|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **طرح نگهداشت و افزایش تولید 27 مخزن** | | | | | | | |
| **HVAC CALCULATION NOTE FOR CONTROL BUILDING**  **نگهداشت و افزایش تولید میدان نفتی بینک** | | | | | | | |
|  | |  |  |  |  |  |  |
|  | |  |  |  |  |  |  |
| D02 | | JAN.2023 | AFD | H.Adineh | M.Fakharian | M.Mehrshad |  |
| D01 | | JUL. 2022 | IFA | H.Adineh | M.Fakharian | M.Mehrshad |  |
| D00 | | MAR. 2022 | IFC | H.Adineh | M.Fakharian | M.Mehrshad |  |
| **Rev.** | | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **CLIENT Approval** |
| **Class: 2** | | | **CLIENT Doc. Number:** **F0Z-708865** | | | | |
| **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** |
| **1** | X | X | X |  |  | **66** |  |  |  |  |  |
| **2** | X | X | X |  |  | **67** |  |  |  |  |  |
| **3** | X | X | X |  |  | **68** |  |  |  |  |  |
| **4** | X | X | X |  |  | **69** |  |  |  |  |  |
| **5** | X | X | X |  |  | **70** |  |  |  |  |  |
| **6** | X | X | X |  |  | **71** |  |  |  |  |  |
| **7** | X | X | X |  |  | **72** |  |  |  |  |  |
| **8** | X | X | X |  |  | **73** |  |  |  |  |  |
| **9** | X | X | X |  |  | **74** |  |  |  |  |  |
| **10** | X | X | X |  |  | **75** |  |  |  |  |  |
| **11** | X | X | X |  |  | **76** |  |  |  |  |  |
| **12** | X | X | X |  |  | **77** |  |  |  |  |  |
| **13** | X | X | X |  |  | **78** |  |  |  |  |  |
| **14** | X | X | X |  |  | **79** |  |  |  |  |  |
| **15** | X | X | X |  |  | **80** |  |  |  |  |  |
| **16** | X | X | X |  |  | **81** |  |  |  |  |  |
| **17** | X | X | X |  |  | **82** |  |  |  |  |  |
| **18** | X | X | X |  |  | **83** |  |  |  |  |  |
| **19** | X | X | X |  |  | **84** |  |  |  |  |  |
| **20** | X | X | X |  |  | **85** |  |  |  |  |  |
| **21** | X | X | X |  |  | **86** |  |  |  |  |  |
| **22** | X | X | X |  |  | **87** |  |  |  |  |  |
| **23** | X | X | X |  |  | **88** |  |  |  |  |  |
| **24** | X | X | X |  |  | **89** |  |  |  |  |  |
| **25** | X | X | X |  |  | **90** |  |  |  |  |  |
| **26** | X | X | X |  |  | **91** |  |  |  |  |  |
| **27** | X | X | X |  |  | **92** |  |  |  |  |  |
| **28** | X | X | X |  |  | **93** |  |  |  |  |  |
| **29** | X | X | X |  |  | **94** |  |  |  |  |  |
| **30** | X | X | X |  |  | **95** |  |  |  |  |  |
| **31** | X | X | X |  |  | **96** |  |  |  |  |  |
| **32** | X | X | X |  |  | **97** |  |  |  |  |  |
| **33** | X | X | X |  |  | **98** |  |  |  |  |  |
| **34** | X | X | X |  |  | **99** |  |  |  |  |  |
| **35** | X | X | X |  |  | **100** |  |  |  |  |  |
| **36** | X | X | X |  |  | **101** |  |  |  |  |  |
| **37** | X | X | X |  |  | **102** |  |  |  |  |  |
| **38** | X | X | X |  |  | **103** |  |  |  |  |  |
| **39** | X | X | X |  |  | **104** |  |  |  |  |  |
| **40** | X | X | X |  |  | **105** |  |  |  |  |  |
| **41** | X | X | X |  |  | **106** |  |  |  |  |  |
| **42** | X | X | X |  |  | **107** |  |  |  |  |  |
| **43** | X | X | X |  |  | **108** |  |  |  |  |  |
| **44** | X | X | X |  |  | **109** |  |  |  |  |  |
| **45** | X | X | X |  |  | **110** |  |  |  |  |  |
| **46** | X | X | X |  |  | **111** |  |  |  |  |  |
| **47** | X | X | X |  |  | **112** |  |  |  |  |  |
| **48** | X | X | X |  |  | **113** |  |  |  |  |  |
| **49** | X | X | X |  |  | **114** |  |  |  |  |  |
| **50** | X | X | X |  |  | **115** |  |  |  |  |  |
| **51** | X | X | X |  |  | **116** |  |  |  |  |  |
| **52** | X | X | X |  |  | **117** |  |  |  |  |  |
| **53** | X | X | X |  |  | **118** |  |  |  |  |  |
| **54** | X | X | X |  |  | **119** |  |  |  |  |  |
| **55** | X | X | X |  |  | **120** |  |  |  |  |  |
| **56** | X | X | X |  |  | **121** |  |  |  |  |  |
| **57** |  | X | X |  |  | **122** |  |  |  |  |  |
| **58** |  | X | X |  |  | **123** |  |  |  |  |  |
| **59** |  | X |  |  |  | **124** |  |  |  |  |  |
| **60** |  | X |  |  |  | **125** |  |  |  |  |  |
| **61** |  | X |  |  |  | **126** |  |  |  |  |  |
| **62** |  | X |  |  |  | **127** |  |  |  |  |  |
| **63** |  | X |  |  |  | **128** |  |  |  |  |  |
| **64** |  |  |  |  |  | **129** |  |  |  |  |  |
| **65** |  |  |  |  |  | **130** |  |  |  |  |  |

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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**

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

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

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

1. **Site Conditions**

The following information is related to Bandar Deylam and Genaveh.

## Site location

* + Latitude 30° 32’ N
  + Longitude 50° 17’ E
  + Elevation 10 m

## External design conditions (for HVAC design calculation)

* + Summer dry bulb temperature : 41° C
  + Summer wet bulb humidity : : 30.5 ° C
  + Summer daily range temperature : 15.0° C
  + Winter dry bulb temperature : 6.0° C
  + Winter relative humidity : 78%

Note1: Outdoor refrigeration equipment shall be designed to maintain design conditions with an

50 °C temperature.

1. **Internal design conditions (Control Room Building)**

BASED ON “HVAC DESIGN CRITERIA” DOC. NUMBER: BK-GNRAL-PEDCO-000-HV-DC-0001

| **Room** | **Min. Fresh Air**  **(Note 3)** | **Min. Exhaust** | **Room Temp**  **Winter/Summer**  **(Deg C)** | **Relative Humidity**  **Winter/Summer**  **(Min/Max)%** | **Over Pressure Value (Pa)** | **Equipment Heat Gain**  **(Watts)** |
| --- | --- | --- | --- | --- | --- | --- |
| Control Room | 10% supply air | - | 22/24 | 30/60 | Positive | See( 13.3Design Criteria) |
| Engineering Room | 10 l/s. person | - | 22/24 | 30/60 | Positive | - |
| Auxiliary Room | 10% supply air | - | 22/24 | 30/60 | Positive | See( 13.3Design Criteria) |
| UPS & Charger Room | 1 ACH | - | 22/24 | 30/60 | Positive | See( 13.3Design Criteria) |
| Toilet | - | 15 ACH | 20/26 | NC | Negative | - |
| Battery Room | 1 ACH | 10 ACH | NC | NC | Negative | - |
| Corridor | 10 l/s. person | - | 22/24 | 30/60 | Positive | - |
| Air Lock | 10 l/s. person | - | 22/24 | 30/60 | Positive | - |
| Office | 10 l/s. person | - | 22/24 | 30/60 | Positive | - |
| Archive | 10 l/s. person | - | 22/24 | 30/60 | Positive | - |
| HVAC Control Panel Room | 1 ACH | - | 10/30 | NC | Positive | - |
| Prayer Room | 10 l/s. person | - | 22/24 | 30/60 | - | - |
| Instrument Room | 10 l/s. person | - | 22/24 | 30/60 | Positive | - |
| Pantry | 10 l/s. person | 6 ACH | 22/24 | 30/60 | - | - |
| Locker & Shower | 2 ACH | 8 ACH | 20/26 | NC | Negative | - |

1. **HVAC CALCULATION**

## Design weather Parameters:

Design Parameters:

City Name   **binak**

    Location   **IRAN**

    Latitude   **30.3** Deg.

