



نگهداشت و افزایش تولید میدان نفتی بینک  
سطح الارض و ابنیه تحت الارض

عمومی و مشترک



شماره پیمان:

۰۵۳ - ۰۷۳ - ۹۱۸۴

HVAC Calculation Note For Extension of Existing Elect. Building

نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه
D04	0002	CN	HV	120	PEDCO	GCS	BK

شماره صفحه ۱ از ۳۱

## طرح نگهداشت و افزایش تولید ۲۷ مخزن

## HVAC CALCULATION NOTE FOR EXTENSION OF EXISTING ELECT. BUILDING

نگهداشت و افزایش تولید میدان نفتی بینک

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Status:

- 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



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شماره صفحه ۲ از ۳۱

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## 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

The main purpose of this document is to define the HVAC system load calculation has been carried out by computer program (HAP software) as per ASHRAE method in order to evaluate cooling load (summer) and heating load (winter) and also to select HVAC equipment for the calculated cooling and heating load.

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پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه											
BK	GCS	PEDCO	120	HV	CN	0002	D04											

### 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.

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BK	GCS	PEDCO	120	HV	CN	0002	D04											

### 3.3 ENVIRONMENTAL DATA

- ▶ Latitude 29° 73' N
- ▶ Longitude 50° 35' E
- ▶ Elevation 10 m
- ▶ Summer dry bulb temperature : 41° C
- ▶ Summer wet bulb temperature : 30.5° C
- ▶ Summer daily range temperature : 15.0° C
- ▶ Winter dry bulb temperature : 6° C
- ▶ Winter relative humidity : 78%



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

## 4.0 HVAC CALCULATION

### 4.1 DESIGN WEATHER PARAMETERS:

#### Design Parameters:

City Name .....	<b>Binak</b>
Location .....	<b>IRAN</b>
Latitude .....	<b>29.7</b> Deg.
Longitude .....	<b>-50.4</b> Deg.
Elevation .....	<b>10.0</b> m
Summer Design Dry-Bulb .....	<b>41.0</b> °C
Summer Coincident Wet-Bulb .....	<b>30.5</b> °C
Summer Daily Range .....	<b>15.0</b> °K
Winter Design Dry-Bulb .....	<b>6.0</b> °C
Winter Design Wet-Bulb .....	<b>4.4</b> °C
Atmospheric Clearness Number .....	<b>1.00</b>
Average Ground Reflectance .....	<b>0.20</b>
Soil Conductivity .....	<b>1.385</b> W/(m·°K)
Local Time Zone (GMT +/- N hours) .....	<b>-3.5</b> hours
Consider Daylight Savings Time .....	<b>No</b>
Simulation Weather Data .....	<b>noneN/A</b>
Current Data is .....	<b>User Modified</b>
Design Cooling Months .....	<b>January to December</b>

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### Design Day Maximum Solar Heat Gains

(The MSHG values are expressed in W/m<sup>2</sup>)

Month	N	NNE	NE	ENE	E	ESE	SE	SSE	S
January	77.5	77.5	95.1	360.4	561.2	730.9	794.1	786.3	762.3
February	89.1	89.1	206.7	484.1	668.9	760.8	782.0	718.9	671.9
March	101.4	120.5	367.4	576.2	723.5	759.6	702.5	590.8	520.1
April	113.0	252.7	487.2	636.6	705.1	688.3	568.6	408.7	322.0
May	124.3	351.1	551.9	666.3	679.9	619.4	469.6	279.8	199.5
June	161.0	389.1	570.0	664.8	662.8	586.8	421.4	228.9	165.7
July	128.9	355.9	541.6	644.7	671.3	606.9	452.1	270.2	196.1
August	118.3	256.1	470.7	606.2	686.0	663.8	546.8	395.4	311.9
September	104.3	109.2	354.3	538.8	681.8	728.9	670.0	569.4	503.5
October	91.2	91.2	226.5	441.2	642.7	746.9	748.8	692.4	650.8
November	78.1	78.1	103.7	341.8	572.3	707.9	785.7	774.1	747.8
December	71.9	71.9	71.9	306.4	524.4	699.0	788.1	799.2	780.7
Month	SSW	SW	WSW	W	WNW	NW	NNW	HOR	Mult
January	779.8	791.7	733.2	577.4	337.4	108.2	77.5	591.4	1.00
February	716.3	777.2	772.2	650.4	482.8	225.6	89.1	714.5	1.00
March	590.5	703.8	755.6	713.7	589.1	369.6	114.3	816.8	1.00
April	413.5	574.6	682.6	707.6	645.8	485.9	241.4	863.3	1.00
May	282.1	471.6	614.4	688.4	669.7	550.4	343.5	875.1	1.00
June	233.1	424.2	577.0	674.2	670.6	567.0	376.4	872.9	1.00
July	274.2	458.7	596.0	677.5	657.5	539.9	345.0	865.3	1.00
August	398.9	554.0	657.3	682.8	624.7	473.1	240.3	846.4	1.00
September	569.0	669.3	728.9	681.0	540.4	354.6	108.6	783.8	1.00
October	697.0	755.4	737.2	647.9	457.7	216.5	91.2	696.8	1.00
November	775.6	786.0	708.0	568.2	351.0	91.0	78.1	582.8	1.00
December	798.2	790.7	685.6	536.9	295.2	71.9	71.9	533.5	1.00

Mult. = User-defined solar multiplier factor.



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شماره صفحه: ۸ از ۳۱

### Cooling Design Temperature Profile

Location: Binak, IRAN

(Dry and Wet Bulb temperatures are expressed in °C)

Hr	January		February		March		April		May		June	
	DB	WB	DB	WB	DB	WB	DB	WB	DB	WB	DB	WB
0000	19.4	19.1	20.5	20.2	23.0	22.8	24.5	24.2	26.7	26.4	28.1	27.8
0100	18.6	18.3	19.7	19.5	22.3	22.0	23.7	23.5	26.0	25.7	27.4	27.1
0200	17.9	17.6	19.0	18.7	21.5	21.3	23.0	22.7	25.2	24.9	26.6	26.4
0300	17.3	17.0	18.4	18.1	20.9	20.7	22.4	22.1	24.6	24.3	26.0	25.8
0400	16.8	16.5	17.9	17.7	20.5	20.2	21.9	21.7	24.2	23.9	25.6	25.3
0500	16.7	16.4	17.8	17.5	20.3	20.1	21.8	21.5	24.0	23.7	25.4	25.2
0600	17.0	16.7	18.1	17.8	20.6	20.4	22.1	21.8	24.3	24.0	25.7	25.5
0700	17.7	17.4	18.8	18.6	21.4	21.1	22.8	22.6	25.1	24.8	26.5	26.2
0800	19.1	18.8	20.2	19.9	22.7	22.5	24.2	23.9	26.4	26.1	27.8	27.6
0900	21.0	20.7	22.1	21.9	24.7	24.4	26.1	25.9	28.4	27.0	29.8	28.2
1000	23.3	22.2	24.4	23.2	26.9	25.6	28.4	26.6	30.6	27.5	32.0	28.7
1100	25.8	22.9	26.9	23.9	29.5	26.2	30.9	27.2	33.2	28.1	34.6	29.3
1200	28.2	23.6	29.3	24.5	31.9	26.8	33.3	27.7	35.6	28.6	37.0	29.8
1300	30.0	24.1	31.1	25.0	33.7	27.2	35.1	28.1	37.4	29.0	38.8	30.2
1400	31.2	24.4	32.3	25.3	34.9	27.5	36.3	28.4	38.6	29.3	40.0	30.4
1500	31.7	24.5	32.8	25.4	35.3	27.6	36.8	28.5	39.0	29.4	40.4	30.5
1600	31.2	24.4	32.3	25.3	34.9	27.5	36.3	28.4	38.6	29.3	40.0	30.4
1700	30.2	24.1	31.3	25.0	33.8	27.3	35.3	28.2	37.5	29.1	38.9	30.2
1800	28.5	23.7	29.6	24.6	32.2	26.9	33.6	27.8	35.9	28.7	37.3	29.8
1900	26.6	23.1	27.7	24.1	30.2	26.4	31.7	27.3	33.9	28.3	35.3	29.4
2000	24.6	22.6	25.7	23.5	28.3	25.9	29.7	26.9	32.0	27.8	33.4	29.0
2100	23.0	22.1	24.1	23.1	26.6	25.5	28.1	26.5	30.3	27.4	31.7	28.6
2200	21.5	21.2	22.6	22.3	25.1	24.9	26.6	26.1	28.8	27.1	30.2	28.3
2300	20.3	20.0	21.4	21.1	23.9	23.7	25.4	25.1	27.6	26.8	29.0	28.0

