 3.293 W/(m²-°K)
Glass Shade Coefficient 0.880
Glass Shaded All Day? No

4.3 SPACE INPUT DATA:

SWITCHGEAR ROOM

1. General Details:

Floor Area 58.0 m²
Avg. Ceiling Height 5.0 m
Building Weight 341.8 kg/m²

1.1. OA Ventilation Requirements:

Space Usage User-Defined
OA Requirement 1 0.0 L/s
OA Requirement 2 0.00 L/(s-m²)
Space Usage Defaults . ASHRAE Standard 62.1-2007

2. Internals:

2.1. Overhead Lighting:

Fixture Type Free Hanging
Wattage 20.00 W/m²
Ballast Multiplier 1.20
Schedule Lighting

2.2. Task Lighting:

Wattage 0.00 W/m²
Schedule None

2.3. Electrical Equipment:

Wattage 8000.0 Watts
Schedule Equipment

3. Walls, Windows, Doors:

Exp .	Wall Gross Area (m ²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
SW	28.0	0	0	1
NE	28.0	0	0	1
NW	56.0	0	0	0
SE	36.0	0	0	0

3.1. Construction Types for Exposure E

Wall Type External Wall
Door Type 2*3

3.2. Construction Types for Exposure W

Wall Type External Wall
Door Type 1*2.5

3.3. Construction Types for Exposure S

2.4. People:

Occupancy 0.0 Person
Activity Level Office Work
Sensible 71.8 W/person
Latent 60.1 W/person
Schedule None

2.5. Miscellaneous Loads:

Sensible 0 W
Schedule None
Latent 0 W
Schedule None

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک																									
شماره پیمان: 053 - 073- 9184	<table><tr><th colspan="8">HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S</th></tr><tr><th>پروژه</th><th>بسته کاری</th><th>صادر کننده</th><th>تسهیلات</th><th>رشته</th><th>نوع مدرک</th><th>سریال</th><th>نسخه</th></tr><tr><td>BK</td><td>W007S</td><td>PEDCO</td><td>110</td><td>HV</td><td>CN</td><td>0001</td><td>D01</td></tr></table>	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S								پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	BK	W007S	PEDCO	110	HV	CN	0001	D01	شماره صفحه: 10 از 19
HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S																										
پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه																			
BK	W007S	PEDCO	110	HV	CN	0001	D01																			

Wall Type External Wall

3.4. Construction Types for Exposure N

Wall Type External Wall

4. Roofs, Skylights:

Exp.	Roof Gross Area (m ²)	Roof Slope (deg.)	Skylight Qty.
H	58.0	0	0

4.1. Construction Types for Exposure H

Roof Type External Roof(2)

5. Infiltration:

Design Cooling 1.00 ACH
Design Heating 1.00 ACH
Energy Analysis 0.00 L/s

Infiltration occurs at all hours.

6. Floors:

Type Slab Floor On Grade
Floor Area 58.0 m²
Total Floor U-Value 2.0 W/(m²-°K)
Exposed Perimeter 28.2 m
Edge Insulation R-Value 0.00 (m²-°K)/W

7. Partitions:

7.1. 1st Partition Details:

Partition Type Wall Partition
Area 36.0 m²
U-Value 2.839 W/(m²-°K)
Uncondit. Space Max Temp 23.9 °C
Ambient at Space Max Temp 41.0 °C
Uncondit. Space Min Temp 23.9 °C
Ambient at Space Min Temp 6.0 °C

7.2. 2nd Partition Details:

(No partition data)

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053 - 073- 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 11 از 19	
	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	W007S	PEDCO	110	HV	CN	0001		D01

4.4 SYSTEM INPUT DATA:

Air System Information

Air System Name **SWITCHGEAR BUILDING OF WELL PADS**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **1**
Floor Area **58.0** m²
Location **binak, IRAN**

Sizing Calculation Information

Calculation Months **Jan to Dec**
Sizing Data **Calculated**

Zone L/s Sizing **Sum of space airflow rates**
Space L/s Sizing **Individual peak space loads**

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053 - 073- 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 12 از 19	
	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	W007S	PEDCO	110	HV	CN	0001		D01

Air System Information

Air System Name **SWITCHGEAR BUILDING OF WELL PADS**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **1**
Floor Area **58.0** m²
Location **binak, IRAN**

Sizing Calculation Information

Calculation Months **Jan to Dec**
Sizing Data **Calculated**

Zone L/s Sizing **Sum of space airflow rates**
Space L/s Sizing **Individual peak space loads**

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053 - 073 - 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه 13 از 19	
	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	W007S	PEDCO	110	HV	CN	0001		D01

Zone Sizing Data

Zone Name	Maximum Cooling Sensible (kW)	Design Airflow (L/s)	Minimum Airflow (L/s)	Time of Peak Load	Maximum Heating Load (kW)	Zone Floor Area (m²)	Zone L/(s-m²)
Zone 1	12.2	633	633	Jul 1500	0.6	58.0	10.91