    Longitude   **-50.2** 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)   **-1.0** 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 | 76.4 | 76.4 | 104.1 | 335.1 | 577.4 | 722.3 | 796.4 | 786.7 | 764.0 |
| February | 88.0 | 88.0 | 230.9 | 458.1 | 662.9 | 773.4 | 774.9 | 717.7 | 674.9 |
| March | 100.7 | 108.6 | 368.7 | 585.3 | 707.6 | 758.3 | 705.1 | 595.4 | 528.1 |
| April | 113.1 | 256.3 | 472.2 | 642.7 | 716.0 | 679.9 | 580.0 | 422.9 | 334.5 |
| May | 124.2 | 353.9 | 534.8 | 663.8 | 694.2 | 620.4 | 475.0 | 290.9 | 209.6 |
| June | 157.8 | 384.6 | 558.6 | 667.1 | 676.8 | 585.8 | 428.0 | 240.6 | 172.3 |
| July | 127.6 | 344.7 | 537.1 | 656.3 | 678.1 | 598.4 | 463.4 | 281.6 | 203.3 |
| August | 118.2 | 248.3 | 466.5 | 623.6 | 687.8 | 654.3 | 558.9 | 407.2 | 322.5 |
| September | 104.5 | 113.3 | 336.6 | 555.0 | 683.3 | 716.4 | 681.4 | 580.5 | 517.4 |
| October | 90.9 | 90.9 | 201.8 | 462.7 | 636.7 | 736.7 | 756.5 | 701.7 | 660.0 |
| November | 77.8 | 77.8 | 98.3 | 345.3 | 551.3 | 718.6 | 773.6 | 774.1 | 756.1 |
| December | 71.4 | 71.4 | 71.4 | 269.7 | 530.8 | 696.4 | 785.4 | 795.0 | 786.8 |
| **Month** | **SSW** | **SW** | **WSW** | **W** | **WNW** | **NW** | **NNW** | **HOR** | **Mult** |
| January | 789.5 | 796.9 | 721.1 | 569.2 | 354.1 | 83.2 | 76.4 | 579.3 | 1.00 |
| February | 722.0 | 781.4 | 766.3 | 669.5 | 467.5 | 224.5 | 88.0 | 702.0 | 1.00 |
| March | 596.6 | 704.4 | 761.1 | 720.6 | 569.4 | 368.1 | 116.6 | 809.9 | 1.00 |
| April | 421.4 | 576.3 | 689.2 | 714.5 | 631.4 | 476.0 | 257.9 | 863.7 | 1.00 |
| May | 289.5 | 470.8 | 624.0 | 691.1 | 655.0 | 542.6 | 355.7 | 877.6 | 1.00 |
| June | 238.3 | 421.9 | 590.9 | 670.1 | 656.4 | 565.4 | 389.3 | 873.7 | 1.00 |
| July | 278.1 | 456.2 | 609.2 | 671.7 | 644.3 | 540.2 | 353.4 | 863.9 | 1.00 |
| August | 405.5 | 554.8 | 664.2 | 689.2 | 610.9 | 463.3 | 256.0 | 845.0 | 1.00 |
| September | 580.7 | 681.6 | 714.0 | 684.8 | 554.4 | 333.4 | 114.2 | 785.9 | 1.00 |
| October | 698.5 | 750.4 | 744.7 | 624.3 | 458.7 | 216.5 | 90.9 | 693.3 | 1.00 |
| November | 770.3 | 775.6 | 718.6 | 559.7 | 335.4 | 103.0 | 77.8 | 579.1 | 1.00 |
| December | 796.5 | 774.3 | 701.4 | 517.9 | 296.9 | 71.4 | 71.4 | 527.6 | 1.00 |

## 

## CONSTRUCTIONS U-VALUE:

**External Wall**

**Wall Details**

    Outside Surface Color   **Dark**

    Absorptivity   **0.900**

    Overall U-Value   **0.485** 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 board | 30.000 | 800.9 | 1.09 | 0.18638 | 24.0 |
| concrete block | 350.000 | 977.1 | 0.84 | 0.43027 | 342.0 |
| insulation | 50.000 | 40.0 | 0.92 | 1.19000 | 2.0 |
| cement mortar | 30.000 | 0.0 | 0.00 | 0.06500 | 0.0 |
| facade stone | 20.000 | 7833.0 | 0.50 | 0.00910 | 156.7 |
| Outside surface resistance | 0.000 | 0.0 | 0.00 | 0.05864 | 0.0 |
| **Totals** | **480.000** | **-** |  | **2.06003** | **524.7** |

**External Roof**

**Roof Details**

    Outside Surface Color   **Dark**

    Absorptivity   **0.900**

    Overall U-Value   **0.463** 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 |
| concrete | 400.000 | 2242.6 | 0.84 | 0.22000 | 897.0 |
| rock wool insulation | 50.000 | 40.0 | 0.92 | 1.19000 | 2.0 |
| cement mortar proofing | 50.000 | 1121.3 | 1.47 | 0.40000 | 56.1 |
| Asphalt roll | 1.588 | 1121.3 | 1.51 | 0.02698 | 1.8 |
| sand cement mortat | 30.000 | 0.0 | 0.00 | 0.06500 | 0.0 |
| Terrazzo | 20.000 | 608.7 | 0.84 | 0.08000 | 12.2 |
| Outside surface resistance | 0.000 | 0.0 | 0.00 | 0.05864 | 0.0 |
| **Totals** | **551.588** | **-** |  | **2.16125** | **969.1** |

**DOORS:**

**1.2\*2.5**

**Door Details:**

    Gross Area   **3.0** m²

    Door U-Value   **5.800** 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**

**1.6 x 2.5**

**Door Details:**

    Gross Area   **4.0** m²

    Door U-Value   **5.800** 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**

## SPACES INPUT DATA:

**AIR LOCK (E)**

**1. General Details:**

    Floor Area   **10.0** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **100** % of supply air

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **1.0** Person

    Activity Level   **User defined**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **0.00** W/m²

    Schedule   **None**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| ENE | 8.6 | 0 | 0 | 1 |

**3.1. Construction Types for Exposure E**

    Wall Type   **External Wall**

    Door Type   **1.2\*2.5**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 10.0 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **10.0** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **1.6** m

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

**7. Partitions:**

**(No partition data).**

**AIR LOCK (w)**

**1. General Details:**

    Floor Area   **10.1** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **100** % of supply air

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **1.0** Person

    Activity Level   **User defined**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **0.00** W/m²

    Schedule   **None**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| WSW | 9.9 | 0 | 0 | 1 |

**3.1. Construction Types for Exposure W**

    Wall Type   **External Wall**

    Door Type   **1.2\*2.5**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 10.1 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **10.1** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **2.3** m

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

**7. Partitions:**

**(No partition data).**

**ARCHIVE**

**1. General Details:**

    Floor Area   **18.8** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **10.0** L/s/person

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.25**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **2.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **300.0** Watts

    Schedule   **Equipment**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| WSW | 20.0 | 0 | 0 | 0 |
| SSE | 20.2 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure W**

    Wall Type   **External Wall**

**3.2. Construction Types for Exposure S**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 18.3 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **18.8** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **8.2** m

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

**7. Partitions:**

**(No partition data).**

**CONTROL ROOM**

**1. General Details:**

    Floor Area   **62.9** 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   **100.0** L/s

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **5.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **750** W

    Schedule   **Equipment**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **4000.0** Watts

    Schedule   **Equipment**

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

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

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 62.4 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor Below Grade**

    Floor Area   **62.4** m²

    Exposed Perimeter   **0.0** m

    Total Floor U-Value   **2.000** W/(m²-°K)

    Floor Depth   **1.0** m

    Basement Wall U-Value   **0.568** W/(m²-°K)

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

    Wall Insulation Depth   **0.0** m

**7. Partitions:**

**(No partition data).**

**Corridor 1**

**1. General Details:**

    Floor Area   **27.3** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **10.0** L/s/person

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **3.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **0.00** W/m²

    Schedule   **None**

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

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

**3.1. Construction Types for Exposure W**

    Wall Type   **External Wall**

    Door Type   **1.2\*2.5**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 27.3 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **27.3** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **0.0** m

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

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **32.0** m²

    U-Value   **1.860** W/(m²-°K)

    Uncondit. Space Max Temp   **27.0** °C

    Ambient at Space Max Temp   **41.0** °C

    Uncondit. Space Min Temp   **10.0** °C

    Ambient at Space Min Temp   **6.0** °C

**7.2. 2nd Partition Details:**

    Partition Type   **Wall Partition**

    Area   **38.7** m²

    U-Value   **1.860** W/(m²-°K)