Hr	July		August		September		October		November		December	
	DB	WB	DB	WB	DB	WB	DB	WB	DB	WB	DB	WB
0000	28.7	27.8	28.7	27.8	27.6	27.2	25.6	25.3	22.5	22.2	19.9	19.6
0100	28.0	27.7	28.0	27.7	26.8	26.6	24.8	24.6	21.7	21.5	19.2	18.9
0200	27.2	26.9	27.2	26.9	26.1	25.8	24.1	23.8	21.0	20.7	18.4	18.1
0300	26.6	26.3	26.6	26.3	25.5	25.2	23.5	23.2	20.4	20.1	17.8	17.5
0400	26.2	25.9	26.2	25.9	25.0	24.8	23.0	22.8	19.9	19.7	17.4	17.1
0500	26.0	25.7	26.0	25.7	24.9	24.6	22.9	22.6	19.8	19.5	17.2	16.9
0600	26.3	26.0	26.3	26.0	25.2	24.9	23.2	22.9	20.1	19.8	17.5	17.2
0700	27.1	26.8	27.1	26.8	25.9	25.7	23.9	23.7	20.8	20.6	18.3	18.0
0800	28.4	27.8	28.4	27.8	27.3	27.0	25.3	25.0	22.2	21.9	19.6	19.3
0900	30.4	28.2	30.4	28.2	29.2	27.6	27.2	26.4	24.1	23.9	21.6	21.3
1000	32.6	28.7	32.6	28.7	31.5	28.1	29.5	26.9	26.4	25.4	23.8	23.4
1100	35.2	29.3	35.2	29.3	34.0	28.7	32.0	27.5	28.9	26.0	26.4	24.1
1200	37.6	29.8	37.6	29.8	36.4	29.2	34.4	28.1	31.3	26.6	28.8	24.7
1300	39.4	30.2	39.4	30.2	38.2	29.6	36.2	28.5	33.1	27.0	30.6	25.2
1400	40.6	30.4	40.6	30.4	39.4	29.8	37.4	28.7	34.3	27.3	31.8	25.5
1500	41.0	30.5	41.0	30.5	39.9	29.9	37.9	28.8	34.8	27.4	32.2	25.6
1600	40.6	30.4	40.6	30.4	39.4	29.8	37.4	28.7	34.3	27.3	31.8	25.5
1700	39.5	30.2	39.5	30.2	38.4	29.6	36.4	28.5	33.3	27.0	30.7	25.2
1800	37.9	29.9	37.9	29.9	36.7	29.3	34.7	28.1	31.6	26.6	29.1	24.8
1900	35.9	29.4	35.9	29.4	34.8	28.9	32.8	27.7	29.7	26.2	27.1	24.3
2000	34.0	29.0	34.0	29.0	32.8	28.4	30.8	27.2	27.7	25.7	25.2	23.8
2100	32.3	28.7	32.3	28.7	31.2	28.0	29.2	26.8	26.1	25.3	23.5	23.2
2200	30.8	28.3	30.8	28.3	29.7	27.7	27.7	26.5	24.6	24.3	22.0	21.7
2300	29.6	28.0	29.6	28.0	28.5	27.4	26.5	26.2	23.4	23.1	20.8	20.5





نگهداشت و افزایش تولید میدان نفتی بینک  
سطح الارض و ابنيه تحت الارض

عمومی و مشترک



شماره پیمان:

۰۵۳ - ۰۷۳ - ۹۱۸۴

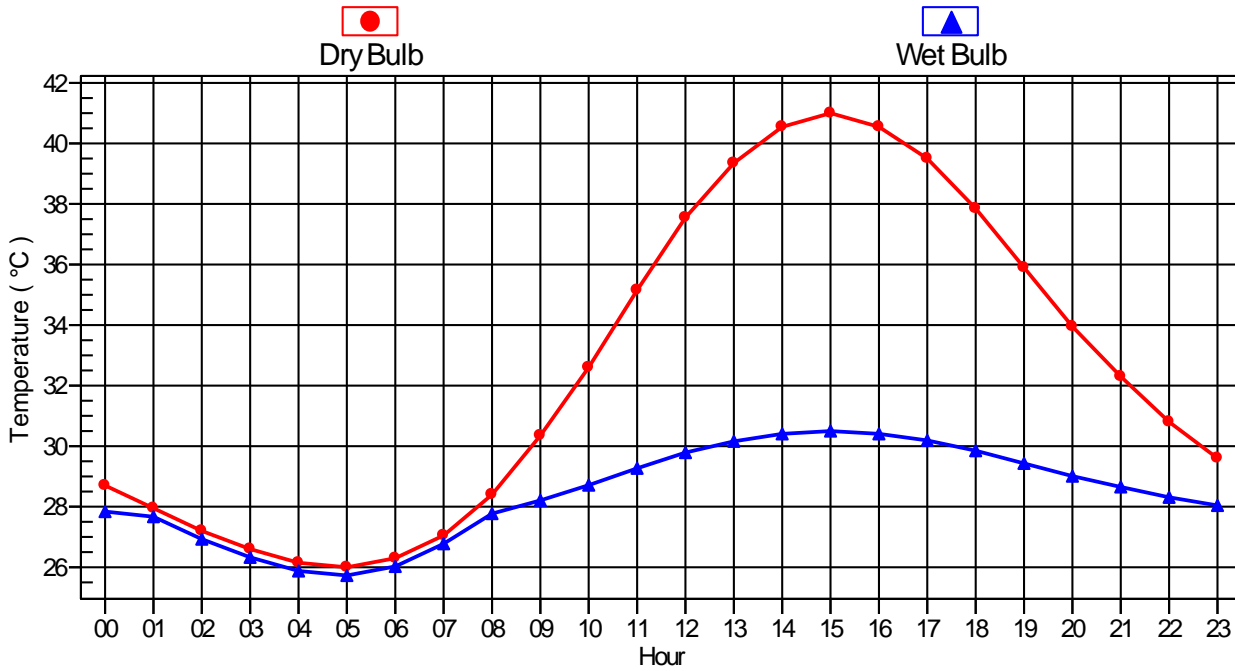
HVAC Calculation Note For Extension of Existing Elect. Building




نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه
D04	0002	CN	HV	120	PEDCO	GCS	BK

شماره صفحه ۹ از ۳۱

## Design Temperature Profile

### Design Temperature Profiles for July



 <p>NISOC</p>	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض</p> <p>عمومی و مشترک</p>	 																
<p>شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴</p>	<p><b>HVAC Calculation Note For Extension of Existing Elect. Building</b></p> <table border="1" data-bbox="389 338 1192 403"> <tr> <td>نسخه</td> <td>سریال</td> <td>نوع مدرک</td> <td>رشته</td> <td>تسهیلات</td> <td>صادرکننده</td> <td>بسته کاری</td> <td>پروژه</td> </tr> <tr> <td>D04</td> <td>0002</td> <td>CN</td> <td>HV</td> <td>120</td> <td>PEDCO</td> <td>GCS</td> <td>BK</td> </tr> </table>	نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه	D04	0002	CN	HV	120	PEDCO	GCS	BK	<p>شماره صفحه ۱۰ از ۳۱</p>
نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه											
D04	0002	CN	HV	120	PEDCO	GCS	BK											

## 4.2 CONSTRUCTIONS U-VALUE:

### Wall

#### Wall Details

Outside Surface Color ..... **Medium**  
Absorptivity ..... **0.675**  
Overall U-Value ..... **1.968** W/(m<sup>2</sup>·K)

#### Wall Layers Details (Inside to Outside)

Layers	Thickness mm	Density kg/m <sup>3</sup>	Specific Ht. kJ / (kg - °K)	R-Value (m <sup>2</sup> ·K)/W	Weight kg/m <sup>2</sup>
Inside surface resistance	0.000	0.0	0.00	0.12064	0.0
Gypsum plaster-P219-19 INBR	20.000	1200.0	1.09	0.03509	24.0
Cement plaster-P210-19 INBR	20.000	750.0	0.80	0.06667	15.0
Concrete wall-P210-19 INBR	300.000	2300.0	0.84	0.13043	690.0
Cement plaster-P210-19 INBR	20.000	750.0	0.80	0.06667	15.0
Face brick-P224-19 INBR	30.000	2000.0	0.03	0.03000	60.0
Outside surface resistance	0.000	0.0	0.00	0.05864	0.0
<b>Totals</b>	<b>390.000</b>	-		<b>0.50814</b>	<b>804.0</b>

### Roof

#### Roof Details

Outside Surface Color ..... **Medium**  
Absorptivity ..... **0.675**  
Overall U-Value ..... **0.484** W/(m<sup>2</sup>·K)

