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| --- | --- | --- | --- | --- | --- | --- | --- |
| **طرح نگهداشت و افزایش تولید 27 مخزن** | | | | | | | |
| **HVAC CALCULATION NOTE FOR EXTENSION OF EXISTING CONTROL BUILDING**  **نگهداشت و افزایش تولید میدان نفتی بینک** | | | | | | | |
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|  | |  |  |  |  |  |  |
| D00 | | DEC. 2023 | IFC | K.Ahmadi | M.Fakharian | S.Faramarzpour |  |
| **Rev.** | | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **CLIENT Approval** |
| **Class: 2** | | | **CLIENT Doc. Number:** **F0Z-709530** | | | | |
| **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** | | | | | |

**REVISION RECORD SHEET**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |  | **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |
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| 2 | X |  |  |  |  | 59 |  |  |  |  |  |
| 3 | X |  |  |  |  | 60 |  |  |  |  |  |
| 4 | X |  |  |  |  | 61 |  |  |  |  |  |
| 5 | X |  |  |  |  | 62 |  |  |  |  |  |
| 6 | X |  |  |  |  | 63 |  |  |  |  |  |
| 7 | X |  |  |  |  | 64 |  |  |  |  |  |
| 8 | X |  |  |  |  | 65 |  |  |  |  |  |
| 9 | X |  |  |  |  | 66 |  |  |  |  |  |
| 10 | X |  |  |  |  | 67 |  |  |  |  |  |
| 11 | X |  |  |  |  | 68 |  |  |  |  |  |
| 12 | X |  |  |  |  | 69 |  |  |  |  |  |
| 13 | X |  |  |  |  | 70 |  |  |  |  |  |
| 14 | X |  |  |  |  | 71 |  |  |  |  |  |
| 15 | X |  |  |  |  | 72 |  |  |  |  |  |
| 16 | X |  |  |  |  | 73 |  |  |  |  |  |
| 17 | X |  |  |  |  | 74 |  |  |  |  |  |
| 18 | X |  |  |  |  | 75 |  |  |  |  |  |
| 19 | X |  |  |  |  | 76 |  |  |  |  |  |
| 20 | X |  |  |  |  | 77 |  |  |  |  |  |
| 21 | X |  |  |  |  | 78 |  |  |  |  |  |
| 22 | X |  |  |  |  | 79 |  |  |  |  |  |
| 23 | X |  |  |  |  | 80 |  |  |  |  |  |
| 24 | X |  |  |  |  | 81 |  |  |  |  |  |
| 25 | X |  |  |  |  | 82 |  |  |  |  |  |
| 26 | X |  |  |  |  | 83 |  |  |  |  |  |
| 27 | X |  |  |  |  | 84 |  |  |  |  |  |
| 28 | X |  |  |  |  | 85 |  |  |  |  |  |
| 29 | X |  |  |  |  | 86 |  |  |  |  |  |
| 30 | X |  |  |  |  | 87 |  |  |  |  |  |
| 31 | X |  |  |  |  | 88 |  |  |  |  |  |
| 32 | X |  |  |  |  | 89 |  |  |  |  |  |
| 33 | X |  |  |  |  | 90 |  |  |  |  |  |
| 34 | X |  |  |  |  | 91 |  |  |  |  |  |
| 35 | X |  |  |  |  | 92 |  |  |  |  |  |
| 36 | X |  |  |  |  | 93 |  |  |  |  |  |
| 37 |  |  |  |  |  | 94 |  |  |  |  |  |
| 38 |  |  |  |  |  | 95 |  |  |  |  |  |
| 39 |  |  |  |  |  | 96 |  |  |  |  |  |
| 40 |  |  |  |  |  | 97 |  |  |  |  |  |
| 41 |  |  |  |  |  | 98 |  |  |  |  |  |
| 42 |  |  |  |  |  | 99 |  |  |  |  |  |
| 43 |  |  |  |  |  | 100 |  |  |  |  |  |
| 44 |  |  |  |  |  | 101 |  |  |  |  |  |
| 45 |  |  |  |  |  | 102 |  |  |  |  |  |
| 46 |  |  |  |  |  | 103 |  |  |  |  |  |
| 47 |  |  |  |  |  | 104 |  |  |  |  |  |
| 48 |  |  |  |  |  | 105 |  |  |  |  |  |
| 49 |  |  |  |  |  | 106 |  |  |  |  |  |
| 50 |  |  |  |  |  | 107 |  |  |  |  |  |
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| 53 |  |  |  |  |  | 110 |  |  |  |  |  |
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1. **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. |

1. **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.

1. **NORMATIVE REFERENCES**

## Local Codes and Standards

* IPS Iranian petroleum standards
* INBC Iranian National Building Code

## 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](http://www.awwa.org/)
* ASME [The American Society of Mechanical Engineers](https://www.asme.org/)

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

## 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.

1. **HVAC CALCULATION**

## Design weather Parameters:

**Design Parameters:**

    City Name   **Binak**

    Location   **IRAN**

    Latitude   **29.7** Deg.

    Longitude   **-50.4** Deg.