    Uncondit. Space Max Temp   **28.0** °C

    Ambient at Space Max Temp   **41.0** °C

    Uncondit. Space Min Temp   **22.0** °C

    Ambient at Space Min Temp   **6.0** °C

**Corridor 2**

**1. General Details:**

    Floor Area   **10.5** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **10.0** L/s/person

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **1.0** Person

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **0.00** W/m²

    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 | 10.5 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **10.5** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **0.0** m

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

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **20.0** m²

    U-Value   **1.860** W/(m²-°K)

    Uncondit. Space Max Temp   **26.0** °C

    Ambient at Space Max Temp   **41.0** °C

    Uncondit. Space Min Temp   **20.0** °C

    Ambient at Space Min Temp   **6.0** °C

**7.2. 2nd Partition Details:**

    Partition Type   **Wall Partition**

    Area   **38.7** m²

    U-Value   **1.860** W/(m²-°K)

    Uncondit. Space Max Temp   **28.0** °C

    Ambient at Space Max Temp   **41.0** °C

    Uncondit. Space Min Temp   **22.0** °C

    Ambient at Space Min Temp   **6.0** °C

**ENGINEERING ROOM**

**1. General Details:**

    Floor Area   **19.6** 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   **10.0** L/s/person

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **3.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **450.0** Watts

    Schedule   **Equipment**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| NNW | 24.5 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure N**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 19.6 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor Below Grade**

    Floor Area   **19.6** m²

    Exposed Perimeter   **5.7** m

    Total Floor U-Value   **2.000** W/(m²-°K)

    Floor Depth   **1.0** m

    Basement Wall U-Value   **0.568** W/(m²-°K)

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

    Wall Insulation Depth   **0.0** m

**7. Partitions:**

**(No partition data).**

**HVAC CONTROL PANEL**

**1. General Details:**

    Floor Area   **11.7** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **10.0** L/s

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **3.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **2000.0** Watts

    Schedule   **Equipment**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| WSW | 9.8 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure W**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 11.7 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **11.7** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **2.3** m

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

**7. Partitions:**

**(No partition data).**

**INSTRUMENT ROOM**

**1. General Details:**

    Floor Area   **19.5** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **10.0** L/s/person

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.25**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **3.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **300.0** Watts

    Schedule   **Equipment**

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

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

**3.1. Construction Types for Exposure E**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 20.1 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **19.5** m²

    Total Floor U-Value   **1.600** W/(m²-°K)

    Exposed Perimeter   **3.0** m

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

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **27.0** m²

    U-Value   **2.839** W/(m²-°K)

    Uncondit. Space Max Temp   **26.0** °C

    Ambient at Space Max Temp   **44.0** °C

    Uncondit. Space Min Temp   **20.0** °C

    Ambient at Space Min Temp   **6.0** °C

**7.2. 2nd Partition Details:**

**(No partition data).**

**ITR**

**1. General Details:**

    Floor Area   **92.8** 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   **10** % of supply air

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **2.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **20000.0** Watts

    Schedule   **Equipment**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| NNW | 27.5 | 0 | 0 | 1 |
| ENE | 62.3 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure N**

    Wall Type   **External Wall**

    Door Type   **1.6 x 2.5**

**3.2. Construction Types for Exposure E**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 92.8 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

 Type   **Slab Floor Below Grade**

    Floor Area   **92.8** m²

    Exposed Perimeter   **20.7** m

    Total Floor U-Value   **2.000** W/(m²-°K)

    Floor Depth   **1.0** m

    Basement Wall U-Value   **0.568** W/(m²-°K)

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

    Wall Insulation Depth   **0.0** m

**7. Partitions:**

**(No partition data).**

**LOCKER AND SHOWER**

**1. General Details:**

    Floor Area   **16.0** 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   **100** % of supply air

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **2.0** People

    Activity Level   **User defined**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **0.00** W/m²

    Schedule   **None**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| ENE | 11.6 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure S**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 16 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **16.0** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **2.6** m

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

**7. Partitions:**

**(No partition data).**

**OFFICE (1)**

**1. General Details:**

    Floor Area   **14.8** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **10.0** L/s/person

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.25**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **3.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **450.0** Watts

    Schedule   **Equipment**

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

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

**3.1. Construction Types for Exposure W**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 14.8 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **14.8** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **3.2** m

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

**7. Partitions:**

**(No partition data).**

**OFFICE (2)**

**1. General Details:**

    Floor Area   **10.8** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **10.0** L/s/person

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.25**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **2.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **300.0** Watts

    Schedule   **Equipment**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| WSW | 15.8 | 0 | 0 | 0 |
| SSE | 20.7 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure W**

    Wall Type   **External Wall**

**3.2. Construction Types for Exposure S**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 10.8 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** L/s

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **10.8** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **0.0** m

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

**7. Partitions:**

**(No partition data).**

**PANTRY**

**1. General Details:**

    Floor Area   **24.3** 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   **181.0** L/s

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.0** Watts

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **5.0** People

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **1106** W

    Schedule   **Equipment**

    Latent   **574** W

    Schedule   **Equipment**

**2.3. Electrical Equipment:**

    Wattage   **0.00** W/m²

    Schedule   **None**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| SSE | 28.4 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure S**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 24.3 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **24.3** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **6.6** m

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

**7. Partitions:**

**7.1. 1st Partition Details:**

    Partition Type   **Wall Partition**

    Area   **16.7** m²

    U-Value   **2.839** W/(m²-°K)

    Uncondit. Space Max Temp   **26.0** °C

    Ambient at Space Max Temp   **44.0** °C

    Uncondit. Space Min Temp   **20.0** °C

    Ambient at Space Min Temp   **6.0** °C

**7.2. 2nd Partition Details:**

**(No partition data).**

**PRAYER ROOM**

**1. General Details:**

    Floor Area   **9.0** m²

    Avg. Ceiling Height   **2.8** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **30.0** L/s

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **3.0** People

    Activity Level   **User defined**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **0.00** W/m²

    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 | 9.0 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **9.0** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **0.0** m

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

**7. Partitions:**

**(No partition data).**

**TOILET**

**1. General Details:**

    Floor Area   **26** 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   **100** % of supply air

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **2.0** People

    Activity Level   **User defined**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **0.00** W/m²

    Schedule   **None**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| SSE | 27.5 | 0 | 0 | 0 |
| ENE | 17.2 | 0 | 0 | 0 |

**3.1. Construction Types for Exposure E**

    Wall Type   **External Wall**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 26 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **26** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **10.4** m

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

**7. Partitions:**

**(No partition data).**

**UPS ROOM**

**1. General Details:**

    Floor Area   **23.0** m²

    Avg. Ceiling Height   **2.6** m

    Building Weight   **341.8** kg/m²

**1.1. OA Ventilation Requirements:**

    Space Usage   **User-Defined**

    OA Requirement 1   **30.0** L/s

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

    Space Usage Defaults   **ASHRAE Standard 62.1-2007**

**2. Internals:**

**2.1. Overhead Lighting:**

    Fixture Type   **Free Hanging**

    Wattage   **20.00** W/m²

    Ballast Multiplier   **1.20**

    Schedule   **Lighting**

**2.4. People:**

    Occupancy   **1.0** Person

    Activity Level   **Office Work**

    Sensible   **71.8** W/person

    Latent   **60.1** W/person

    Schedule   **People**

**2.2. Task Lighting:**

    Wattage   **0.00** W/m²

    Schedule   **None**

**2.5. Miscellaneous Loads:**

    Sensible   **0** W

    Schedule   **None**

    Latent   **0** W

    Schedule   **None**

**2.3. Electrical Equipment:**

    Wattage   **5000.0** Watts

    Schedule   **Equipment**

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

| **Exp.** | **Wall Gross Area (m²)** | **Window 1 Qty.** | **Window 2 Qty.** | **Door 1 Qty.** |
| --- | --- | --- | --- | --- |
| NNW | 24.0 | 0 | 0 | 0 |
| WSW | 18.0 | 0 | 0 | 1 |

**3.1. Construction Types for Exposure N**

    Wall Type   **External Wall**

**3.2. Construction Types for Exposure W**

    Wall Type   **External Wall**

    Door Type   **1.2\*2.5**

**4. Roofs, Skylights:**

| **Exp.** | **Roof Gross Area (m²)** | **Roof Slope (deg.)** | **Skylight Qty.** |
| --- | --- | --- | --- |
| H | 22.0 | 0 | 0 |

**4.1. Construction Types for Exposure H**

    Roof Type   **External Roof**

**5. Infiltration:**

    Design Cooling   **0.00** ACH

    Design Heating   **0.00** L/s

    Energy Analysis   **0.00** L/s

    Infiltration occurs only when the fan is off.