#### Roof Layers Details (Inside to Outside)

Layers	Thickness mm	Density kg/m <sup>3</sup>	Specific Ht. kJ / (kg - °K)	R-Value (m <sup>2</sup> ·K)/W	Weight kg/m <sup>2</sup>
Inside surface resistance	0.000	0.0	0.00	0.12064	0.0
Concrete roof-P210-19 INBR	300.000	2300.0	0.84	0.13043	690.0
HDPU-P218-19 INBR	50.000	50.0	0.84	1.21951	2.5
Cement plaster-P210-19 INBR	100.000	750.0	0.84	0.33333	75.0
Waterproofing layer-P219-19 INBR	4.000	1100.0	1.67	0.01739	4.4
Cement plaster-P210-19 INBR	50.000	750.0	0.80	0.16667	37.5
Terrazzo tile-P212-19 INBR	25.000	2000.0	0.84	0.01852	50.0
Outside surface resistance	0.000	0.0	0.00	0.05864	0.0
<b>Totals</b>	<b>529.000</b>	-		<b>2.06513</b>	<b>859.4</b>

### B.P.D./T-1

#### Door Details:

Gross Area ..... **2.6** m<sup>2</sup>  
Door U-Value ..... **3.000** W/(m<sup>2</sup>·K)

#### Glass Details:

Glass Area ..... **0.0** m<sup>2</sup>  
Glass U-Value ..... **3.293** W/(m<sup>2</sup>·K)  
Glass Shade Coefficient ..... **0.880**  
Glass Shaded All Day? ..... **No**

### Ext. Dor W=1

#### Door Details:

Gross Area ..... **2.2** m<sup>2</sup>  
Door U-Value ..... **3.000** W/(m<sup>2</sup>·K)

#### Glass Details:

Glass Area ..... **0.0** m<sup>2</sup>  
Glass U-Value ..... **3.293** W/(m<sup>2</sup>·K)  
Glass Shade Coefficient ..... **0.880**  
Glass Shaded All Day? ..... **No**



نگهداشت و افزایش تولید میدان نفتی بینک  
سطح الارض و ابنیه تحت الارض

عمومی و مشترک



شماره پیمان:

۰۵۳ - ۰۷۳ - ۹۱۸۴

**HVAC Calculation Note For Extension of Existing Elect. Building**

نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه
D04	0002	CN	HV	120	PEDCO	GCS	BK

شماره صفحه: ۱۱ از ۳۱



**Ext. Dor W=2**

**Door Details:**

Gross Area ..... **4.4** m<sup>2</sup>  
Door U-Value ..... **3.000** W/(m<sup>2</sup>-°K)

**Glass Details:**

Glass Area ..... **0.0** m<sup>2</sup>  
Glass U-Value ..... **3.293** W/(m<sup>2</sup>-°K)  
Glass Shade Coefficient ..... **0.880**  
Glass Shaded All Day? ..... **No**

 <b>NISOC</b>	<b>نگهداشت و افزایش تولید میدان نفتی بینک</b> <b>سطح الارض و ابنیه تحت الارض</b>  <b>عمومی و مشترک</b>	 <b>شماره صفحه: ۱۲ از ۳۱</b>																
<b>شماره پیمان:</b> ۰۵۳ - ۰۷۳ - ۹۱۸۴	<b>HVAC Calculation Note For Extension of Existing Elect. Building</b>																	
	<table border="1"> <tr> <th>پروژه</th> <th>بسته کاری</th> <th>صادرکننده</th> <th>تسهیلات</th> <th>رشته</th> <th>نوع مدرک</th> <th>سریال</th> <th>نسخه</th> </tr> <tr> <td>BK</td> <td>GCS</td> <td>PEDCO</td> <td>120</td> <td>HV</td> <td>CN</td> <td>0002</td> <td>D04</td> </tr> </table>	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	BK	GCS	PEDCO	120	HV	CN	0002	D04	
پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه											
BK	GCS	PEDCO	120	HV	CN	0002	D04											

### 4.3 SPACE INPUT DATA:

#### 01-Capacitor Bank

##### 1. General Details:

Floor Area ..... 24.7 m<sup>2</sup>  
 Avg. Ceiling Height ..... 4.1 m  
 Building Weight ..... 341.8 kg/m<sup>2</sup>

##### 1.1. OA Ventilation Requirements:

Space Usage ..... User-Defined  
 OA Requirement 1 ..... 0.0 L/s/person  
 OA Requirement 2 ..... 0.00 L/(s·m<sup>2</sup>)  
 Space Usage Defaults . ASHRAE Standard 62.1-2010

##### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Recessed (Unvented)  
 Wattage ..... 20.00 W/m<sup>2</sup>  
 Ballast Multiplier ..... 1.00  
 Schedule ..... Lighting

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

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/m<sup>2</sup>  
 Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 4920.0 Watts  
 Schedule ..... Electrical Eq.

##### 2.4. People:

##### 3. Walls, Windows, Doors:

##### 2.5. Miscellaneous Loads:

Sensible ..... 0 W  
 Schedule ..... None  
 Latent ..... 0 W  
 Schedule ..... None

Exp.	Wall Gross Area (m <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
NNW	26.2	0	0	0
ENE	15.6	0	0	1

##### 3.1. Construction Types for Exposure NNW

Wall Type ..... Wall

##### 3.2. Construction Types for Exposure ENE

Wall Type ..... Wall  
 Door Type ..... B.P.D./T-1

##### 4. Roofs, Skylights:

Exp.	Roof Gross Area (m <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
H	24.7	0	0

##### 4.1. Construction Types for Exposure H

Roof Type ..... Roof

##### 5. Infiltration:

Design Cooling ..... 1.00 ACH  
 Design Heating ..... 1.00 ACH  
 Energy Analysis ..... 1.00 ACH

Infiltration occurs at all hours.

##### 6. Floors:

Type ..... Slab Floor On Grade  
 Floor Area ..... 24.7 m<sup>2</sup>  
 Total Floor U-Value ..... 0.568 W/(m<sup>2</sup>·°K)  
 Exposed Perimeter ..... 10.3 m  
 Edge Insulation R-Value ..... 0.00 (m<sup>2</sup>·°K)/W



##### 7. Partitions:

##### 7.1. 1st Partition Details:

Partition Type ..... Wall Partition  
 Area ..... 41.8 m<sup>2</sup>  
 U-Value ..... 1.260 W/(m<sup>2</sup>·°K)  
 Uncondit. Space Max Temp ..... 35.0 °C  
 Ambient at Space Max Temp ..... 41.0 °C  
 Uncondit. Space Min Temp ..... 12.8 °C  
 Ambient at Space Min Temp ..... 6.0 °C

##### 7.2. 2nd Partition Details:

(No partition data).

 <b>NISOC</b>	<b>نگهداشت و افزایش تولید میدان نفتی بینک</b> <b>سطح الارض و ابنیه تحت الارض</b>  <b>عمومی و مشترک</b>	 <b>شماره صفحه: ۱۳ از ۳۱</b>																
<b>شماره پیمان:</b> ۰۵۳ - ۰۷۳ - ۹۱۸۴	<b>HVAC Calculation Note For Extension of Existing Elect. Building</b>																	
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نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه											
D04	0002	CN	HV	120	PEDCO	GCS	BK											

## 02-High Voltage Room

### 1. General Details:

Floor Area .....	129.8	m <sup>2</sup>
Avg. Ceiling Height .....	4.1	m
Building Weight .....	341.8	kg/m <sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage .....	User-Defined	
OA Requirement 1 .....	332.7	L/s
OA Requirement 2 .....	0.00	L/(s-m <sup>2</sup> )
Space Usage Defaults .	ASHRAE Standard 62.1-2010	

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type .....	Recessed (Unvented)	
Wattage .....	20.00	W/m <sup>2</sup>
Ballast Multiplier .....	1.00	
Schedule .....	Lighting	

#### 2.2. Task Lighting:

Wattage .....	0.00	W/m <sup>2</sup>
Schedule .....	None	

#### 2.3. Electrical Equipment:

Wattage .....	20960.0	Watts
Schedule .....	Electrical Eq.	

#### 2.4. People:

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
NNW	51.1	0	0	0
ENE	21.4	0	0	1

#### 3.1. Construction Types for Exposure NNW

Wall Type ..... Wall

#### 3.2. Construction Types for Exposure ENE

Wall Type ..... Wall  
 Door Type ..... Ext. Dor W=2

#### 4. Roofs, Skylights:

Exp.	Roof Gross Area (m <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
H	129.8	0	0

#### 4.1. Construction Types for Exposure H

Roof Type ..... Roof

#### 5. Infiltration:

Design Cooling .....	0.00	ACH
Design Heating .....	0.00	ACH
Energy Analysis .....	0.00	ACH

Infiltration occurs at all hours.