    Elevation   **10.0** 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   **4.4** °C

    Atmospheric Clearness Number   **1.00**

    Average Ground Reflectance   **0.20**

    Soil Conductivity   **1.385** W/(m-°K)

    Local Time Zone (GMT +/- N hours)   **-3.5** hours

    Consider Daylight Savings Time   **No**

    Simulation Weather Data   **noneN/A**

    Current Data is   **User Modified**

    Design Cooling Months   **January to December**

**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 | 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.

**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 |

**Design Temperature Profile**



## CONSTRUCTIONS U-VALUE:

**Wall (Anti acid ceramic tile)**

**Wall Details**

    Outside Surface Color   **Medium**

    Absorptivity   **0.675**

    Overall U-Value   **0.203** W/(m²-°K)

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Thickness** | **Density** | **Specific Ht.** | **R-Value** | **Weight** |
| **Layers** | **mm** | **kg/m³** | **kJ / (kg - °K)** | **(m²-°K)/W** | **kg/m²** |
| Inside surface resistance | 0.000 | 0.0 | 0.00 | 0.12064 | 0.0 |
| Anti acid ceramic tile | 12.500 | 1000.0 | 0.34 | 0.03676 | 12.5 |
| Cement plaster | 25.000 | 1600.0 | 0.80 | 0.03125 | 40.0 |
| HW concrete | 400.000 | 2242.6 | 0.84 | 2.31116 | 8970.4 |
| Cement plaster | 30.000 | 1600.0 | 0.80 | 0.03750 | 48.0 |
| Face brick | 70.000 | 2000.0 | 0.03 | 2.33000 | 140.0 |
| Outside surface resistance | 0.000 | 0.0 | 0.00 | 0.05864 | 0.0 |
| **Totals** | **537.500** | **-** |  | **4.92595** | **9210.9** |

**Wall (Cement plaster)**

**Wall Details**

    Outside Surface Color   **Medium**

    Absorptivity   **0.675**

    Overall U-Value   **0.359** W/(m²-°K)

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Thickness** | **Density** | **Specific Ht.** | **R-Value** | **Weight** |
| **Layers** | **mm** | **kg/m³** | **kJ / (kg - °K)** | **(m²-°K)/W** | **kg/m²** |
| Inside surface resistance | 0.000 | 0.0 | 0.00 | 0.12064 | 0.0 |
| Cement plaster | 5.000 | 1600.0 | 0.80 | 0.00625 | 8.0 |
| HW concrete | 400.000 | 2242.6 | 0.84 | 0.23112 | 897.0 |
| Cement plaster | 30.000 | 1600.0 | 0.80 | 0.03750 | 48.0 |
| Face brick | 70.000 | 2000.0 | 0.03 | 2.33000 | 140.0 |
| Outside surface resistance | 0.000 | 0.0 | 0.00 | 0.05864 | 0.0 |
| **Totals** | **505.000** | **-** |  | **2.78415** | **1093.0** |

**Wall (General)**

**Wall Details**

    Outside Surface Color   **Medium**

    Absorptivity   **0.675**

    Overall U-Value   **0.354** W/(m²-°K)

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Thickness** | **Density** | **Specific Ht.** | **R-Value** | **Weight** |
| **Layers** | **mm** | **kg/m³** | **kJ / (kg - °K)** | **(m²-°K)/W** | **kg/m²** |
| Inside surface resistance | 0.000 | 0.0 | 0.00 | 0.12064 | 0.0 |
| Gypsum plaster | 5.000 | 800.9 | 1.09 | 0.03106 | 4.0 |
| Cement plaster | 15.000 | 1600.0 | 0.80 | 0.01875 | 24.0 |
| HW concrete | 400.000 | 2242.6 | 0.84 | 0.23112 | 897.0 |
| Cement plaster | 30.000 | 1600.0 | 0.80 | 0.03750 | 48.0 |
| Face brick | 70.000 | 2000.0 | 0.03 | 2.33000 | 140.0 |
| Outside surface resistance | 0.000 | 0.0 | 0.00 | 0.05864 | 0.0 |
| **Totals** | **520.000** | **-** |  | **2.82771** | **1113.1** |

**Roof**

**Roof Details**

    Outside Surface Color   **Medium**

    Absorptivity   **0.675**

    Overall U-Value   **0.479** W/(m²-°K)

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Thickness** | **Density** | **Specific Ht.** | **R-Value** | **Weight** |
| **Layers** | **mm** | **kg/m³** | **kJ / (kg - °K)** | **(m²-°K)/W** | **kg/m²** |
| Inside surface resistance | 0.000 | 0.0 | 0.00 | 0.12064 | 0.0 |
| HW concrete | 200.000 | 2242.6 | 0.84 | 0.11556 | 448.5 |
| Rock wool | 50.000 | 25.0 | 0.84 | 1.00000 | 1.3 |
| LW concrete | 100.000 | 640.7 | 0.84 | 0.57779 | 64.1 |
| Waterproofing/isogume or similar | 4.000 | 1000.0 | 1.67 | 0.17390 | 4.0 |
| Cement plaster | 25.000 | 1600.0 | 0.80 | 0.03750 | 40.0 |
| Terrazzo tile | 25.000 | 2000.0 | 0.84 | 0.00185 | 50.0 |
| Outside surface resistance | 0.000 | 0.0 | 0.00 | 0.05864 | 0.0 |
| **Totals** | **404.000** | **-** |  | **2.08588** | **607.8** |