**6. Floors:**

    Type   **Slab Floor On Grade**

    Floor Area   **23.0** m²

    Total Floor U-Value   **2.000** W/(m²-°K)

    Exposed Perimeter   **9.9** m

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

**7. Partitions:**

**(No partition data).**

## SYSTEM INPUT DATA

**1. General Details:**

    Air System Name   **CONTROL BUILDING**

    Equipment Type   **Split AHU**

    Air System Type   **CAV with Terminal Reheat**

    Number of zones   **3**

**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

**Preheat Coil Data:**

    Setpoint   **10.0** °C

    Heating Source   **Electric Resistance**

    Schedule   **JFMAMJJASOND**

    Coil position   **Downstream of Mixing Point**

**Central Cooling Data:**

    Supply Air Temperature   **14.0** °C

    Coil Bypass Factor   **0.100**

    Cooling Source   **Air-Cooled DX**

    Schedule   **JFMAMJJASOND**

    Capacity Control   **Cycled or Staged Capacity - Fan On**

**Supply Fan Data:**

    Fan Type   **Backward Inclined or Airfoil (BI/AF)**

    Configuration   **Draw-thru**

    Fan Performance   **1201** Pa

    Overall Efficiency   **60** %

**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** |  |
| CONTROL ROOM | x1 |
| Corridor 1 | x1 |
| ENGINEERING ROOM | x1 |
| OFFICE (1) | x1 |
| OFFICE (2) | x1 |
| PANTRY | x1 |
| PRAYER ROOM | x1 |
| UPS ROOM | x1 |
| Corridor 2 | x1 |
| INSTRUMENT ROOM | x1 |
| ITR | x1 |
| ARCHIVE | x1 |
| AIR LOCK (E) | x1 |
| AIR LOCK (w) | x1 |
| **Zone 2: Zone 2** |  |
| LOCKER AND SHOWER | x1 |
| TOILET | x1 |
| **Zone 3: Zone 3** |  |
| HVAC CONTROL PANEL | 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** | **Diversity Factor** | **Direct Exhaust Airflow** | **Direct Exhaust Fan** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **(°C)** | **(°C)** | **(°C)** | **(°C)** | **(°C)** | **(%)** | **(L/s)** | **(kW)** |
| **1** | 24.0 | 24.0 | 22.0 | 22.0 | 0.83 | 100 | 0.0 | 0.0 |
| **2** | 26.0 | 26.0 | 20.0 | 20.0 | 0.83 | 100 | 0.0 | 0.0 |
| **3** | 27.0 | 27.0 | 10.0 | 10.0 | 0.83 | 100 | 0.0 | 0.0 |

    Thermostat Schedule   **Fan**

    Unoccupied Cooling is   **Available**

**Supply Terminals Data:**

    Zone   **All**

    Terminal Type   **Diffuser with RH**

    Minimum Airflow   **0.00** L/s/person

    Reheat Coil Source   **Electric Resistance**

    Reheat Coil Schedule   **JFMAMJJASOND**

**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):**

**System Sizing Data:**

**Sizing Data:**

    Cooling Supply Temperature   **14.0** °C

    Supply Fan Airflow   **4970.7** L/s

    Ventilation Airflow   **1019.4** L/s

**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** %

**Zone Sizing Data:**

    Zone Airflow Sizing Method   **Sum of space airflow rates**

    Space Airflow Sizing Method   **Individual peak space loads**

| **Zone** | **Supply Airflow** | **Zone Htg Unit** | **Reheat Coil** | **-** |
| --- | --- | --- | --- | --- |
|  | **(L/s)** | **(kW)** | **(kW)** | **-** |
| **1** | 4625.1 | - | 53.6 | - |
| **2** | 157.8 | - | 2.1 |  |
| **3** | 187.7 | - | 0.1 |  |

**5. Equipment Data**

**Central Cooling Unit - Air-Cooled DX**

    Estimated Maximum Load   **137.4** kW

    Design OAT   **35.0** °C

    Equipment Sizing   **Auto-Sized**

    Capacity Oversizing Factor   **0** %

    ARI Performance Rating   **3.224** EER

    Conventional Cutoff OAT   **12.8** °C

    Low Temperature Operation   **Used**

    Low Temperature Cutoff OAT   **-17.8** °C

## SYSTEM DESIGN REPORT

**Air System Information**

    Air System Name   **CONTROL BUILDING**

    Equipment Class   **SPLT AHU**

    Air System Type   **CAV/RH**

Number of zones   **3**

Floor Area   **407.1** 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**

**Central Cooling Coil Sizing Data**

    Total coil load   **137.4** kW

    Sensible coil load   **89.4** kW

    Coil L/s at Jun 1400   **4971** L/s

    Max block L/s   **4971** L/s

    Sum of peak zone L/s   **4971** L/s

    Sensible heat ratio   **0.651**

    m²/kW   **3.0**

    W/m²   **337.4**

    Water flow @ 5.6 °K rise   **N/A**

Load occurs at   **Jun 1400**

OA DB / WB   **40.0 / 30.4** °C

Entering DB / WB   **27.8 / 20.3** °C

Leaving DB / WB   **12.9 / 12.3** °C

Coil ADP   **11.2** °C

Bypass Factor   **0.100**

Resulting RH   **46** %

Design supply temp.   **14.0** °C

Zone T-stat Check   **3 of 3** OK

Max zone temperature deviation   **0.0** °K

**Preheat Coil Sizing Data**

**No heating coil loads occurred during this calculation.**

**Supply Fan Sizing Data**

    Actual max L/s   **4971** L/s

    Standard L/s   **4965** L/s

    Actual max L/(s-m²)   **12.21** L/(s-m²)

Fan motor BHP   **12.54** BHP

Fan motor kW   **9.95** kW

Fan static   **1201** Pa

**Outdoor Ventilation Air Data**

    Design airflow L/s   **1019** L/s

    L/(s-m²)   **2.50** L/(s-m²)

L/s/person   **24.86** L/s/person

**Air System Information**

    Air System Name   **CONTROL BUILDING**

    Equipment Class   **SPLT AHU**

    Air System Type   **CAV/RH**

Number of zones   **3**

Floor Area   **407.1** 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 | 55.5 | 4625 | 4625 | Jul 1500 | 9.0 | 353.4 | 13.09 |
| Zone 2 | 2.3 | 158 | 158 | Jul 0100 | 0.9 | 42.0 | 3.76 |
| Zone 3 | 2.9 | 188 | 188 | Jul 0200 | 0.1 | 11.7 | 16.05 |

**Zone Terminal Sizing Data**

|  |  | **Reheat** | **Zone** | **Zone** |  |
| --- | --- | --- | --- | --- | --- |
|  | **Reheat** | **Coil** | **Htg** | **Htg** | **Mixing** |
|  | **Coil** | **Water** | **Coil** | **Water** | **Box Fan** |
|  | **Load** | **L/s** | **Load** | **L/s** | **Airflow** |
| **Zone Name** | **(kW)** | **@ 11.1 °K** | **(kW)** | **@ 11.1 °K** | **(L/s)** |
| Zone 1 | 53.6 | - | 0.0 | - | 0 |
| Zone 2 | 2.1 | - | 0.0 | - | 0 |
| Zone 3 | 0.1 | - | 0.0 | - | 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*** |  |  |  |  |  |  |  |
| CONTROL ROOM | 1 | 8.0 | Jul 0400 | 661 | 0.5 | 62.9 | 10.51 |
| Corridor 1 | 1 | 1.6 | Jul 1500 | 129 | 1.0 | 27.3 | 4.72 |
| ENGINEERING ROOM | 1 | 1.7 | Jul 0200 | 138 | 0.5 | 19.6 | 7.04 |
| OFFICE (1) | 1 | 1.4 | Jul 0200 | 120 | 0.3 | 14.8 | 8.08 |
| OFFICE (2) | 1 | 1.2 | Aug 0000 | 103 | 0.4 | 10.8 | 9.56 |
| PANTRY | 1 | 2.2 | Aug 1600 | 181 | 0.7 | 24.3 | 7.45 |
| PRAYER ROOM | 1 | 0.6 | Jul 0400 | 48 | 0.1 | 9.0 | 5.29 |
| UPS ROOM | 1 | 7.0 | Jul 1500 | 580 | 1.0 | 23.0 | 25.20 |
| Corridor 2 | 1 | 0.8 | Jul 1500 | 67 | 0.2 | 10.5 | 6.39 |
| INSTRUMENT ROOM | 1 | 1.5 | Jul 1500 | 127 | 0.5 | 19.5 | 6.50 |
| ITR | 1 | 26.7 | Jul 1600 | 2214 | 2.4 | 92.8 | 23.86 |
| ARCHIVE | 1 | 1.6 | Aug 0100 | 129 | 0.6 | 18.8 | 6.87 |
| AIR LOCK (E) | 1 | 0.8 | Jul 1500 | 64 | 0.5 | 10.0 | 6.42 |
| AIR LOCK (w) | 1 | 0.8 | Jul 1500 | 65 | 0.5 | 10.1 | 6.44 |
| ***Zone 2*** |  |  |  |  |  |  |  |
| LOCKER AND SHOWER | 1 | 0.8 | Jul 0100 | 58 | 0.3 | 16.0 | 3.62 |
| TOILET | 1 | 1.4 | Jul 0100 | 100 | 0.7 | 26.0 | 3.84 |
| ***Zone 3*** |  |  |  |  |  |  |  |
| HVAC CONTROL PANEL | 1 | 2.9 | Jul 0200 | 188 | 0.1 | 11.7 | 16.05 |