#### 6. Floors:

Type .....	Floor Above Unconditioned Space	
Floor Area .....	129.8	m <sup>2</sup>
Total Floor U-Value .....	0.568	W/(m <sup>2</sup> -°K)
Unconditioned Space Max Temp. ....	35.0	°C
Ambient at Space Max Temp. ....	41.0	°C
Unconditioned Space Min Temp. ....	12.8	°C
Ambient at Space Min Temp. ....	6.0	°C




#### 7. Partitions:

##### 7.1. 1st Partition Details:

Partition Type .....	Wall Partition	
Area .....	43.4	m <sup>2</sup>
U-Value .....	1.260	W/(m <sup>2</sup> -°K)
Uncondit. Space Max Temp .....	35.0	°C
Ambient at Space Max Temp .....	41.0	°C
Uncondit. Space Min Temp .....	12.8	°C
Ambient at Space Min Temp .....	6.0	°C

##### 7.2. 2nd Partition Details:

(No partition data).

 <p>NISOC</p>	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض</p> <p>عمومی و مشترک</p>	 																
<p>شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴</p>	<p><b>HVAC Calculation Note For Extension of Existing Elect. Building</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>نسخه</td> <td>سریال</td> <td>نوع مدرک</td> <td>رشته</td> <td>تسهیلات</td> <td>صادرکننده</td> <td>بسته کاری</td> <td>پروژه</td> </tr> <tr> <td>D04</td> <td>0002</td> <td>CN</td> <td>HV</td> <td>120</td> <td>PEDCO</td> <td>GCS</td> <td>BK</td> </tr> </table>	نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه	D04	0002	CN	HV	120	PEDCO	GCS	BK	<p>شماره صفحه: ۱۴ از ۳۱</p>
نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه											
D04	0002	CN	HV	120	PEDCO	GCS	BK											

### 03-Low Voltage Room

#### 1. General Details:

Floor Area ..... 156.6 m<sup>2</sup>  
Avg. Ceiling Height ..... 4.1 m  
Building Weight ..... 341.8 kg/m<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... User-Defined  
OA Requirement 1 ..... 389.4 L/s  
OA Requirement 2 ..... 0.00 L/(s-m<sup>2</sup>)  
Space Usage Defaults . ASHRAE Standard 62.1-2010

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Recessed (Unvented)  
Wattage ..... 20.00 W/m<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... Lighting

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/m<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 37361.0 Watts  
Schedule ..... Electrical Eq.

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
WSW	21.4	0	0	1
SSE	13.6	0	0	0
ENE	21.4	0	0	1

##### 3.1. Construction Types for Exposure WSW

Wall Type ..... Wall  
Door Type ..... Ext. Dor W=1

##### 3.2. Construction Types for Exposure SSE

Wall Type ..... Wall

##### 3.3. Construction Types for Exposure ENE

Wall Type ..... Wall  
Door Type ..... Ext. Dor W=2

#### 4. Roofs, Skylights:

Exp.	Roof Gross Area (m <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
H	156.6	0	0

##### 4.1. Construction Types for Exposure H

Roof Type ..... Roof

#### 5. Infiltration:

Design Cooling ..... 0.00 ACH  
Design Heating ..... 0.00 ACH  
Energy Analysis ..... 0.00 ACH

Infiltration occurs at all hours.

#### 6. Floors:

Type ..... Floor Above Unconditioned Space  
Floor Area ..... 156.6 m<sup>2</sup>  
Total Floor U-Value ..... 0.568 W/(m<sup>2</sup>-°K)  
Unconditioned Space Max Temp. .... 35.0 °C  
Ambient at Space Max Temp. .... 41.0 °C  
Unconditioned Space Min Temp. .... 12.8 °C  
Ambient at Space Min Temp. .... 6.0 °C

#### 7. Partitions:

##### 7.1. 1st Partition Details:

Partition Type ..... Wall Partition  
Area ..... 128.4 m<sup>2</sup>  
U-Value ..... 1.260 W/(m<sup>2</sup>-°K)  
Uncondit. Space Max Temp ..... 35.0 °C  
Ambient at Space Max Temp ..... 41.0 °C  
Uncondit. Space Min Temp ..... 12.8 °C  
Ambient at Space Min Temp ..... 6.0 °C

##### 7.2. 2nd Partition Details:




(No partition data).

#### 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

 <p>NISOC</p>	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض</p> <p>عمومی و مشترک</p>	 																
<p>شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴</p>	<p><b>HVAC Calculation Note For Extension of Existing Elect. Building</b></p> <table border="1" data-bbox="389 338 1190 405"> <tr> <td>نسخه</td> <td>سریال</td> <td>نوع مدرک</td> <td>رشته</td> <td>تسهیلات</td> <td>صادرکننده</td> <td>بسته کاری</td> <td>پروژه</td> </tr> <tr> <td>D04</td> <td>0002</td> <td>CN</td> <td>HV</td> <td>120</td> <td>PEDCO</td> <td>GCS</td> <td>BK</td> </tr> </table>	نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه	D04	0002	CN	HV	120	PEDCO	GCS	BK	<p>شماره صفحه: ۱۵ از ۳۱</p>
نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه											
D04	0002	CN	HV	120	PEDCO	GCS	BK											

#### 4.4 SYSTEM INPUT DATA:

##### Capacitor Bank System

##### 1. General Details:

Air System Name ..... Capacitor Bank System  
 Equipment Type ..... Terminal Units  
 Air System Type ..... Split DX Fan Coil  
 Number of zones ..... 1  
 Ventilation ..... Direct Ventilation

##### 2. Ventilation System Components:

(Common Ventilation System not used: no inputs)

##### 3. Zone Components:

##### Space Assignments:

Zone 1: Zone 1	
01-Capacitor Bank	x1

##### Thermostats and Zone Data:

Zone	Cooling T-Stat Occ. (°C)	Cooling T-Stat Unocc. (°C)	Heating T-Stat Occ. (°C)	Heating T-Stat Unocc. (°C)	T-Stat Throttling Range (°C)
1	30.0	31.0	10.0	8.0	0.83

Thermostat Schedule ..... Fan  
 Unoccupied Cooling is ..... Available

##### Common Terminal Unit Data:

##### Cooling Coil:

Design Supply Temperature ..... 18.0 °C  
 Coil Bypass Factor ..... 0.100  
 Cooling Source ..... Air-Cooled DX  
 Schedule ..... JFMAMJJASOND

##### Heating Coil:

Design Supply Temperature ..... 35.0 °C  
 Heating Source ..... Electric Resistance  
 Schedule ..... JFMAMJJASOND  
 Fan Control ..... Fan On  
 Ventilation Sizing Method ..... ASHRAE Std 62.1-2010

##### Terminal Units Data:

Zone ..... All  
 Terminal Type ..... Fan Coil  
 Minimum Airflow ..... 0.00 L/s/person  
 Fan Performance ..... 0 Pa  
 Fan Overall Efficiency ..... 50 %

##### 4. Sizing Data (Computer-Generated):

##### System Sizing Data:



##### Sizing Data:

##### Hydronic Sizing Specifications:

Chilled Water Delta-T ..... 5.6 °K  
 Hot Water Delta-T ..... 11.1 °K

##### Safety Factors:

Cooling Sensible ..... 10 %  
 Cooling Latent ..... 10 %  
 Heating ..... 10 %

 <p>NISOC</p>	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض</p> <p>عمومی و مشترک</p>																	
<p>شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴</p>	<p><b>HVAC Calculation Note For Extension of Existing Elect. Building</b></p> <table border="1" data-bbox="389 338 1190 403"> <tr> <td>پروژه</td> <td>بسته کاری</td> <td>صادرکننده</td> <td>تسهیلات</td> <td>رشته</td> <td>نوع مدرک</td> <td>سریال</td> <td>نسخه</td> </tr> <tr> <td>BK</td> <td>GCS</td> <td>PEDCO</td> <td>120</td> <td>HV</td> <td>CN</td> <td>0002</td> <td>D04</td> </tr> </table>	پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	BK	GCS	PEDCO	120	HV	CN	0002	D04	<p>شماره صفحه: ۱۶ از ۳۱</p>
پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه											
BK	GCS	PEDCO	120	HV	CN	0002	D04											

## Elec. Building System

### 1. General Details:

Air System Name ..... Elec. Building  
 Equipment Type ..... Packaged Rooftop Units  
 Air System Type ..... Single Zone CAV  
 Number of zones ..... 1

### 2. Ventilation System Components:

#### Ventilation Air Data:

Airflow Control ..... Constant Ventilation Airflow  
 Ventilation Sizing Method ..... Sum of Space OA Airflows  
 Unocc. Damper Position ..... Closed  
 Damper Leak Rate ..... 0 %  
 Outdoor Air CO2 Level ..... 400 ppm