Terminal Unit Sizing Data – Cooling

Zone Name	Total Coil Load (kW)	Sens Coil Load (kW)	Coil Entering DB / WB (°C)	Coil Leaving DB / WB (°C)	Water Flow @ 5.6 °K (L/s)	Time of Peak Load
Zone 1	15.1	11.9	30.7 / 20.9	15.0 / 14.2	-	Jun 1500

Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @11.1 °K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	1.1	10.0 / 11.5	-	633	0.000	0.000	0

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053-073-9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S								شماره صفحه: 14 از 19
	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	
	BK	W007S	PEDCO	110	HV	CN	0001	D01	

4.5 AIR SYSTEM DESIGN LOAD SAMMARY:

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 40.4 °C / 30.5 °C			HEATING OA DB / WB 6.0 °C / 6.0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m ²	0	-	0 m ²	-	-
Wall Transmission	140 m ²	414	-	140 m ²	183	-
Roof Transmission	58 m ²	423	-	58 m ²	115	-
Window Transmission	0 m ²	0	-	0 m ²	0	-
Skylight Transmission	0 m ²	0	-	0 m ²	0	-
Door Loads	9 m ²	382	-	9 m ²	197	-
Floor Transmission	58 m ²	0	-	58 m ²	95	-
Partitions	36 m ²	-625	-	36 m ²	0	-
Ceiling	0 m ²	0	-	0 m ²	0	-
Overhead Lighting	1392 W	1392	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	8000 W	8000	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	1014	2918	-	389	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	1100	292	10%	98	0
>> Total Zone Loads	-	12101	3210	-	1076	0
Zone Conditioning	-	11917	3210	-	1134	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Exhaust Fan Load	0 L/s	0	-	0 L/s	0	-
Ventilation Load	0 L/s	0	0	0 L/s	0	0
Ventilation Fan Load	0 L/s	0	-	0 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	11917	3210	-	1134	0
Terminal Unit Cooling	-	11917	3214	-	0	0
Terminal Unit Heating	-	0	-	-	1134	-
>> Total Conditioning	-	11917	3214	-	1134	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان:	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 15 از 19	
053 – 073 – 9184	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال		نسخه
	BK	W007S	PEDCO	110	HV	CN	0001		D01

4.6 ZONE DESIGN LOAD SAMMARY:

Zone 1			DESIGN COOLING			DESIGN HEATING		
			COOLING DATA AT Jul 1500			HEATING DATA AT DES HTG		
			COOLING OA DB / WB 41.0 °C / 30.5 °C			HEATING OA DB / WB 6.0 °C / 6.0 °C		
			OCCUPIED T-STAT 30.0 °C			OCCUPIED T-STAT 10.0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)		
Window & Skylight Solar Loads	0 m ²	0	-	0 m ²	-	-		
Wall Transmission	140 m ²	431	-	140 m ²	183	-		
Roof Transmission	58 m ²	425	-	58 m ²	115	-		
Window Transmission	0 m ²	0	-	0 m ²	0	-		
Skylight Transmission	0 m ²	0	-	0 m ²	0	-		
Door Loads	9 m ²	410	-	9 m ²	197	-		
Floor Transmission	58 m ²	0	-	58 m ²	95	-		
Partitions	36 m ²	-625	-	36 m ²	0	-		
Ceiling	0 m ²	0	-	0 m ²	0	-		
Overhead Lighting	1392 W	1392	-	0	0	-		
Task Lighting	0 W	0	-	0	0	-		
Electric Equipment	8000 W	8000	-	0	0	-		
People	0	0	0	0	0	0		
Infiltration	-	1068	2869	-	389	0		
Miscellaneous	-	0	0	-	0	0		
Safety Factor	10% / 10%	1110	287	10%	98	0		
>> Total Zone Loads	-	12211	3156	-	1076	0		

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک								
شماره پیمان: 053-073-9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S								شماره صفحه: 16 از 19
	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	
	BK	W007S	PEDCO	110	HV	CN	0001	D01	

4.7 SPACE DESIGN LOAD SAMMARY:

TABLE 1.1.A. COMPONENT LOADS FOR SPACE " SWITCHGEAR ROOM " IN ZONE " Zone 1 "						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500 COOLING OA DB / WB 41.0 °C / 30.5 °C OCCUPIED T-STAT 30.0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 6.0 °C OCCUPIED T-STAT 10.0 °C		
		Sensible (W)	Latent (W)		Sensible (W)	Latent (W)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	0 m ²	0	-	0 m ²	-	-
Wall Transmission	140 m ²	431	-	140 m ²	183	-
Roof Transmission	58 m ²	425	-	58 m ²	115	-
Window Transmission	0 m ²	0	-	0 m ²	0	-
Skylight Transmission	0 m ²	0	-	0 m ²	0	-
Door Loads	9 m ²	410	-	9 m ²	197	-
Floor Transmission	58 m ²	0	-	58 m ²	95	-
Partitions	36 m ²	-625	-	36 m ²	0	-
Ceiling	0 m ²	0	-	0 m ²	0	-
Overhead Lighting	1392 W	1392	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	8000 W	8000	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	1068	2869	-	389	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	1110	287	10%	98	0
>> Total Zone Loads	-	12211	3156	-	1076	0