**1. Summary**

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

    Design Ventilation Airflow Rate   **1019** L/s

**2. Space Ventilation Analysis Table**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Floor** |  | **Maximum** | **Required** | **Required** | **Required** | **Required** | **Uncorrected** |
|  |  | **Area** | **Maximum** | **Supply Air** | **Outdoor Air** | **Outdoor Air** | **Outdoor Air** | **Outdoor Air** | **Outdoor Air** |
| **Zone Name / Space Name** | **Mult.** | **(m²)** | **Occupants** | **(L/s)** | **(L/s/person)** | **(L/(s-m²))** | **(L/s)** | **(% of supply)** | **(L/s)** |
| **Zone 1** |  |  |  |  |  |  |  |  |  |
| CONTROL ROOM | 1 | 62.9 | 5.0 | 661.1 | 0.00 | 0.00 | 100.0 | 0.0 | 100.0 |
| Corridor 1 | 1 | 27.3 | 2.0 | 128.8 | 10.00 | 0.00 | 0.0 | 0.0 | 20.0 |
| ENGINEERING ROOM | 1 | 19.6 | 3.0 | 138.0 | 10.00 | 0.00 | 0.0 | 0.0 | 30.0 |
| OFFICE (1) | 1 | 14.8 | 3.0 | 119.6 | 10.00 | 0.00 | 0.0 | 0.0 | 30.0 |
| OFFICE (2) | 1 | 10.8 | 2.0 | 103.3 | 10.00 | 0.00 | 0.0 | 0.0 | 20.0 |
| PANTRY | 1 | 24.3 | 5.0 | 181.0 | 0.00 | 0.00 | 181.0 | 0.0 | 181.0 |
| PRAYER ROOM | 1 | 9.0 | 3.0 | 47.6 | 0.00 | 0.00 | 30.0 | 0.0 | 30.0 |
| UPS ROOM | 1 | 23.0 | 1.0 | 579.5 | 0.00 | 0.00 | 30.0 | 0.0 | 30.0 |
| Corridor 2 | 1 | 10.5 | 1.0 | 67.0 | 10.00 | 0.00 | 0.0 | 0.0 | 10.0 |
| INSTRUMENT ROOM | 1 | 19.5 | 3.0 | 126.8 | 10.00 | 0.00 | 0.0 | 0.0 | 30.0 |
| ITR | 1 | 92.8 | 2.0 | 2213.9 | 0.00 | 0.00 | 0.0 | 10.0 | 221.4 |
| ARCHIVE | 1 | 18.8 | 2.0 | 129.2 | 10.00 | 0.00 | 0.0 | 0.0 | 20.0 |
| AIR LOCK (E) | 1 | 10.0 | 1.0 | 64.2 | 0.00 | 0.00 | 0.0 | 100.0 | 64.2 |
| AIR LOCK (w) | 1 | 10.1 | 1.0 | 65.0 | 0.00 | 0.00 | 0.0 | 100.0 | 65.0 |
| **Zone 2** |  |  |  |  |  |  |  |  |  |
| LOCKER AND SHOWER | 1 | 16.0 | 2.0 | 58.0 | 0.00 | 0.00 | 0.0 | 100.0 | 58.0 |
| TOILET | 1 | 26.0 | 2.0 | 99.8 | 0.00 | 0.00 | 0.0 | 100.0 | 99.8 |
| **Zone 3** |  |  |  |  |  |  |  |  |  |
| HVAC CONTROL PANEL | 1 | 11.7 | 3.0 | 187.7 | 0.00 | 0.00 | 10.0 | 0.0 | 10.0 |
| **Totals (incl. Space Multipliers)** |  |  |  | **4970.7** |  |  |  |  | **1019.4** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **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** |
| **ZONE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 291 m² | 2180 | - | 291 m² | 2260 | - |
| Roof Transmission | 353 m² | 3327 | - | 353 m² | 2610 | - |
| Window Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Skylight Transmission | 0 m² | 0 | - | 0 m² | 0 | - |
| Door Loads | 13 m² | 1079 | - | 13 m² | 1206 | - |
| Floor Transmission | 353 m² | 0 | - | 353 m² | 1100 | - |
| Partitions | 173 m² | 804 | - | 173 m² | 1037 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 7986 W | 7986 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 30800 W | 30799 | - | 0 | 0 | - |
| People | 34 | 2441 | 2043 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 1856 | 574 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 5047 | 262 | 10% | 821 | 0 |
| **>> Total Zone Loads** | **-** | **55519** | **2878** | **-** | **9035** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Zone 2** | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0100** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 28.0 °C / 27.7 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 26.0 °C** | | | **OCCUPIED T-STAT 20.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **ZONE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 56 m² | 400 | - | 56 m² | 383 | - |
| Roof Transmission | 42 m² | 381 | - | 42 m² | 272 | - |
| 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 | 42 m² | 0 | - | 42 m² | 179 | - |
| Partitions | 0 m² | 0 | - | 0 m² | 0 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 1008 W | 1008 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 4 | 287 | 240 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 208 | 24 | 10% | 83 | 0 |
| **>> Total Zone Loads** | **-** | **2284** | **264** | **-** | **917** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Zone 3** | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0200** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 27.2 °C / 26.9 °C** | | | **HEATING OA DB / WB 6.0 °C / 4.4 °C** | | |
|  | **OCCUPIED T-STAT 27.0 °C** | | | **OCCUPIED T-STAT 10.0 °C** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **ZONE LOADS** | **Details** | **(W)** | **(W)** | **Details** | **(W)** | **(W)** |
| Window & Skylight Solar Loads | 0 m² | 0 | - | 0 m² | - | - |
| Wall Transmission | 10 m² | 76 | - | 10 m² | 19 | - |
| Roof Transmission | 12 m² | 103 | - | 12 m² | 22 | - |
| 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 | 12 m² | 0 | - | 12 m² | 11 | - |
| Partitions | 0 m² | 0 | - | 0 m² | 0 | - |
| Ceiling | 0 m² | 0 | - | 0 m² | 0 | - |
| Overhead Lighting | 281 W | 281 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 2000 W | 2000 | - | 0 | 0 | - |
| People | 3 | 215 | 180 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 268 | 18 | 10% | 5 | 0 |
| **>> Total Zone Loads** | **-** | **2943** | **198** | **-** | **57** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.1.A. COMPONENT LOADS FOR SPACE '' CONTROL ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0400** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 79.1 °F / 78.6 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Roof Transmission | 672 ft² | 2144 | - | 672 ft² | 1576 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 672 ft² | 0 | - | 672 ft² | 0 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 1510 W | 5151 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 4000 W | 13648 | - | 0 | 0 | - |
| People | 5 | 1225 | 1025 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 2559 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 2473 | 103 | 10% | 158 | 0 |
| **>> Total Zone Loads** | **-** | **27200** | **1128** | **-** | **1734** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.1.B. ENVELOPE LOADS FOR SPACE '' CONTROL ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 672 | 0.081 | - | 2144 | - | 1576 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.2.A. COMPONENT LOADS FOR SPACE '' Corridor 1 '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 1500** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 105.8 °F / 86.9 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Roof Transmission | 294 ft² | 879 | - | 294 ft² | 690 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 294 ft² | 0 | - | 294 ft² | 0 | - |
| Partitions | 761 ft² | 1214 | - | 761 ft² | 2437 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 655 W | 2236 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 2 | 490 | 410 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 482 | 41 | 10% | 313 | 0 |
| **>> Total Zone Loads** | **-** | **5300** | **451** | **-** | **3439** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.2.B. ENVELOPE LOADS FOR SPACE '' Corridor 1 '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 294 | 0.081 | - | 879 | - | 690 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.3.A. COMPONENT LOADS FOR SPACE '' ENGINEERING ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0200** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 81.0 °F / 80.5 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 264 ft² | 615 | - | 264 ft² | 649 | - |
| Roof Transmission | 211 ft² | 672 | - | 211 ft² | 495 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 211 ft² | 0 | - | 211 ft² | 373 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 470 W | 1605 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 450 W | 1535 | - | 0 | 0 | - |
| People | 3 | 735 | 615 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 516 | 62 | 10% | 152 | 0 |
| **>> Total Zone Loads** | **-** | **5678** | **677** | **-** | **1669** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.3.B. ENVELOPE LOADS FOR SPACE '' ENGINEERING ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **NNW EXPOSURE** |  |  |  |  |  |  |
| WALL | 264 | 0.085 | - | 615 | - | 649 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 211 | 0.081 | - | 672 | - | 495 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.4.A. COMPONENT LOADS FOR SPACE '' OFFICE (1) '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0200** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 81.0 °F / 80.5 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 149 ft² | 432 | - | 149 ft² | 366 | - |
| Roof Transmission | 159 ft² | 508 | - | 159 ft² | 374 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 159 ft² | 0 | - | 159 ft² | 202 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 370 W | 1262 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 450 W | 1535 | - | 0 | 0 | - |
| People | 3 | 735 | 615 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 447 | 62 | 10% | 94 | 0 |
| **>> Total Zone Loads** | **-** | **4920** | **677** | **-** | **1036** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.4.B. ENVELOPE LOADS FOR SPACE '' OFFICE (1) '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **WSW EXPOSURE** |  |  |  |  |  |  |
| WALL | 149 | 0.085 | - | 432 | - | 366 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 159 | 0.081 | - | 508 | - | 374 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.5.A. COMPONENT LOADS FOR SPACE '' OFFICE (2) '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Aug 0000** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 83.7 °F / 82.1 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 393 ft² | 1084 | - | 393 ft² | 967 | - |
| Roof Transmission | 116 ft² | 345 | - | 116 ft² | 273 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 116 ft² | 0 | - | 116 ft² | 0 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 270 W | 921 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 300 W | 1024 | - | 0 | 0 | - |
| People | 2 | 490 | 410 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 386 | 41 | 10% | 124 | 0 |
| **>> Total Zone Loads** | **-** | **4250** | **451** | **-** | **1364** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.5.B. ENVELOPE LOADS FOR SPACE '' OFFICE (2) '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **WSW EXPOSURE** |  |  |  |  |  |  |
| WALL | 170 | 0.085 | - | 506 | - | 419 |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 223 | 0.085 | - | 578 | - | 549 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 116 | 0.081 | - | 345 | - | 273 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.6.A. COMPONENT LOADS FOR SPACE '' PANTRY '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Aug 1600** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 105.0 °F / 86.7 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 306 ft² | 758 | - | 306 ft² | 753 | - |
| Roof Transmission | 262 ft² | 735 | - | 262 ft² | 614 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 262 ft² | 0 | - | 262 ft² | 384 | - |
| Partitions | 180 ft² | 175 | - | 180 ft² | 324 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 24 W | 82 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 5 | 1225 | 1025 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 3774 | 1959 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 675 | 298 | 10% | 207 | 0 |
| **>> Total Zone Loads** | **-** | **7423** | **3282** | **-** | **2281** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.6.B. ENVELOPE LOADS FOR SPACE '' PANTRY '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 306 | 0.085 | - | 758 | - | 753 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 262 | 0.081 | - | 735 | - | 614 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.7.A. COMPONENT LOADS FOR SPACE '' PRAYER ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0400** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 79.1 °F / 78.6 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Roof Transmission | 97 ft² | 309 | - | 97 ft² | 227 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 97 ft² | 0 | - | 97 ft² | 0 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 216 W | 737 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 3 | 735 | 615 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 178 | 62 | 10% | 23 | 0 |
| **>> Total Zone Loads** | **-** | **1959** | **677** | **-** | **250** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.7.B. ENVELOPE LOADS FOR SPACE '' PRAYER ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 97 | 0.081 | - | 309 | - | 227 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.8.A. COMPONENT LOADS FOR SPACE '' UPS ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 1500** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 105.8 °F / 86.9 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 420 ft² | 929 | - | 420 ft² | 1034 | - |