**B.P.D.-1**

**Door Details:**

    Gross Area   **2.6** m²

    Door U-Value   **3.000** 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**

## SPACE INPUT DATA:

**00-Conference Room**

**1. General Details:**

    Floor Area   **38.4** m²

    Avg. Ceiling Height   **3.0** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **0.0** L/s/person

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2010**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Recessed (Unvented)**

    Wattage   **13.20** W/m²

    Ballast Multiplier   **1.00**

    Schedule   **Lighting**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **100.0** Watts

    Schedule   **Electrical Eq.**

**2.4. People:**

    Occupancy   **20.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| WSW | 13.1 | 0 | 0 | 0 |
| SSE | 26.5 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure WSW**

    Wall Type   **Wall (General)**

**3.2. Construction Types for Exposure SSE**

    Wall Type   **Wall (General)**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 38.4 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **38.4** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Exposed Perimeter   **13.2** m

    Edge Insulation R-Value   **0.00** (m²-°K)/W

**7. Partitions:**

**(No partition data).**

**01-Management Room**

**1. General Details:**

    Floor Area   **20.6** m²

    Avg. Ceiling Height   **3.0** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **0.0** L/s/person

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2010**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Recessed (Unvented)**

    Wattage   **11.90** W/m²

    Ballast Multiplier   **1.00**

    Schedule   **Lighting**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **150.0** Watts

    Schedule   **Electrical Eq.**

**2.4. People:**

    Occupancy  **3.0** People

    Activity Level  **Office Work**

    Sensible  **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| SSE | 14.2 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure SSE**

    Wall Type   **Wall (General)**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 20.6 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **20.6** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Exposed Perimeter   **4.7** m

    Edge Insulation R-Value   **0.00** (m²-°K)/W

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **5.7** m²

    U-Value   **1.260** W/(m²-°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).**

**02-Entrance**

**1. General Details:**

    Floor Area   **15.8** m²

    Avg. Ceiling Height   **2.5** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **0.0** L/s/person

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2010**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Recessed (Unvented)**

    Wattage   **7.10** W/m²

    Ballast Multiplier   **1.00**

    Schedule   **Lighting**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **200.0** Watts

    Schedule   **Electrical Eq.**

**2.4. People:**

    Occupancy   **3.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| SSE | 14.2 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure SSE**

  Wall Type   **Wall (General)**

**4. Roofs, Skylights:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| SSE | 14.2 | 0 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **15.8** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Exposed Perimeter   **4.7** m

    Edge Insulation R-Value   **0.00** (m²-°K)/W

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **5.7** m²

    U-Value   **1.260** W/(m²-°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).**

**03-Archive**

**1. General Details:**

    Floor Area   **12.5** m²

    Avg. Ceiling Height   **3.0** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **0.0** L/s/person

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2010**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Recessed (Unvented)**

    Wattage   **11.90** W/m²

    Ballast Multiplier   **1.00**

    Schedule   **Lighting**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **50.0** Watts

    Schedule   **Electrical Eq.**

**2.4. People:**

    Occupancy   **2.0** People

    Activity Level   **Office Work**

    Sensible  **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| SSE | 8.8 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure SSE**

    Wall Type   **Wall (General)**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 12.5 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **12.5** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Exposed Perimeter   **2.9** m

    Edge Insulation R-Value   **0.00** (m²-°K)/W

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **5.7** m²

    U-Value   **1.260** W/(m²-°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).**

**04-Dining Room**

**1. General Details:**

    Floor Area   **16.7** m²

    Avg. Ceiling Height   **3.0** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **0.0** L/s/person

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2010**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Recessed (Unvented)**

    Wattage   **11.50** W/m²

    Ballast Multiplier   **1.00**

    Schedule   **Lighting**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **50.0** Watts

    Schedule   **Electrical Eq.**

**2.4. People:**

    Occupancy   **5.0** People

    Activity Level   **Seated at Rest**

    Sensible   **67.4** W/person

    Latent   **35.2** W/person

    Schedule   **People**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule  **None**

    Latent   **0** W

    Schedule  **None**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| SSE | 11.8 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure SSE**

    Wall Type   **Wall (General)**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 16.7 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **16.7** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Exposed Perimeter   **3.9** m

    Edge Insulation R-Value   **0.00** (m²-°K)/W

**7. Partitions:**

**(No partition data).**

**05-Prayer Room**

**1. General Details:**

    Floor Area   **16.7** m²

    Avg. Ceiling Height   **3.0** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **0.0** L/s/person

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2010**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Recessed (Unvented)**

    Wattage   **11.50** W/m²

    Ballast Multiplier   **1.00**

    Schedule   **Lighting**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **0.0** Watts

    Schedule   **None**

**2.4. People:**

    Occupancy   **15.0** People

    Activity Level   **Sedentary Work**

    Sensible   **82.1** W/person

    Latent   **79.1** W/person

    Schedule   **People**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule  **None**

    Latent   **0** W

    Schedule   **None**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| SSE | 11.8 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure SSE**

    Wall Type   **Wall (General)**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 16.7 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **16.7** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Exposed Perimeter   **3.9** m

    Edge Insulation R-Value   **0.00** (m²-°K)/W

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **12.7** m²

    U-Value   **1.260** W/(m²-°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).**