#### Central Cooling Data:

Supply Air Temperature ..... 14.4 °C  
 Coil Bypass Factor ..... 0.100  
 Cooling Source ..... Air-Cooled DX  
 Schedule ..... JFMAMJJASOND  
 Capacity Control ..... Cycled or Staged Capacity - Fan On

#### Central Heating Data:

Supply Temperature ..... 35.0 °C  
 Heating Source ..... Electric Resistance  
 Schedule ..... JFMAMJJASOND  
 Capacity Control ..... Cycled or Staged Capacity - Fan On

#### Supply Fan Data:

Fan Type ..... Forward Curved  
 Configuration ..... Draw-thru  
 Fan Performance ..... 0 Pa  
 Overall Efficiency ..... 54 %  
 Fan Control ..... 1-speed fan, cooling and heating

#### Duct System Data:

**Supply Duct Data:**  
 Duct Heat Gain ..... 0 %  
 Duct Leakage ..... 0 %  
**Return Duct or Plenum Data:**  
 Return Air Via ..... Ducted Return

### 3. Zone Components:

#### Space Assignments:

Zone 1: Zone 1	
02-High Voltage Room	x1
03-Low Voltage Room	x1

#### Thermostats and Zone Data:

Zone ..... All  
 Cooling T-stat: Occ. .... 30.0 °C  
 Cooling T-stat: Unocc. .... 31.0 °C  
 Heating T-stat: Occ. .... 10.0 °C  
 Heating T-stat: Unocc. .... 8.0 °C  
 T-stat Throttling Range ..... 0.83 °K  
 Diversity Factor ..... 100 %  
 Direct Exhaust Airflow ..... 0.0 L/s  
 Direct Exhaust Fan kW ..... 0.0 kW  
 Thermostat Schedule ..... Fan  
 Unoccupied Cooling is ..... Available

#### Supply Terminals Data:

Zone ..... All  
 Terminal Type ..... Diffuser  
 Minimum Airflow ..... 0.00 L/s/person

#### Zone Heating Units:

Zone ..... All  
 Zone Heating Unit Type ..... None  
 Zone Unit Heat Source ..... Electric Resistance  
 Zone Heating Unit Schedule ..... JFMAMJJASOND

### 4. Sizing Data (Computer-Generated):





نگهداشت و افزایش تولید میدان نفتی بینک  
سطح الارض و ابنیه تحت الارض

عمومی و مشترک



شماره پیمان:

۰۵۳ - ۰۷۳ - ۹۱۸۴

HVAC Calculation Note For Extension of Existing Elect. Building

نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه
D04	0002	CN	HV	120	PEDCO	GCS	BK

شماره صفحه: ۱۷ از ۳۱

**System Sizing Data:**

**Sizing Data:**

**Hydronic Sizing Specifications:**

Chilled Water Delta-T ..... 5.6 °K



Hot Water Delta-T ..... 11.1 °K

**Safety Factors:**

Cooling Sensible ..... 10 %

Cooling Latent ..... 10 %

Heating ..... 10 %

	نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض <b>عمومی و مشترک</b>								
	<b>HVAC Calculation Note For Extension of Existing Elect. Building</b>								
شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴	پروژه BK	بسته کاری GCS	صادر کننده PEDCO	تسهیلات 120	رشته HV	نوع مدرک CN	سریال 0002	نسخه D04	شماره صفحه: ۱۸ از ۳۱

## 4.5 AIR SYSTEM SIZING SUMMARAIR

### Capacitor Bank System

#### Air System Information

Air System Name ..... Capacitor Bank System  
 Equipment Class ..... TERM  
 Air System Type ..... SPLT-FC

Number of zones ..... 1  
 Floor Area ..... 24.7 m<sup>2</sup>  
 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

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 (m <sup>2</sup> )	Zone L/(s-m <sup>2</sup> )
Zone 1	6.8	472	472	Jul 1500	0.6	24.7	19.09

#### 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	7.6	6.7	30.7 / 22.2	18.9 / 18.1	-	Jul 1600

#### 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	0.6	9.9 / 10.9	-	472	0.000	0.000	0

#### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s-m <sup>2</sup> )
Zone 1 01-Capacitor Bank	1	6.8	Jul 1500	472	0.6	24.7	19.09

 <b>NISOC</b>	<b>نگهداشت و افزایش تولید میدان نفتی بینک</b> <b>سطح الارض و ابنیه تحت الارض</b>  <b>عمومی و مشترک</b>	 <b>شرکت توسعه انرژی</b> <b>HIRGAN ENERGY</b>																
شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴	<b>HVAC Calculation Note For Extension of Existing Elect. Building</b>	شماره صفحه: ۱۹ از ۳۱																
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BK	GCS	PEDCO	120	HV	CN	0002	D04											

## Elec. Building System

### Air System Information

Air System Name ..... **Elec. Building**  
 Equipment Class ..... **PKG ROOF**  
 Air System Type ..... **SZCAV**

Number of zones ..... **1**  
 Floor Area ..... **286.4** m<sup>2</sup>  
 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**

### Central Cooling Coil Sizing Data

Total coil load ..... **106.9** kW  
 Sensible coil load ..... **77.9** kW  
 Coil L/s at Jul 1600 ..... **3748** L/s  
 Max block L/s ..... **3748** L/s  
 Sum of peak zone L/s ..... **3748** L/s  
 Sensible heat ratio ..... **0.729**  
 m<sup>2</sup>/kW ..... **2.7**  
 W/m<sup>2</sup> ..... **373.2**  
 Water flow @ 5.6 °K rise ..... **N/A**

Load occurs at ..... **Jul 1600**  
 OA DB / WB ..... **40.6 / 30.4** °C  
 Entering DB / WB ..... **32.5 / 22.2** °C  
 Leaving DB / WB ..... **15.3 / 14.4** °C  
 Coil ADP ..... **13.4** °C  
 Bypass Factor ..... **0.100**  
 Resulting RH ..... **36** %  
 Design supply temp. .... **14.4** °C  
 Zone T-stat Check ..... **1 of 1** OK  
 Max zone temperature deviation ..... **0.0** °K

### Central Heating Coil Sizing Data

Max coil load ..... **4.4** kW  
 Coil L/s at Des Htg ..... **3748** L/s  
 Max coil L/s ..... **3748** L/s  
 Water flow @ 11.1 °K drop ..... **N/A**

Load occurs at ..... **Des Htg**  
 W/m<sup>2</sup> ..... **15.4**  
 Ent. DB / Lvg DB ..... **9.0 / 10.0** °C

### Supply Fan Sizing Data

Actual max L/s ..... **3748** L/s  
 Standard L/s ..... **3744** L/s  
 Actual max L/(s-m<sup>2</sup>) ..... **13.09** L/(s-m<sup>2</sup>)

Fan motor BHP ..... **0.00** BHP  
 Fan motor kW ..... **0.00** kW  
 Fan static ..... **0** Pa

### Outdoor Ventilation Air Data

Design airflow L/s ..... **722** L/s  
 L/(s-m<sup>2</sup>) ..... **2.52** L/(s-m<sup>2</sup>)

### 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 (m <sup>2</sup> )	Zone L/(s-m <sup>2</sup> )
Zone 1	70.3	3748	3748	Jul 0800	1.8	286.4	13.09

### Zone Terminal Sizing Data

No Zone Terminal Sizing Data required for this system.

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s-m <sup>2</sup> )
<b>Zone 1</b>							
02-High Voltage Room	1	26.1	Jul 0800	1393	0.9	129.8	10.73
03-Low Voltage Room	1	44.2	Jul 0800	2355	0.9	156.6	15.04

 <b>NISOC</b>	<b>نگهداشت و افزایش تولید میدان نفتی بینک</b> <b>سطح الارض و ابنیه تحت الارض</b>  <b>عمومی و مشترک</b>	 <b>شماره صفحه ۲۰ از ۳۱</b>																
شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴	<b>HVAC Calculation Note For Extension of Existing Elect. Building</b>																	
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پروژه	بسته کاری	صادرکننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه											
BK	GCS	PEDCO	120	HV	CN	0002	D04											

## 4.6 VENTILATION SIZING SUMMARY

### Capacitor Bank System

#### 1. Summary

Ventilation Sizing Method ..... ASHRAE Std 62.1-2010

Design Condition ..... Cooling operation

#### 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Supply Air (L/s) (Vpz)	Space Floor Area (m <sup>2</sup> ) (Az)	Area Outdoor Air Rate (L/(s-m <sup>2</sup> )) (Ra)	Time Averaged Occupancy (Occupants) (Pz)	People Outdoor Air Rate (L/s/person) (Rp)	Air Distribution Effectiveness (Ez)	Space Outdoor Air (L/s) (Voz)	Breathing Zone Outdoor Air (L/s) (Vbz)	Space Ventilation Efficiency (Evz)
<b>Zone 1</b>										
01-Capacitor Bank	1	472	24.7	0.00	0.0	0.00	1.00	0	0	1.000
<b>Totals (incl. Space Multipliers)</b>		<b>472</b>							<b>0</b>	<b>1.000</b>