| Roof Transmission | 237 ft² | 709 | - | 237 ft² | 556 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 32 ft² | 850 | - | 32 ft² | 950 | - |
| Floor Transmission | 248 ft² | 0 | - | 248 ft² | 478 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 552 W | 1883 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 5000 W | 17060 | - | 0 | 0 | - |
| People | 1 | 245 | 205 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 2168 | 21 | 10% | 302 | 0 |
| **>> Total Zone Loads** | **-** | **23843** | **226** | **-** | **3319** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.8.B. ENVELOPE LOADS FOR SPACE '' UPS ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **NNW EXPOSURE** |  |  |  |  |  |  |
| WALL | 258 | 0.085 | - | 527 | - | 636 |
| **WSW EXPOSURE** |  |  |  |  |  |  |
| WALL | 161 | 0.085 | - | 402 | - | 398 |
| DOOR | 32 | 1.021 | - | 850 | - | 950 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 237 | 0.081 | - | 709 | - | 556 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.9.A. COMPONENT LOADS FOR SPACE '' Corridor 2 '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 1500** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 105.8 °F / 86.9 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Roof Transmission | 113 ft² | 338 | - | 113 ft² | 265 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 113 ft² | 0 | - | 113 ft² | 0 | - |
| Partitions | 632 ft² | 1065 | - | 632 ft² | 254 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 252 W | 860 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 1 | 245 | 205 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 251 | 21 | 10% | 52 | 0 |
| **>> Total Zone Loads** | **-** | **2758** | **226** | **-** | **571** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.9.B. ENVELOPE LOADS FOR SPACE '' Corridor 2 '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 113 | 0.081 | - | 338 | - | 265 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.10.A. COMPONENT LOADS FOR SPACE '' INSTRUMENT ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 1500** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 105.8 °F / 86.9 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 141 ft² | 385 | - | 141 ft² | 347 | - |
| Roof Transmission | 216 ft² | 647 | - | 216 ft² | 508 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 210 ft² | 0 | - | 210 ft² | 203 | - |
| Partitions | 291 ft² | 288 | - | 291 ft² | 523 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 488 W | 1663 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 300 W | 1024 | - | 0 | 0 | - |
| People | 3 | 735 | 615 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 474 | 62 | 10% | 158 | 0 |
| **>> Total Zone Loads** | **-** | **5217** | **677** | **-** | **1739** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.10.B. ENVELOPE LOADS FOR SPACE '' INSTRUMENT ROOM '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **ENE EXPOSURE** |  |  |  |  |  |  |
| WALL | 141 | 0.085 | - | 385 | - | 347 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 216 | 0.081 | - | 647 | - | 508 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.11.A. COMPONENT LOADS FOR SPACE '' ITR '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 1600** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 105.0 °F / 86.7 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 924 ft² | 2363 | - | 924 ft² | 2274 | - |
| Roof Transmission | 999 ft² | 2989 | - | 999 ft² | 2344 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 43 ft² | 1123 | - | 43 ft² | 1267 | - |
| Floor Transmission | 999 ft² | 0 | - | 999 ft² | 1466 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 2227 W | 7599 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 20000 W | 68240 | - | 0 | 0 | - |
| People | 2 | 490 | 410 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 8280 | 41 | 10% | 735 | 0 |
| **>> Total Zone Loads** | **-** | **91084** | **451** | **-** | **8086** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.11.B. ENVELOPE LOADS FOR SPACE '' ITR '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **NNW EXPOSURE** |  |  |  |  |  |  |
| WALL | 253 | 0.085 | - | 518 | - | 623 |
| DOOR | 43 | 1.021 | - | 1123 | - | 1267 |
| **ENE EXPOSURE** |  |  |  |  |  |  |
| WALL | 671 | 0.085 | - | 1844 | - | 1651 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 999 | 0.081 | - | 2989 | - | 2344 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.12.A. COMPONENT LOADS FOR SPACE '' ARCHIVE '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Aug 0100** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 82.3 °F / 81.8 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 403 ft² | 1113 | - | 403 ft² | 991 | - |
| Roof Transmission | 202 ft² | 604 | - | 202 ft² | 475 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 202 ft² | 0 | - | 202 ft² | 394 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 470 W | 1604 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 300 W | 1024 | - | 0 | 0 | - |
| People | 2 | 490 | 410 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 483 | 41 | 10% | 186 | 0 |
| **>> Total Zone Loads** | **-** | **5317** | **451** | **-** | **2046** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.12.B. ENVELOPE LOADS FOR SPACE '' ARCHIVE '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **WSW EXPOSURE** |  |  |  |  |  |  |
| WALL | 185 | 0.085 | - | 551 | - | 456 |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 217 | 0.085 | - | 562 | - | 535 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 202 | 0.081 | - | 604 | - | 475 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.13.A. COMPONENT LOADS FOR SPACE '' AIR LOCK (E) '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 1500** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 105.8 °F / 86.9 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 60 ft² | 165 | - | 60 ft² | 148 | - |
| Roof Transmission | 108 ft² | 322 | - | 108 ft² | 253 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 32 ft² | 850 | - | 32 ft² | 950 | - |
| Floor Transmission | 108 ft² | 0 | - | 108 ft² | 112 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 240 W | 819 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 1 | 245 | 205 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 240 | 21 | 10% | 146 | 0 |
| **>> Total Zone Loads** | **-** | **2640** | **226** | **-** | **1609** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.13.B. ENVELOPE LOADS FOR SPACE '' AIR LOCK (E) '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **ENE EXPOSURE** |  |  |  |  |  |  |
| WALL | 60 | 0.085 | - | 165 | - | 148 |
| DOOR | 32 | 1.021 | - | 850 | - | 950 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 108 | 0.081 | - | 322 | - | 253 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.14.A. COMPONENT LOADS FOR SPACE '' AIR LOCK (w) '' IN ZONE '' Zone 1 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 1500** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 105.8 °F / 86.9 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 75.2 °F** | | | **OCCUPIED T-STAT 71.6 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 74 ft² | 185 | - | 74 ft² | 183 | - |
| Roof Transmission | 109 ft² | 325 | - | 109 ft² | 255 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 32 ft² | 850 | - | 32 ft² | 950 | - |
| Floor Transmission | 109 ft² | 0 | - | 109 ft² | 143 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 242 W | 827 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 1 | 245 | 205 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 243 | 21 | 10% | 153 | 0 |
| **>> Total Zone Loads** | **-** | **2675** | **226** | **-** | **1684** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 1.14.B. ENVELOPE LOADS FOR SPACE '' AIR LOCK (w) '' IN ZONE '' Zone 1 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **WSW EXPOSURE** |  |  |  |  |  |  |
| WALL | 74 | 0.085 | - | 185 | - | 183 |
| DOOR | 32 | 1.021 | - | 850 | - | 950 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 109 | 0.081 | - | 325 | - | 255 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 2.1.A. COMPONENT LOADS FOR SPACE '' LOCKER AND SHOWER '' IN ZONE '' Zone 2 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0100** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 82.3 °F / 81.8 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 78.8 °F** | | | **OCCUPIED T-STAT 68.0 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 125 ft² | 308 | - | 125 ft² | 269 | - |
| Roof Transmission | 172 ft² | 495 | - | 172 ft² | 354 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 172 ft² | 0 | - | 172 ft² | 158 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 384 W | 1310 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 2 | 490 | 410 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 260 | 41 | 10% | 78 | 0 |
| **>> Total Zone Loads** | **-** | **2863** | **451** | **-** | **859** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 2.1.B. ENVELOPE LOADS FOR SPACE '' LOCKER AND SHOWER '' IN ZONE '' Zone 2 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **ENE EXPOSURE** |  |  |  |  |  |  |
| WALL | 125 | 0.085 | - | 308 | - | 269 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 172 | 0.081 | - | 495 | - | 354 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 2.2.A. COMPONENT LOADS FOR SPACE '' TOILET '' IN ZONE '' Zone 2 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0100** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 82.3 °F / 81.8 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 78.8 °F** | | | **OCCUPIED T-STAT 68.0 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 481 ft² | 1057 | - | 481 ft² | 1037 | - |
| Roof Transmission | 280 ft² | 804 | - | 280 ft² | 575 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 280 ft² | 0 | - | 280 ft² | 453 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 624 W | 2129 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 0 W | 0 | - | 0 | 0 | - |
| People | 2 | 490 | 410 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 448 | 41 | 10% | 206 | 0 |
| **>> Total Zone Loads** | **-** | **4928** | **451** | **-** | **2271** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 2.2.B. ENVELOPE LOADS FOR SPACE '' TOILET '' IN ZONE '' Zone 2 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **SSE EXPOSURE** |  |  |  |  |  |  |
| WALL | 296 | 0.085 | - | 600 | - | 638 |
| **ENE EXPOSURE** |  |  |  |  |  |  |
| WALL | 185 | 0.085 | - | 457 | - | 399 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 280 | 0.081 | - | 804 | - | 575 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 3.1.A. COMPONENT LOADS FOR SPACE '' HVAC CONTROL PANEL '' IN ZONE '' Zone 3 ''** | | | | | | |
|  | **DESIGN COOLING** | | | **DESIGN HEATING** | | |
|  | **COOLING DATA AT Jul 0200** | | | **HEATING DATA AT DES HTG** | | |
|  | **COOLING OA DB / WB 81.0 °F / 80.5 °F** | | | **HEATING OA DB / WB 42.8 °F / 39.9 °F** | | |
|  | **OCCUPIED T-STAT 80.6 °F** | | | **OCCUPIED T-STAT 50.0 °F** | | |
|  |  | **Sensible** | **Latent** |  | **Sensible** | **Latent** |
| **SPACE LOADS** | **Details** | **(BTU/hr)** | **(BTU/hr)** | **Details** | **(BTU/hr)** | **(BTU/hr)** |
| Window & Skylight Solar Loads | 0 ft² | 0 | - | 0 ft² | - | - |
| Wall Transmission | 105 ft² | 258 | - | 105 ft² | 65 | - |
| Roof Transmission | 129 ft² | 353 | - | 129 ft² | 76 | - |
| Window Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Skylight Transmission | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Door Loads | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Floor Transmission | 126 ft² | 0 | - | 126 ft² | 38 | - |
| Partitions | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Ceiling | 0 ft² | 0 | - | 0 ft² | 0 | - |
| Overhead Lighting | 281 W | 958 | - | 0 | 0 | - |
| Task Lighting | 0 W | 0 | - | 0 | 0 | - |
| Electric Equipment | 2000 W | 6824 | - | 0 | 0 | - |
| People | 3 | 735 | 615 | 0 | 0 | 0 |
| Infiltration | - | 0 | 0 | - | 0 | 0 |
| Miscellaneous | - | 0 | 0 | - | 0 | 0 |
| Safety Factor | 10% / 10% | 913 | 62 | 10% | 18 | 0 |
| **>> Total Zone Loads** | **-** | **10041** | **677** | **-** | **196** | **0** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **TABLE 3.1.B. ENVELOPE LOADS FOR SPACE '' HVAC CONTROL PANEL '' IN ZONE '' Zone 3 ''** | | | | | | |
|  |  |  |  | **COOLING** | **COOLING** | **HEATING** |
|  | **Area** | **U-Value** | **Shade** | **TRANS** | **SOLAR** | **TRANS** |
|  | **(ft²)** | **(BTU/(hr-ft²-°F))** | **Coeff.** | **(BTU/hr)** | **(BTU/hr)** | **(BTU/hr)** |
| **WSW EXPOSURE** |  |  |  |  |  |  |
| WALL | 105 | 0.085 | - | 258 | - | 65 |
| **H EXPOSURE** |  |  |  |  |  |  |
| ROOF | 129 | 0.081 | - | 353 | - | 76 |