**06-Corridor**

**1. General Details:**

    Floor Area   **15.2** m²

    Avg. Ceiling Height   **2.5** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **0.0** L/s/person

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2010**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Recessed (Unvented)**

    Wattage   **7.10** W/m²

    Ballast Multiplier   **1.00**

    Schedule   **Lighting**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **0.0** Watts

    Schedule   **None**

**2.4. People:**

    Occupancy   **3.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**3. Walls, Windows, Doors:**

**(No Wall, Window, Door data).**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 15.2 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs at all hours.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **15.2** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Exposed Perimeter   **4.7** m

    Edge Insulation R-Value   **0.00** (m²-°K)/W

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **3.4** m²

    U-Value   **1.260** W/(m²-°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).**

**07-UPS**

**1. General Details:**

    Floor Area   **33.5** m²

    Avg. Ceiling Height   **4.0** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **0.0** L/s/person

    OA Requirement 2   **0.00** L/(s-m²)

    Space Usage Defaults   **ASHRAE Standard 62.1-2010**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Recessed (Unvented)**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.00**

    Schedule   **Lighting**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **4000.0** Watts

    Schedule   **Electrical Eq.**

**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**

**3. Walls, Windows, Doors:**

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| NNW | 13.8 | 0 | 0 | 0 |
| WSW | 9.5 | 0 | 0 | 0 |
| SSE | 13.8 | 0 | 0 | 1 |

**3.1. Construction Types for Exposure NNW**

    Wall Type   **Wall (Cement plaster)**

**3.2. Construction Types for Exposure WSW**

    Wall Type   **Wall (Cement plaster)**

**3.3. Construction Types for Exposure SSE**

    Wall Type   **Wall (Cement plaster)**

    Door Type   **B.P.D.-1**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 33.5 | 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   **33.5** m²

    Total Floor U-Value   **0.568** W/(m²-°K)

    Exposed Perimeter   **9.3** m

    Edge Insulation R-Value   **0.00** (m²-°K)/W

**7. Partitions:**

**(No partition data).**

## SYSTEM INPUT DATA

**1. General Details:**

    Air System Name   **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** |  |
| 00-Conference Room | x1 |
| 01-Management Room | x1 |
| 02-Entrance | x1 |
| 03-Archive | x1 |
| 04-Dining Room | x1 |
| 05-Prayer Room | x1 |
| 06-Corridor | x1 |
| 07-UPS | x1 |

**Thermostats and Zone Data:**

| **Zone** | **Cooling T-Stat Occ.** | **Cooling T-Stat Unocc.** | **Heating T-Stat Occ.** | **Heating T-Stat Unocc.** | **T-Stat Throttling Range** |
| --- | --- | --- | --- | --- | --- |
|  | **(°C)** | **(°C)** | **(°C)** | **(°C)** | **(°C)** |
| **1** | 24.0 | 26.0 | 22.0 | 18.0 | 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:**

    Cooling Supply Temperature   **18.0** °C

    Heating Supply Temperature   **35.0** °C

**Safety Factors:**

    Cooling Sensible   **10** %

    Cooling Latent   **10** %

    Heating   **10** %

## AIR SYSTEM SIZING SUMMARAIR

**Air System Information**

    Air System Name   **System**

    Equipment Class   **TERM**

    Air System Type   **SPLT-FC**

Number of zones   **1**

Floor Area   **169.4** 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**

**Zone Sizing Data**

|  | **Maximum** |  |  |  | **Maximum** | **Zone** |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Cooling** | **Design** | **Minimum** |  | **Heating** | **Floor** |  |
|  | **Sensible** | **Airflow** | **Airflow** | **Time of** | **Load** | **Area** | **Zone** |
| **Zone Name** | **(kW)** | **(L/s)** | **(L/s)** | **Peak Load** | **(kW)** | **(m²)** | **L/(s-m²)** |
| Zone 1 | 13.3 | 1875 | 1875 | Jul 0800 | 4.2 | 169.4 | 11.07 |

**Terminal Unit Sizing Data - Cooling**

|  | **Total** | **Sens** | **Coil** | **Coil** | **Water** | **Time** |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Coil** | **Coil** | **Entering** | **Leaving** | **Flow** | **of** |
|  | **Load** | **Load** | **DB / WB** | **DB / WB** | **@ 5.6 °K** | **Peak** |
| **Zone Name** | **(kW)** | **(kW)** | **(°C)** | **(°C)** | **(L/s)** | **Load** |
| Zone 1 | 18.0 | 13.2 | 24.6 / 20.8 | 18.7 / 18.3 | - | Aug 0800 |

**Terminal Unit Sizing Data - Heating, Fan, Ventilation**

|  |  | **Heating** | **Htg Coil** |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Heating** | **Coil** | **Water** | **Fan** |  |  | **OA Vent** |
|  | **Coil** | **Ent/Lvg** | **Flow** | **Design** | **Fan** | **Fan** | **Design** |
|  | **Load** | **DB** | **@11.1 °K** | **Airflow** | **Motor** | **Motor** | **Airflow** |
| **Zone Name** | **(kW)** | **(°C)** | **(L/s)** | **(L/s)** | **(BHP)** | **(kW)** | **(L/s)** |
| Zone 1 | 4.0 | 21.7 / 23.5 | - | 1875 | 0.000 | 0.000 | 0 |