### Elec. Building System

#### 1. Summary

Ventilation Sizing Method ..... Sum of Space OA Airflows

Design Ventilation Airflow Rate ..... 722 L/s

#### 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s-m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
02-High Voltage Room	1	129.8	0.0	1392.8	0.00	0.00	332.7	0.0	332.7
03-Low Voltage Room	1	156.6	0.0	2355.2	0.00	0.00	389.4	0.0	389.4
<b>Totals (incl. Space Multipliers)</b>				<b>3748.0</b>					<b>722.1</b>



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شماره پیمان:

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نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه
D04	0002	CN	HV	120	PEDCO	GCS	BK

شماره صفحه: ۲۱ از ۳۱

#### 4.7 AIR SYSTEM DESIGN LOAD SUMMARY:

##### Capacitor Bank System

ZONE LOADS	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 40.6 °C / 30.4 °C			HEATING OA DB / WB 6.0 °C / 4.4 °C		
	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	-	-
Wall Transmission	39 m <sup>2</sup>	549	-	39 m <sup>2</sup>	309	-
Roof Transmission	25 m <sup>2</sup>	131	-	25 m <sup>2</sup>	48	-
Window Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Skylight Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Door Loads	3 m <sup>2</sup>	64	-	3 m <sup>2</sup>	31	-
Floor Transmission	25 m <sup>2</sup>	0	-	25 m <sup>2</sup>	23	-
Partitions	42 m <sup>2</sup>	169	-	42 m <sup>2</sup>	0	-
Ceiling	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Overhead Lighting	0 W	11	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	4920 W	4920	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	358	844	-	136	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	620	84	10%	55	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>6823</b>	<b>928</b>	-	<b>601</b>	<b>0</b>
Zone Conditioning	-	6715	928	-	559	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	-
<b>&gt;&gt; Total System Loads</b>	-	<b>6715</b>	<b>928</b>	-	<b>559</b>	<b>0</b>
Terminal Unit Cooling	-	6715	933	-	0	0
Terminal Unit Heating	-	0	-	-	559	-
<b>&gt;&gt; Total Conditioning</b>	-	<b>6715</b>	<b>933</b>	-	<b>559</b>	<b>0</b>
<b>Key:</b>	<b>Positive values are clg loads Negative values are htg loads</b>			<b>Positive values are htg loads Negative values are clg loads</b>		



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شماره پیمان:

۰۵۳ - ۰۷۳ - ۹۱۸۴

HVAC Calculation Note For Extension of Existing Elect. Building

پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه
BK	GCS	PEDCO	120	HV	CN	0002	D04

شماره صفحه: ۲۲ از ۳۱

Elec. Building System

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 40.6 °C / 30.4 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 4.4 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	-	-
Wall Transmission	118 m <sup>2</sup>	1719	-	118 m <sup>2</sup>	928	-
Roof Transmission	286 m <sup>2</sup>	1522	-	286 m <sup>2</sup>	555	-
Window Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Skylight Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Door Loads	11 m <sup>2</sup>	270	-	11 m <sup>2</sup>	132	-
Floor Transmission	286 m <sup>2</sup>	523	-	286 m <sup>2</sup>	0	-
Partitions	172 m <sup>2</sup>	696	-	172 m <sup>2</sup>	0	-
Ceiling	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Overhead Lighting	0 W	131	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	58321 W	58318	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	6318	0	10%	161	0
>> Total Zone Loads	-	69496	0	-	1776	0
Zone Conditioning	-	69238	0	-	1150	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	3748 L/s	0	-	3748 L/s	0	-
Ventilation Load	722 L/s	8642	28997	722 L/s	3270	0
Supply Fan Load	3748 L/s	0	-	3748 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	77881	28997	-	4420	0
Central Cooling Coil	-	77881	29003	-	0	0
Central Heating Coil	-	0	-	-	4420	-
>> Total Conditioning	-	77881	29003	-	4420	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		



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HVAC Calculation Note For Extension of Existing Elect. Building

نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه
D04	0002	CN	HV	120	PEDCO	GCS	BK

شماره صفحه: ۲۳ از ۳۱



#### 4.8 ZONE DESIGN LOAD SUMMARY:

##### Capacitor Bank System

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500 COOLING OA DB / WB 41.0 °C / 30.5 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 4.4 °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 <sup>2</sup>	0	-	0 m <sup>2</sup>	-	-
Wall Transmission	39 m <sup>2</sup>	528	-	39 m <sup>2</sup>	309	-
Roof Transmission	25 m <sup>2</sup>	132	-	25 m <sup>2</sup>	48	-
Window Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Skylight Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Door Loads	3 m <sup>2</sup>	65	-	3 m <sup>2</sup>	31	-
Floor Transmission	25 m <sup>2</sup>	0	-	25 m <sup>2</sup>	23	-
Partitions	42 m <sup>2</sup>	174	-	42 m <sup>2</sup>	0	-
Ceiling	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Overhead Lighting	0 W	12	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	4920 W	4920	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	373	810	-	136	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	620	81	10%	55	0
>> Total Zone Loads	-	6823	891	-	601	0

##### Elec. Building System

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 0800 COOLING OA DB / WB 28.4 °C / 27.8 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 4.4 °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 <sup>2</sup>	0	-	0 m <sup>2</sup>	-	-
Wall Transmission	118 m <sup>2</sup>	1591	-	118 m <sup>2</sup>	928	-
Roof Transmission	286 m <sup>2</sup>	1778	-	286 m <sup>2</sup>	555	-
Window Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Skylight Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Door Loads	11 m <sup>2</sup>	-27	-	11 m <sup>2</sup>	132	-
Floor Transmission	286 m <sup>2</sup>	-406	-	286 m <sup>2</sup>	0	-
Partitions	172 m <sup>2</sup>	-541	-	172 m <sup>2</sup>	0	-
Ceiling	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Overhead Lighting	5728 W	3194	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	58321 W	58318	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	6391	0	10%	161	0
>> Total Zone Loads	-	70299	0	-	1776	0

 <p>NISOC</p>	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض</p> <p>عمومی و مشترک</p>																	
<p>شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴</p>	<p><b>HVAC Calculation Note For Extension of Existing Elect. Building</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>نسخه</td><td>سریال</td><td>نوع مدرک</td><td>رشته</td><td>تسهیلات</td><td>صادرکننده</td><td>بسته کاری</td><td>پروژه</td> </tr> <tr> <td>D04</td><td>0002</td><td>CN</td><td>HV</td><td>120</td><td>PEDCO</td><td>GCS</td><td>BK</td> </tr> </table>	نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه	D04	0002	CN	HV	120	PEDCO	GCS	BK	<p>شماره صفحه: ۲۴ از ۳۱</p>
نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه											
D04	0002	CN	HV	120	PEDCO	GCS	BK											

#### 4.9 SPACE DESIGN LOAD SUMMARY:

##### Capacitor Bank System

	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 / 4.4 °C		
OCCUPIED T-STAT 30.0 °C			OCCUPIED T-STAT 10.0 °C			
SPACE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	-	-
Wall Transmission	39 m <sup>2</sup>	528	-	39 m <sup>2</sup>	309	-
Roof Transmission	25 m <sup>2</sup>	132	-	25 m <sup>2</sup>	48	-
Window Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Skylight Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Door Loads	3 m <sup>2</sup>	65	-	3 m <sup>2</sup>	31	-
Floor Transmission	25 m <sup>2</sup>	0	-	25 m <sup>2</sup>	23	-
Partitions	42 m <sup>2</sup>	174	-	42 m <sup>2</sup>	0	-
Ceiling	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Overhead Lighting	0 W	12	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	4920 W	4920	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	373	810	-	136	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	620	81	10%	55	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>6823</b>	<b>891</b>	-	<b>601</b>	<b>0</b>

	Area (m <sup>2</sup> )	U-Value (W/(m <sup>2</sup> -°K))	Shade Coeff.	COOLING	COOLING	HEATING
				TRANS	SOLAR	TRANS
				(W)	(W)	(W)
<b>NNW EXPOSURE</b>						
WALL	26	1.968	-	281	-	206
<b>ENE EXPOSURE</b>						
WALL	13	1.968	-	247	-	102
DOOR	3	3.000	-	65	-	31
<b>H EXPOSURE</b>						
ROOF	25	0.484	-	132	-	48





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D04	0002	CN	HV	120	PEDCO	GCS	BK