TABLE 1.1.B. ENVELOPE LOADS FOR SPACE " SWITCHGEAR ROOM " IN ZONE " Zone 1 "						
	Area	U-Value	Shade	COOLING TRANS	COOLING SOLAR	HEATING TRANS
	(m ²)	(W/(m ² ·°K))	Coeff.	(W)	(W)	(W)
SW EXPOSURE						
WALL	22	0.328	-	62	-	29
DOOR	6	5.800	-	289	-	139
NE EXPOSURE						
WALL	26	0.328	-	94	-	33
DOOR	3	5.800	-	121	-	58
NW EXPOSURE						
WALL	56	0.328	-	139	-	73
SE EXPOSURE						
WALL	36	0.328	-	136	-	47
H EXPOSURE						
ROOF	58	0.495	-	425	-	115

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک							
شماره پیمان: 053 – 073– 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 17 از 19
	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	
	BK	W007S	PEDCO	110	HV	CN	0001	D01

4.8 SYSTEM PSYCHROMETRICS:

July DESIGN COOLING DAY, 1700

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	40.4	0.02375	0	400	0	0
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	30.7	0.01145	633	45	11917	3210
Return Plenum	Outlet	-17.8	0.01145	633	45	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2944.1 W/(L/s)

Site Altitude = 10.0 m

TABLE 2: ZONE DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Zone 1 (Cooling)							
Ventilation Air	-	-	-	0	-	-	-
Cooling Coil Inlet	-	30.7	0.01145	633	0	-	-
Cooling Coil Outlet	-	15.0	0.00973	633	0	11917	3214
Heating Coil Inlet	-	15.0	0.00973	633	0	-	-
Heating Coil Outlet	-	15.0	0.00973	633	0	0	-
Zone Air	-	30.7	0.01145	633	0	11917	-

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک							
شماره پیمان: 053 – 073– 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 18 از 19
	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	
	BK	W007S	PEDCO	110	HV	CN	0001	D01

5.0 Equipment Selection

5.1 AIR CONDITIONING UNIT

Switchgear Room Total Cooling Load= 15367 w $\approx$ 52432 btu/hr

Actual Total Cooling Load with considering 10% over capacity = 57675 btu/hr

Actual Total heating Load with considering 10% over capacity = 1076 * 1.1 * 3.412=4038 btu/hr

Split Unit Actual Cooling/Heating Capacity= 19225/1350 btu/hr

Switchgear Room load ÷ Quantity = 57675 btu/hr ÷ 3 = 19225 btu/hr → 3*split unit 24000 nominal load-wall mounted (Tropical-heat pump type)

(nominal capacity will be checked by vendor according to ambient temperature)

Indoor Unit Equipment No: 1302-SUI-01 A,B,C

Quantity: 3

Type : wall mounted

Outdoor Unit Equipment No: 1302-SUO-01 A,B,C

5.2 EXHAUST FAN SELECTION

Equipment No:	1201-EF-01	1201-EF-02
Quantity	1	1
Type	WALL MOUNTED	WALL MOUNTED
Flow Rate(CMH)	190 $\approx$ (ACH-10)	80L/S $\approx$ (ACH-1)
Static Pressure	Sand trap louver: 44pa Exhaust Air Louver: 38 pa Total pr. Drop With 10% over design→90 pa	Sand trap louver: 44pa Exhaust Air Louver: 38 pa Total pr. Drop With 10% over design→90 pa
Service Area	Battery Room	Switchgear Room
Remarks		

 NISOC	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض عمومی و مشترک							
شماره پیمان: 053 – 073– 9184	HVAC CALCULATION NOTE FOR SWITCHGEAR BUILDING – W007S							شماره صفحه: 19 از 19
	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	
	BK	W007S	PEDCO	110	HV	CN	0001	D01

5.3 SAND TRAP LOUVER SELECTION

Battery Room Sand Trap Louver (STL-01):

Pressure Drop = 44 pa $\approx$ 0.174 inwg

Air Flow Rate: 190 l/s

from "Shahrokhi Manufacturing co." catalogue for Sand Trap Louver:

0.174 inwg Pressure Drop (from the SH.SAL.L table) $\rightarrow V_k=300$ FPM

Air Flow Rate: l/s $\approx$ 403 CFM $\rightarrow$

$A_k=403/300=1.34 \rightarrow W=36"$, $H=18"$

Switchgear Room Sand Trap Louver (STL-02):

According to "Shahrokhi Manufacturing co." catalogue for Sand Trap Louver:

V_k = Face Velocity in FPM

A_k = effective free area in square feet = CFM/FPM

Pressure Drop = 44 pa $\approx$ 0.174 inwg

Air Flow Rate: 80 l/s $\approx$ 170 cfm

from "Shahrokhi Manufacturing co." catalogue for Sand Trap Louver:

if 0.174 inwg Pressure Drop (from the SH.SAL.L table) $\rightarrow V_k=300$ FPM

Air Flow Rate: 80 l/s $\approx$ 170 cfm $\rightarrow$

$A_k=170/300=0.57 \rightarrow W=18"$, $H=18"$