**Space Loads and Airflows**

|  |  | **Cooling** | **Time** | **Air** | **Heating** | **Floor** |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Zone Name /** |  | **Sensible** | **of** | **Flow** | **Load** | **Area** | **Space** |
| **Space Name** | **Mult.** | **(kW)** | **Load** | **(L/s)** | **(kW)** | **(m²)** | **L/(s-m²)** |
| ***Zone 1*** |  |  |  |  |  |  |  |
| 00-Conference Room | 1 | 2.6 | Jul 0800 | 357 | 0.7 | 38.4 | 9.29 |
| 01-Management Room | 1 | 0.8 | Jul 0800 | 117 | 0.4 | 20.6 | 5.69 |
| 02-Entrance | 1 | 0.8 | Jul 0800 | 114 | 0.4 | 15.8 | 7.19 |
| 03-Archive | 1 | 0.5 | Jul 0800 | 69 | 0.3 | 12.5 | 5.48 |
| 04-Dining Room | 1 | 0.8 | Jul 0800 | 105 | 0.3 | 16.7 | 6.31 |
| 05-Prayer Room | 1 | 1.8 | Jul 0800 | 242 | 0.4 | 16.7 | 14.51 |
| 06-Corridor | 1 | 0.5 | Jul 0800 | 64 | 0.2 | 15.2 | 4.23 |
| 07-UPS | 1 | 5.8 | Jul 1500 | 807 | 1.5 | 33.5 | 24.08 |

## ventilation sizing summary

**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** **(m²)** **(Az)** | **Area** **Outdoor Air Rate** **(L/(s-m²))** **(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)** |
| Zone 1 |  |  |  |  |  |  |  |  |  |  |
| 00-Conference Room | 1 | 357 | 38.4 | 0.00 | 20.0 | 0.00 | 1.00 | 0 | 0 | 1.000 |
| 01-Management Room | 1 | 117 | 20.6 | 0.00 | 3.0 | 0.00 | 1.00 | 0 | 0 | 1.000 |
| 02-Entrance | 1 | 114 | 15.8 | 0.00 | 3.0 | 0.00 | 1.00 | 0 | 0 | 1.000 |
| 03-Archive | 1 | 69 | 12.5 | 0.00 | 2.0 | 0.00 | 1.00 | 0 | 0 | 1.000 |
| 04-Dining Room | 1 | 105 | 16.7 | 0.00 | 5.0 | 0.00 | 1.00 | 0 | 0 | 1.000 |
| 05-Prayer Room | 1 | 242 | 16.7 | 0.00 | 15.0 | 0.00 | 1.00 | 0 | 0 | 1.000 |
| 06-Corridor | 1 | 64 | 15.2 | 0.00 | 3.0 | 0.00 | 1.00 | 0 | 0 | 1.000 |
| 07-UPS | 1 | 807 | 33.5 | 0.00 | 0.0 | 0.00 | 1.00 | 0 | 0 | 1.000 |
| Totals (incl. Space Multipliers) |  | 2579 |  |  |  |  |  |  | 0 | 1.000 |

## air system design load summary:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Aug 0800** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.4 °C / 27.8 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **ZONE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 135 m² | 676 | - | 135 m² | 766 | - |
| Roof Transmission | 174 m² | 1440 | - | 174 m² | 1336 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 3 m² | 40 | - | 3 m² | 125 | - |
| Floor Transmission | 169 m² | 0 | - | 169 m² | 528 | - |
| Partitions | 33 m² | 147 | - | 33 m² | 385 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 2175 W | 1213 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 4550 W | 4550 | - | 0 | 0 | - |
| People | 51 | 3794 | 3225 | 0 | 0 | 0 |
| Infiltration | - | 197 | 1051 | - | 718 | 6 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 1206 | 428 | 10% | 386 | 1 |
| **>> Total Zone Loads** | **-** | **13263** | **4703** | **-** | **4244** | **6** |
| Zone Conditioning | - | 13242 | 4703 | - | 3964 | 6 |
| 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** | **-** | **13242** | **4703** | **-** | **3964** | **6** |
| Terminal Unit Cooling | - | 13242 | 4724 | - | 0 | 0 |
| Terminal Unit Heating | - | 0 | - | - | 3964 | - |
| **>> Total Conditioning** | **-** | **13242** | **4724** | **-** | **3964** | **0** |
| **Key:** | **Positive values are clg loads** | | | **Positive values are htg loads** | | |
|  | **Negative values are htg loads** | | | **Negative values are clg loads** | | |

## ZONE DESIGN LOAD SUMMARY:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Zone 1** | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0800** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.4 °C / 27.8 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 24.0 °C** | | | **OCCUPIED T-STAT 22.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **ZONE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 135 m² | 641 | - | 135 m² | 766 | - |
| Roof Transmission | 174 m² | 1516 | - | 174 m² | 1336 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 3 m² | 40 | - | 3 m² | 125 | - |
| Floor Transmission | 169 m² | 0 | - | 169 m² | 528 | - |
| Partitions | 33 m² | 147 | - | 33 m² | 385 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 2175 W | 1213 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 4550 W | 4550 | - | 0 | 0 | - |
| People | 51 | 3794 | 3225 | 0 | 0 | 0 |
| Infiltration | - | 197 | 1033 | - | 718 | 6 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 1210 | 426 | 10% | 386 | 1 |
| **>> Total Zone Loads** | **-** | **13308** | **4684** | **-** | **4244** | **6** |