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TABLE 1.1.A. COMPONENT LOADS FOR SPACE " 02-High Voltage Room " IN ZONE " Zone 1 "

	DESIGN COOLING			DESIGN HEATING		
	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
	COOLING DATA AT Jul 0800 COOLING OA DB / WB 28.4 °C / 27.8 °C OCCUPIED T-STAT 30.0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 4.4 °C OCCUPIED T-STAT 10.0 °C		
SPACE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	-	-
Wall Transmission	68 m <sup>2</sup>	868	-	68 m <sup>2</sup>	536	-
Roof Transmission	130 m <sup>2</sup>	806	-	130 m <sup>2</sup>	251	-
Window Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Skylight Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Door Loads	4 m <sup>2</sup>	-11	-	4 m <sup>2</sup>	53	-
Floor Transmission	130 m <sup>2</sup>	-184	-	130 m <sup>2</sup>	0	-
Partitions	43 m <sup>2</sup>	-137	-	43 m <sup>2</sup>	0	-
Ceiling	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Overhead Lighting	2596 W	1448	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	20960 W	20959	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	2375	0	10%	84	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>26124</b>	<b>0</b>	-	<b>924</b>	<b>0</b>

TABLE 1.1.B. ENVELOPE LOADS FOR SPACE " 02-High Voltage Room " IN ZONE " Zone 1 "

	Area (m <sup>2</sup> )	U-Value (W/(m <sup>2</sup> ·K))	Shade Coeff.	COOLING	COOLING	HEATING
				TRANS (W)	SOLAR (W)	TRANS (W)
<b>NNW EXPOSURE</b>						
WALL	51	1.968	-	619	-	402
<b>ENE EXPOSURE</b>						
WALL	17	1.968	-	249	-	134
DOOR	4	3.000	-	-11	-	53
<b>H EXPOSURE</b>						
ROOF	130	0.484	-	806	-	251



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نسخه	سریال	نوع مدرک	رشته	تسهیلات	صادرکننده	بسته کاری	پروژه
D04	0002	CN	HV	120	PEDCO	GCS	BK




شماره صفحه: ۲۶ از ۳۱

TABLE 1.2.A. COMPONENT LOADS FOR SPACE " 03-Low Voltage Room " IN ZONE " Zone 1 "

	DESIGN COOLING			DESIGN HEATING		
	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
	COOLING DATA AT Jul 0800 COOLING OA DB / WB 28.4 °C / 27.8 °C OCCUPIED T-STAT 30.0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 6.0 °C / 4.4 °C OCCUPIED T-STAT 10.0 °C		
<b>SPACE LOADS</b>						
Window & Skylight Solar Loads	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	-	-
Wall Transmission	50 m <sup>2</sup>	723	-	50 m <sup>2</sup>	392	-
Roof Transmission	157 m <sup>2</sup>	972	-	157 m <sup>2</sup>	303	-
Window Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Skylight Transmission	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Door Loads	7 m <sup>2</sup>	-16	-	7 m <sup>2</sup>	79	-
Floor Transmission	157 m <sup>2</sup>	-222	-	157 m <sup>2</sup>	0	-
Partitions	128 m <sup>2</sup>	-404	-	128 m <sup>2</sup>	0	-
Ceiling	0 m <sup>2</sup>	0	-	0 m <sup>2</sup>	0	-
Overhead Lighting	3132 W	1747	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	37361 W	37359	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	4016	0	10%	77	0
<b>&gt;&gt; Total Zone Loads</b>	-	<b>44175</b>	<b>0</b>	-	<b>852</b>	<b>0</b>

TABLE 1.2.B. ENVELOPE LOADS FOR SPACE " 03-Low Voltage Room " IN ZONE " Zone 1 "

	Area (m <sup>2</sup> )	U-Value (W/(m <sup>2</sup> ·K))	Shade Coeff.	COOLING	COOLING	HEATING
				TRANS (W)	SOLAR (W)	TRANS (W)
<b>WSW EXPOSURE</b>						
WALL	19	1.968	-	320	-	151
DOOR	2	3.000	-	-5	-	26
<b>SSE EXPOSURE</b>						
WALL	14	1.968	-	155	-	107
<b>ENE EXPOSURE</b>						
WALL	17	1.968	-	249	-	134
DOOR	4	3.000	-	-11	-	53
<b>H EXPOSURE</b>						
ROOF	157	0.484	-	972	-	303

 <p>NISOC</p>	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض</p> <p>عمومی و مشترک</p>	 																
<p>شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴</p>	<p><b>HVAC Calculation Note For Extension of Existing Elect. Building</b></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>پروژه</td> <td>بسته کاری</td> <td>صادر کننده</td> <td>تسهیلات</td> <td>رشته</td> <td>نوع مدرک</td> <td>سریال</td> <td>نسخه</td> </tr> <tr> <td>BK</td> <td>GCS</td> <td>PEDCO</td> <td>120</td> <td>HV</td> <td>CN</td> <td>0002</td> <td>D04</td> </tr> </table>	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	BK	GCS	PEDCO	120	HV	CN	0002	D04	<p>شماره صفحه: ۲۷ از ۳۱</p>
پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه											
BK	GCS	PEDCO	120	HV	CN	0002	D04											

## 5.0 Equipment Selection

### 5.1 AIR CONDITIONING UNIT (SPLIT UNIT)

#### Capacitor Bank System

Item	Service Area
	Capacitor Bank
Calculated Sensible Cooling Load(w)	6823
Calculated Latent Cooling Load(w)	891
Calculated Total Cooling Load(w)	7714
Calculated Total Cooling Load (btu/hr)	26345
Calculated Sensible Heating Load(w)	601
Calculated Sensible Heating Load (btu/hr)	2053
Eq. ID (1202-SUI/SUO-GCSEB-XX )	01
Equipment QTY.	1 duty / 1 standby
Equipment Type	W.M.*
Eq. Calculated Cooling Load+ 10% Over Cap. (btu/hr)	28980
Eq. Calculated Heating Load+ 10% Over Cap. (btu/hr)	2258
Selected Eq. Nominal Cooling Cap. (btu/hr)	B.V.**
Selected Eq. Actual Cooling Cap. (btu/hr)	B.V.**
Selected Eq. Actual Heating Cap. (btu/hr)	B.V.**
Power Supply (V/PH/Hz)	230/1/50
Max. Power Consumption (w) Eq. (Cooling/Heating)	B.V.**
REMARKE ***	Cooling & Heating (Heat Pump)

\*Wall Mounted Split unit




\*\*By Vendor

\*\*\*Indoor & Outdoor Unit-T3, With Thermostat and All Standard Accessory

#### Elec. Building System

#### Existing Package Unit:

PACKAGE UNIT SCHEDULE	
Performance	Tag No. : PU-02-01 , PU-02-02
	Cooling Capacity: 53400 KCAL/HR
	Nominal Tonnage: 25 TON
	Supply Air:12000 CMH – Fresh Air :2550 CMH
SUMMER	Air Inlet Temp. :80.5/68.8 °F
	Leaving Temp. :57.7/56.6 °F
Elec. Data	400-3-50
Physical Data	Dimensions:5200x2000x174 mm
	Operating Weight=1970 kg
Designation & Quantity	P.U-2 QTY=1
	MAX. Ambient Temp.= 125 °F
Com. Data	Elec. Power =25 HP 400-3-50
	Thermal =75450 Kcal/Hr
Condenser Data	QTY=2
	HP=3 HP
Fan Data	Elec.-400-3-50
	RPM=1450
Model	Similar to SARAN P.U. Model SPAR 25-1 Roof Top
Quantity	QTY.=2 One as Standby

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<p>شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴</p>	<p><b>HVAC Calculation Note For Extension of Existing Elect. Building</b></p> <table border="1" data-bbox="387 383 1193 454"> <tr> <td>پروژه</td> <td>بسته کاری</td> <td>صادر کننده</td> <td>تسهیلات</td> <td>رشته</td> <td>نوع مدرک</td> <td>سریال</td> <td>نسخه</td> </tr> <tr> <td>BK</td> <td>GCS</td> <td>PEDCO</td> <td>120</td> <td>HV</td> <td>CN</td> <td>0002</td> <td>D04</td> </tr> </table>	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	BK	GCS	PEDCO	120	HV	CN	0002	D04	<p>شماره صفحه: ۲۸ از ۳۱</p>
پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه											
BK	GCS	PEDCO	120	HV	CN	0002	D04											

**High Voltage and Low Voltage Room:**

**Central Cooling Coil Sizing Data (From Hap 4.9)**

Total coil load .....	106.9	kW
Sensible coil load .....	77.9	kW
Coil L/s at Jul 1600 .....	3748	L/s
Max block L/s .....	3748	L/s
Sum of peak zone L/s .....	3748	L/s
Sensible heat ratio .....	0.729	
m <sup>2</sup> /kW .....	2.7	
W/m <sup>2</sup> .....	373.2	