**June DESIGN COOLING DAY, 1400**

**TABLE 1: SYSTEM DATA**

|  |  | **Dry-Bulb** | **Specific** |  |  | **Sensible** | **Latent** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Temp** | **Humidity** | **Airflow** | **CO2 Level** | **Heat** | **Heat** |
| **Component** | **Location** | **(°F)** | **(lb/lb)** | **(CFM)** | **(ppm)** | **(BTU/hr)** | **(BTU/hr)** |
| Ventilation Air | Inlet | 104.0 | 0.02375 | 2160 | 400 | 64552 | 152407 |
| Vent - Return Mixing | Outlet | 82.0 | 0.01192 | 10532 | 616 | - | - |
| Preheat Coil | Outlet | 82.0 | 0.01192 | 10532 | 616 | 0 | - |
| Central Cooling Coil | Outlet | 55.1 | 0.00864 | 10532 | 616 | 304906 | 163816 |
| Supply Fan | Outlet | 58.1 | 0.00864 | 10532 | 616 | 33951 | - |
| Cold Supply Duct | Outlet | 58.1 | 0.00864 | 10532 | 616 | - | - |
| Zone Air | - | 76.3 | 0.00887 | 10532 | 672 | 206403 | 11400 |
| Return Plenum | Outlet | 76.3 | 0.00887 | 10532 | 672 | 0 | - |

*Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.079 BTU/(hr-CFM-F)*

*Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4741.0 BTU/(hr-CFM)*

*Site Altitude = 32.8 ft*

**TABLE 2: ZONE DATA**

|  | **Zone** |  |  |  |  |  | **Terminal** | **Zone** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Sensible** |  | **Zone** | **Zone** | **Zone** | **CO2** | **Heating** | **Heating** |
|  | **Load** | **T-stat** | **Cond** | **Temp** | **Airflow** | **Level** | **Coil** | **Unit** |
| **Zone Name** | **(BTU/hr)** | **Mode** | **(BTU/hr)** | **(°F)** | **(CFM)** | **(ppm)** | **(BTU/hr)** | **(BTU/hr)** |
| Zone 1 | 188545 | Cooling | 188701 | 76.0 | 9800 | 667 | 0 | 0 |
| Zone 2 | 7563 | Cooling | 7673 | 79.4 | 334 | 768 | 0 | 0 |
| Zone 3 | 9953 | Cooling | 10030 | 81.5 | 398 | 715 | 0 | 0 |

**WINTER DESIGN HEATING**

**TABLE 1: SYSTEM DATA**

|  |  | **Dry-Bulb** | **Specific** |  |  | **Sensible** | **Latent** |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Temp** | **Humidity** | **Airflow** | **CO2 Level** | **Heat** | **Heat** |
| **Component** | **Location** | **(°F)** | **(lb/lb)** | **(CFM)** | **(ppm)** | **(BTU/hr)** | **(BTU/hr)** |
| Ventilation Air | Inlet | 42.8 | 0.00453 | 2160 | 400 | -65274 | 0 |
| Vent - Return Mixing | Outlet | 65.1 | 0.00453 | 10532 | 432 | - | - |
| Preheat Coil | Outlet | 65.1 | 0.00453 | 10532 | 432 | 0 | - |
| Central Cooling Coil | Outlet | 65.1 | 0.00453 | 10532 | 432 | 0 | 0 |
| Supply Fan | Outlet | 68.1 | 0.00453 | 10532 | 432 | 33951 | - |
| Cold Supply Duct | Outlet | 68.1 | 0.00453 | 10532 | 432 | - | - |
| Zone Air | - | 70.8 | 0.00453 | 10532 | 440 | -33689 | 0 |
| Return Plenum | Outlet | 70.8 | 0.00453 | 10532 | 440 | 0 | - |

*Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.079 BTU/(hr-CFM-F)*

*Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4741.0 BTU/(hr-CFM)*

*Site Altitude = 32.8 ft*

**TABLE 2: ZONE DATA**

|  | **Zone** |  |  |  |  |  | **Terminal** | **Zone** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Sensible** |  | **Zone** | **Zone** | **Zone** | **CO2** | **Heating** | **Heating** |
|  | **Load** | **T-stat** | **Cond** | **Temp** | **Airflow** | **Level** | **Coil** | **Unit** |
| **Zone Name** | **(BTU/hr)** | **Mode** | **(BTU/hr)** | **(°F)** | **(CFM)** | **(ppm)** | **(BTU/hr)** | **(BTU/hr)** |
| Zone 1 | -30828 | Heating | -30088 | 71.1 | 9800 | 440 | 62001 | 0 |
| Zone 2 | -3130 | Heating | -3072 | 67.4 | 334 | 440 | 2828 | 0 |
| Zone 3 | -196 | Deadband | -529 | 66.8 | 398 | 440 | 0 | 0 |



1. **Equipment Selection:**

**PACKAGE UNIT:**

**Equipment no :** **22-AHU-01-A,B**

Quantity : 2

with air cooled condensing unit (**22-ACCU-01A,B**)

**Cooling Coil :**

Cooling coil type : DX type

Cooling coil capacity : 137.4 kW

Cooling coil entering temperature : 27.8 °C db / 20.3°C wb

Cooling coil leaving air temperature : 12.9°C db / 12.3°C wb

**Blower:**

Supply Air Flow Rate: 4971 l/s  
Fresh Air Flow Rate: 1019 l/s  
Return Air Flow Rate: 3952 l/s

External Duct static pressure : 1.5 \* 95 m \* 0.816 pa/m =116.28 pa

Sound Attenuator Quantity: 2

Total Sound Attenuator Pressure Drop: 300 pa

Duct heater pressure drop: 58 pa

Motorized Fire Damper: 1\*29 pa = 29 pa

Motorized Smoke Fire Damper: 29 pa = 29 pa

Volume Damper = 3\* 48 pa

Blast Valve = 2 \* 150 pa = 300 pa

Return Register = 48 pa

Supply Diffuser = 48 pa

Sand Trap Louver =77 pa

Total External static pressure= 1120 pa→ 1200 pa

Internal static pressure : by vendor

**EXHAUST FANS:**

|  |  |  |  |
| --- | --- | --- | --- |
| Equipment No: | 22-EF-03-A,B | 22-EF-04 | 22-EF-05 |
| Quantity | 2 (Duty Stand by) | 1 | 1 |
| Type | Centrifuge-  roof mounted | Centrifuge-  roof mounted | Centrifuge-  roof mounted |
| Flow Rate(L/S) | 640 | 229 | 280 |
| Static Pressure | Duct:  10 m x 1.5 x 0.816 pa/m  =12 pa  Margin 10% = 0.85 pa  →14 pa  Exhaust Diffuser:  48 pa  Motorized Fire Damper:  29 pa  Motorized Damper:  29 pa  Sand Trap Louver:  57 pa  Exhaust Air Louver:  38 pa  =215 pa→230 pa | Duct:  12 m x 1.5 x 0.816  pa/m  =14.7 pa Margin 10% : 1.47  =16.17 pa  Exhaust Diffuser:  48 pa  Motorized Damper:  29 pa  Exhaust Air Louver:  38 pa  =131.2 pa→140 pa | Duct:  12 m x 1.5 x 0.816  pa/m  =14.7 pa Margin 10% : 1.47  =16.17 pa  Exhaust Diffuser:  48 pa  Volume Damper:  29 pa  Motorized Damper:  29 pa  Exhaust Air Louver:  38 pa  =160.17 pa→165 pa |
| Service Area | Battery Room | Prayer- pantry | Lavatory-shower &locker |
| Remarks | EX Type |  |  |

**Duct Heater:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 22-EDH-08 | 22-EDH-07 | 22-EDH-06 | 22-EDH-05 | 22-EDH-04 | 22-EDH-03 | 22-EDH-02 | 22-EDH-01 | Equipment No: |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Quantity |
| 7 | 11 | 25 | 6.5 | 8 | 3.5 | 2.5 | 3 | Capacity (kw): |
| 450\*275 | 525\*325 | 775\*450 | 375\*200 | 350\*275 | 350\*150 | 225\*175 | 300\*150 | Duct Size  (mm\*mm) |
| UPS Room | Engineering room  & Control Room | Auxiliary Room (ITR) | Corridors& Air locks | Offices & Archive &  Prayer | Pantry | Instrument Room | Lavatory & locker and shower | Service area |
| Thyrestore (SCR) | Thyrestore (SCR) | Thyrestore (SCR) | Thyrestore (SCR) | Thyrestore (SCR) | Step Control | Step Control | Step Control | Control Capacity Type |

**Sand Trap Louver (HVAC Room):**

Pressure Drop =77 pa ≈ 0.31 inwg

Air Flow Rate: 1019 l/s

from “**Shahrokhi Manufacturing co.**“ catalogue for Sand Trap Louver:

0.31 inwg Pressure Drop → =400 FPM

Air Flow Rate: 1019 l/s ≈ 2123 CFM →

=2123/400=5.3 → W=48” & H=48”