## SPACE DESIGN LOAD SUMMARY:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.1.A. COMPONENT LOADS FOR SPACE '' 00-Conference Room '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0800** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.4 °C / 27.8 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 24.0 °C** | | | **OCCUPIED T-STAT 22.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 40 m² | 193 | - | 40 m² | 224 | - |
| Roof Transmission | 38 m² | 334 | - | 38 m² | 295 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 0 m² | 0 | - | 0 m² | 0 | - |
| Floor Transmission | 38 m² | 0 | - | 38 m² | 133 | - |
| Partitions | 0 m² | 0 | - | 0 m² | 0 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 507 W | 283 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 100 W | 100 | - | 0 | 0 | - |
| People | 20 | 1436 | 1202 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 235 | 120 | 10% | 65 | 0 |
| **>> Total Zone Loads** | **-** | **2580** | **1322** | **-** | **717** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.1.B. ENVELOPE LOADS FOR SPACE '' 00-Conference Room '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **WSW EXPOSURE** |  |  |  |  |  |  |
| WALL | 13 | 0.354 | - | 72 | - | 74 |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 27 | 0.354 | - | 121 | - | 150 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 38 | 0.479 | - | 334 | - | 295 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.2.A. COMPONENT LOADS FOR SPACE '' 01-Management Room '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0800** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.4 °C / 27.8 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 24.0 °C** | | | **OCCUPIED T-STAT 22.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 14 m² | 65 | - | 14 m² | 80 | - |
| Roof Transmission | 21 m² | 179 | - | 21 m² | 158 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 0 m² | 0 | - | 0 m² | 0 | - |
| Floor Transmission | 21 m² | 0 | - | 21 m² | 58 | - |
| Partitions | 6 m² | 25 | - | 6 m² | 66 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 245 W | 137 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 150 W | 150 | - | 0 | 0 | - |
| People | 3 | 215 | 180 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 77 | 18 | 10% | 36 | 0 |
| **>> Total Zone Loads** | **-** | **849** | **198** | **-** | **399** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.2.B. ENVELOPE LOADS FOR SPACE '' 01-Management Room '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 14 | 0.354 | - | 65 | - | 80 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 21 | 0.479 | - | 179 | - | 158 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.3.A. COMPONENT LOADS FOR SPACE '' 02-Entrance '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0800** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.4 °C / 27.8 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 24.0 °C** | | | **OCCUPIED T-STAT 22.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 14 m² | 65 | - | 14 m² | 80 | - |
| Roof Transmission | 21 m² | 179 | - | 21 m² | 158 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 0 m² | 0 | - | 0 m² | 0 | - |
| Floor Transmission | 16 m² | 0 | - | 16 m² | 51 | - |
| Partitions | 6 m² | 25 | - | 6 m² | 66 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 112 W | 63 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 200 W | 200 | - | 0 | 0 | - |
| People | 3 | 215 | 180 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 75 | 18 | 10% | 36 | 0 |
| **>> Total Zone Loads** | **-** | **822** | **198** | **-** | **391** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.3.B. ENVELOPE LOADS FOR SPACE '' 02-Entrance '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 14 | 0.354 | - | 65 | - | 80 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 21 | 0.479 | - | 179 | - | 158 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.4.A. COMPONENT LOADS FOR SPACE '' 03-Archive '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0800** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.4 °C / 27.8 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 24.0 °C** | | | **OCCUPIED T-STAT 22.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 9 m² | 40 | - | 9 m² | 50 | - |
| Roof Transmission | 13 m² | 109 | - | 13 m² | 96 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 0 m² | 0 | - | 0 m² | 0 | - |
| Floor Transmission | 13 m² | 0 | - | 13 m² | 36 | - |
| Partitions | 6 m² | 25 | - | 6 m² | 66 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 149 W | 83 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 50 W | 50 | - | 0 | 0 | - |
| People | 2 | 144 | 120 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 45 | 12 | 10% | 25 | 0 |
| **>> Total Zone Loads** | **-** | **496** | **132** | **-** | **272** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.4.B. ENVELOPE LOADS FOR SPACE '' 03-Archive '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 9 | 0.354 | - | 40 | - | 50 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 13 | 0.479 | - | 109 | - | 96 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.5.A. COMPONENT LOADS FOR SPACE '' 04-Dining Room '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0800** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.4 °C / 27.8 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 24.0 °C** | | | **OCCUPIED T-STAT 22.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 12 m² | 54 | - | 12 m² | 67 | - |
| Roof Transmission | 17 m² | 145 | - | 17 m² | 128 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 0 m² | 0 | - | 0 m² | 0 | - |
| Floor Transmission | 17 m² | 0 | - | 17 m² | 48 | - |
| Partitions | 0 m² | 0 | - | 0 m² | 0 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 192 W | 107 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 50 W | 50 | - | 0 | 0 | - |
| People | 5 | 337 | 176 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 69 | 18 | 10% | 24 | 0 |
| **>> Total Zone Loads** | **-** | **763** | **194** | **-** | **267** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.5.B. ENVELOPE LOADS FOR SPACE '' 04-Dining Room '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 12 | 0.354 | - | 54 | - | 67 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 17 | 0.479 | - | 145 | - | 128 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.6.A. COMPONENT LOADS FOR SPACE '' 05-Prayer Room '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0800** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.4 °C / 27.8 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 24.0 °C** | | | **OCCUPIED T-STAT 22.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 12 m² | 54 | - | 12 m² | 67 | - |
| Roof Transmission | 17 m² | 145 | - | 17 m² | 128 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 0 m² | 0 | - | 0 m² | 0 | - |
| Floor Transmission | 17 m² | 0 | - | 17 m² | 48 | - |
| Partitions | 13 m² | 56 | - | 13 m² | 147 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 192 W | 107 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 15 | 1231 | 1187 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 159 | 119 | 10% | 39 | 0 |
| **>> Total Zone Loads** | **-** | **1753** | **1305** | **-** | **429** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.6.B. ENVELOPE LOADS FOR SPACE '' 05-Prayer Room '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 12 | 0.354 | - | 54 | - | 67 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 17 | 0.479 | - | 145 | - | 128 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.7.A. COMPONENT LOADS FOR SPACE '' 06-Corridor '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0800** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.4 °C / 27.8 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 24.0 °C** | | | **OCCUPIED T-STAT 22.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Roof Transmission | 15 m² | 132 | - | 15 m² | 117 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 0 m² | 0 | - | 0 m² | 0 | - |
| Floor Transmission | 15 m² | 0 | - | 15 m² | 50 | - |
| Partitions | 3 m² | 15 | - | 3 m² | 39 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 108 W | 60 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 3 | 215 | 180 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 42 | 18 | 10% | 21 | 0 |
| **>> Total Zone Loads** | **-** | **465** | **198** | **-** | **227** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.7.B. ENVELOPE LOADS FOR SPACE '' 06-Corridor '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 15 | 0.479 | - | 132 | - | 117 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.8.A. COMPONENT LOADS FOR SPACE '' 07-UPS '' IN ZONE '' 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 / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 24.0 °C** | | | **OCCUPIED T-STAT 22.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 35 m² | 161 | - | 35 m² | 198 | - |
| Roof Transmission | 34 m² | 253 | - | 34 m² | 257 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 3 m² | 112 | - | 3 m² | 125 | - |
| Floor Transmission | 34 m² | 0 | - | 34 m² | 105 | - |
| Partitions | 0 m² | 0 | - | 0 m² | 0 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 0 W | 16 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 4000 W | 4000 | - | 0 | 0 | - |
| People | 0 | 0 | 0 | 0 | 0 | 0 |
| Infiltration | - | 763 | 988 | - | 718 | 6 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 530 | 99 | 10% | 140 | 1 |
| **>> Total Zone Loads** | **-** | **5835** | **1087** | **-** | **1543** | **6** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.8.B. ENVELOPE LOADS FOR SPACE '' 07-UPS '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(m²)** | **(W/(m²-°K))** | **Coeff.** | **(W)** | **(W)** | **(W)** |
| **NNW EXPOSURE** |  |  |  |  |  |  |
| WALL | 14 | 0.359 | - | 61 | - | 79 |
| **WSW EXPOSURE** |  |  |  |  |  |  |
| WALL | 10 | 0.359 | - | 50 | - | 55 |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 11 | 0.359 | - | 50 | - | 64 |
| DOOR | 3 | 3.000 | - | 112 | - | 125 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 34 | 0.479 | - | 253 | - | 257 |