Existing Package Unit Actual Total Cooling Capacity = 53400 kcal/hr = 17.8 ton = 62.6 kW

Total Cooling Load – Package Unit Cooling Capacity = 106.9 – 62.6 = 44.3 kW

LV & HV Rooms Split units new loads = 44.3 kW

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Cooling Latent (kW)	Heating (kW)
02-High Voltage Room	1	26.124	0	0.924
03-Low Voltage Room	1	44.175	0	0.852

$$\text{Low Voltage Room load Ratio} = \frac{44.175}{44.175 + 26.124} = \frac{44.175}{70.29} = 0.628$$




Low Voltage Room load = 0.628 × 44.3 kW = 27.820 kW  
High Voltage Room load = 0.372 × 44.3 kW = 16.480 kW

Item	Service Area	
	High Voltage Room	Low Voltage Room
Calculated Sensible Cooling Load(w)	16480	27820
Calculated Latent Cooling Load(w)	0	0
Calculated Total Cooling Load(w)	16480	27820
Calculated Total Cooling Load (btu/hr)	56282	95010
Calculated Sensible Heating Load(w)	924	852
Calculated Sensible Heating Load (btu/hr)	3156	2910
Eq. ID (1202-SUI/SUO-GCSEB-XX)	02	03
Equipment QTY.	2 duty / 2 standby	2 duty / 2 standby
Equipment Type	C.T.	C.T.
Eq. Calculated Cooling Load+ 10% Over Cap. (btu/hr)	30955	52256
Eq. Calculated Heating Load+ 10% Over Cap. (btu/hr)	1736	1601
Selected Eq. Nominal Cooling Cap. (btu/hr)	B.V.**	B.V.**
Selected Eq. Actual Cooling Cap. (btu/hr)	B.V.**	B.V.**
Selected Eq. Actual Heating Cap. (btu/hr)	B.V.**	B.V.**
Power Supply (V/PH/Hz)	400/3/50	400/3/50
Max. Power Consumption (w) Eq. (Cooling/Heating)	B.V.**	B.V.**
REMARKE ***	Cooling & Heating (Heat Pump)	Cooling & Heating (Heat Pump)

\* Ceiling Mounted Cassette Split unit

\*\*By Vendor

\*\*\*Indoor & Outdoor Unit-T3, With Thermostat, Control and All Standard Accessory

 <p>NISOC</p>	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض</p> <p>عمومی و مشترک</p>	 																
<p>شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴</p>	<p><b>HVAC Calculation Note For Extension of Existing Elect. Building</b></p> <table border="1" data-bbox="387 383 1193 452"> <tr> <td>پروژه</td> <td>بسته کاری</td> <td>صادر کننده</td> <td>تسهیلات</td> <td>رشته</td> <td>نوع مدرک</td> <td>سریال</td> <td>نسخه</td> </tr> <tr> <td>BK</td> <td>GCS</td> <td>PEDCO</td> <td>120</td> <td>HV</td> <td>CN</td> <td>0002</td> <td>D04</td> </tr> </table>	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	BK	GCS	PEDCO	120	HV	CN	0002	D04	<p>شماره صفحه: ۲۹ از ۳۱</p>
پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه											
BK	GCS	PEDCO	120	HV	CN	0002	D04											

## 5.2 FAN FILTER UNIT SELECTION

### 1202-FFU-GCSEB-01 (Capacitor Bank + CO2 Room)

#### Capacitor Bank



Air Flow = 24.73 (area, m<sup>2</sup>) × 4.07 (height, m) × 1 ACH ÷ 60 min = 1.68 m<sup>3</sup>/min = 28 L/S  
= 59.33 cfm

#### CO2 Room

Air Flow = 20.13 (area, m<sup>2</sup>) × 4.57 (height, m) × 6 ACH ÷ 60 min = 9.2 m<sup>3</sup>/min = 153.3 L/S = 324.9 cfm

Item		1202-FFU-GCSEB-01
Service Area		Capacitor Bank + CO2 Room
Equipment QTY.		1
Air Flow(L/S)		181.3
Air Flow(CFM)		384.23
Internal Pressure Drop (In.WG.)	Sand Tarp Louver	By Vendor
	V-Type Aluminium Filter	By Vendor
	Bag Filter (95% Efficiency)	By Vendor
Component Pressure Drop (External) (In.WG.)	Blast Proof Valve-01(300×250)	0.420
	Fire Damper-01(300×250)	0.030
	Intake Air Duct	0.050
	Intake Air Duct Volume Damper (300×200)	0.080
Total External Pressure Drop * + 10% Over S.F.	(In.WG.)	0.669
	(Pa)	166.474
Fan type		Centrifugal
Power Supply (V/PH/Hz)		230/1/50
Power Consumption (w) Each Eq.		By Vendor
REMARKE		Equipped With Bird Mesh, Sand Tarp Louver, V-Type Aluminium Filter and Bag Filter (95% Efficiency).

\* Total Pressure Drop (External + Internal) Shall Be Specified By Vendor.

 <p>NISOC</p>	<p>نگهداشت و افزایش تولید میدان نفتی بینک سطح الارض و ابنیه تحت الارض</p> <p>عمومی و مشترک</p>																	
<p>شماره پیمان: ۰۵۳ - ۰۷۳ - ۹۱۸۴</p>	<p><b>HVAC Calculation Note For Extension of Existing Elect. Building</b></p> <table border="1" data-bbox="387 383 1193 452"> <tr> <td>پروژه</td> <td>بسته کاری</td> <td>صادر کننده</td> <td>تسهیلات</td> <td>رشته</td> <td>نوع مدرک</td> <td>سریال</td> <td>نسخه</td> </tr> <tr> <td>BK</td> <td>GCS</td> <td>PEDCO</td> <td>120</td> <td>HV</td> <td>CN</td> <td>0002</td> <td>D04</td> </tr> </table>	پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه	BK	GCS	PEDCO	120	HV	CN	0002	D04	<p>شماره صفحه: ۳۰ از ۳۱</p>
پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدرک	سریال	نسخه											
BK	GCS	PEDCO	120	HV	CN	0002	D04											

### 5.3 EXHAUST FAN SELECTION

#### 1202-EF-GCSEB-01 (Capacitor Bank + CO2 Room)

##### Capacitor Bank

Air Flow = 24.73 (area, m<sup>2</sup>) × 4.07 (height, m) × 1 ACH ÷ 60 min = 1.68 m<sup>3</sup>/min = 28 L/S  
= 59.33 cfm

##### CO2 Room

Air Flow = 20.13 (area, m<sup>2</sup>) × 4.57 (height, m) × 6 ACH ÷ 60 min = 9.2 m<sup>3</sup>/min = 153.3 L/S = 324.9 cfm

Item		1202-EF-GCSEB-01
Service Area		Capacitor Bank + CO2 Room
Equipment QTY.		1
Air Flow(L/S)		181.3
Air Flow(CFM)		384.23
Component Pressure Drop (External) (In.WG.)	Exhaust Air Diffuser/Register(150×150)	0.028
	Exhaust Air Duct Volume Damper(150×100)	0.090
	Exhaust Air Duct	0.031
	Blast Proof Valve-02(400×150)	0.510
	Fire Damper-02(400×150)	0.032
Total Pressure Drop * + 10% Over S.F.	(In.WG.)	0.760
	(Pa)	189.118
Exhaust Fan type		Utility Ex. Fan (Centrifugal)
Power Supply (V/PH/Hz)		230/1/50
Power Consumption (w) Each Eq.		By Vendor
REMARKE		Equipped With Bird Mesh and Gravity Damper

\* Total Pressure Drop (External + Internal) Shall Be Specified By Vendor.

#### Battery Room Exhaust Fan:

Air Flow = 25.64 (area, m<sup>2</sup>) × 4.07 (height, m) × 10 ACH ÷ 60 min = 17.39 m<sup>3</sup>/min = 289.83 L/S = 614.12 cfm = 1043 m<sup>3</sup>/hr

Wall Mounted Exhaust Fan Pressure Drop: 15 Pa

**“This Fan is Existing and Battery Room Air Exhaust Directly from Inside Battery**



نگهداشت و افزایش تولید میدان نفتی بینک  
سطح الارض و ابنیه تحت الارض

عمومی و مشترک



شماره پیمان:

۰۵۳ - ۰۷۳ - ۹۱۸۴

**HVAC Calculation Note For Extension of Existing Elect. Building**

پروژه	بسته کاری	صادر کننده	تسهیلات	رشته	نوع مدارک	سریال	نسخه
BK	GCS	PEDCO	120	HV	CN	0002	D04

شماره صفحه: ۳۱ از ۳۱

Room"