1. **Equipment Selection**

## Air Conditioning Unit (split unit)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Item** | **Service Area** | | | | | | | |
| Conference Room | Management Room | Entrance | Corridor | Archive | Dining Room | Prayer Room | UPS |
| Calculated Sensible Cooling Load(w) | 2580 | 849 | 822 | 465 | 496 | 763 | 1753 | 5835 |
| Calculated Latent Cooling Load(w) | 1322 | 198 | 198 | 198 | 132 | 194 | 1305 | 1087 |
| Calculated Total Cooling Load(w) | 3902 | 1047 | 1020 | 663 | 628 | 957 | 3058 | 6922 |
| Calculated Total Cooling Load (btu/hr) | 13326 | 3576 | 3483 | 2264 | 2145 | 3268 | 10444 | 23640 |
| Calculated Sensible Heating Load(w) | 717 | 399 | 391 | 227 | 272 | 267 | 429 | 1543 |
| Calculated Sensible Heating Load (btu/hr) | 2449 | 1363 | 1335 | 775 | 929 | 912 | 1465 | 5270 |
| Eq. ID  (1202-SUI/SUO-GCSCB-XX ) | 01 | 02 | 03 | | 04 | 05 | 06 | 07 |
| Equipment QTY. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Equipment Type | W.M.\* | W.M.\* | W.M.\* | W.M.\* | W.M.\* | W.M.\* | W.M.\* | W.M.\* |
| Calculated Cooling Load+ 10% Over Cap. (btu/hr) | 14659 | 3933 | 3832 | 2359 | 3595 | 11488 | 2491 | 26004 |
| Calculated Heating Load+ 10% Over Cap. (btu/hr) | 2694 | 1499 | 1469 | 1022 | 1003 | 1612 | 853 | 5797 |
| Selected Eq. Nominal Cooling Cap. (btu/hr) | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* |
| Selected Eq. Actual Cooling Cap. (btu/hr) | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* |
| Selected Eq. Actual Heating Cap. (btu/hr) | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* |
| Power Supply (V/PH/Hz) | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 | 230/1/50 |
| Max. Power Consumption (w) Eq. (Cooling/Heating) | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* | B.V.\*\* |
| REMARKE \*\*\* | Cooling & Heating (Heat Pump) | Cooling & Heating (Heat Pump) | Cooling & Heating (Heat Pump) | Cooling & Heating (Heat Pump) | Cooling & Heating (Heat Pump) | Cooling & Heating (Heat Pump) | Cooling & Heating (Heat Pump) | Cooling Only |

\*Wall Mounted

\*\*By Vendor

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

## Exhaust fan selection

**1202-EF-GCSCB-01 (Battery Room + UPS)**

**Battery Room**

Air Flow = 46.79 (area, m²) × 4 (height, m) × 6 ACH ÷ 60 min = 18.71 m³/min = 311.83 L/S = 661 cfm

Battery Room (Nickel–Cadmium (Ni-Ca) Battery) Air-Change per Hour (ACH) rate is based on:

* NFPA 76 (Standard for the Fire Protection of Telecommunications Facilities 2009 Edition) - Fan capacity should be 1 CFM per square feet of floor space.
* NFPA 111 (Standard on Stored Electrical Energy Emergency and Standby Power Systems 2005 Edition) - Recommends a minimum of 2 air-changes per hour to remove gasses generated by vented batteries.
* ASHRAE Guideline 21 (Guide for Ventilation and Thermal Management of Batteries for Stationary Applications) - 1 CFM per charging amp, no less than 6 air-changes per hour.
* IMC (International Mechanical Code) - Fan capacity should be 1 CFM per square feet of floor space.
* IEEE 1635 (Institute of Electrical and Electronics Engineers Standard) - 1 CFM per charging amp, no less than 6 air-changes per hour.

**UPS**

Air Flow = 33.5 (area, m²) × 4 (height, m) × 1 ACH ÷ 60 min = 2.23 m³/min = 37.22 L/S = 78.86 cfm

**1202-EF-GCSCB-02 (Prayer Room + Store)**

**Prayer Room**

Air Flow = 16.7 (area, m²) × 3 (height, m) × 6 ACH ÷ 60 min = 5.01 m³/min = 83.5 L/S = 176.9 cfm

**Store**

Air Flow = 23 (area, m²) × 3 (height, m) × 6 ACH ÷ 60 min = 6.9 m³/min = 115 L/S = 243.7 cfm

|  |  |  |
| --- | --- | --- |
| Item | | **1202-EF-GCSCB-01** |
| Service Area | | Battery Room + UPS |
| Equipment QTY. | | 1 Duty +1 Standby |
| Air Flow(L/S) | | 349.05 |
| Air Flow(CFM) | | 739.86 |
| Component Pressure Drop  (External)  (In.WG.) | Sand Tarp Louver | 0.017 |
| Blast Proof Valve-01 | 0.08 |
| Fire Damper-01 | 0.01 |
| Intake Air Duct | 0.038 |
| Intake Air Duct Volume Damper | 0.04 |
| Intake Air Diffuser | 0.026 |
| Exhaust Air Diffuser/Register | 0.121 |
| Exhaust Air Duct Volume Damper | 0.04 |
| Exhaust Air Duct | 0.028 |
| Blast Proof Valve-02 | 0.08 |
| Fire Damper-02 | 0.01 |
| Motorized Damper | 0.06 |
| Total Pressure Drop \*  + 10% Over S.F. | (In.WG.) | 0.605 |
| (Pa) | 150.00 |
| Exhaust Fan type | | Utility Ex. Fan |
| Power Supply (V/PH/Hz) | | 230/1/50 |
| Power Consumption (w) Each Eq. | | By Vendor |
| REMARKE | | Equipped With Bird Mesh - Explosion Proof |

\*Total Pressure Drop Should Be Specified By Vendor.

|  |  |  |
| --- | --- | --- |
| Item | | **1202-EF-GCSCB-02** |
| Service Area | | Prayer Room + Store |
| Equipment QTY. | | 1 |
| Air Flow(L/S) | | 198.50 |
| Air Flow(CFM) | | 420.6 |
| Component Pressure Drop  (External)  (In.WG.) | Door Grill #1 | 0.051 |
| Door Grill #2 | 0.06 |
| Exhaust Air Diffuser/Register | 0.037 |
| Exhaust Air Duct Volume Damper | 0.04 |
| Exhaust Air Duct | 0.015 |
| Blast Proof Valve-03 | 0.08 |
| Fire Damper-03 | 0.01 |
| Total Pressure Drop \*  + 10% Over S.F. | (In.WG.) | 0.322 |
| (Pa) | 80.13 |
| Exhaust Fan type | | Utility Ex. Fan |
| Power Supply (V/PH/Hz) | | 230/1/50 |
| Power Consumption (w) Each Eq. | | By Vendor |
| REMARKE | | Equipped With Bird Mesh |

\*Total Pressure Drop Should Be Specified By Vendor.