

# Residential System Sizing Calculation

## Summary

Murtagh Custom - 1500 Model

Project Title:  
221073 Murtagh Custom

Lake City, FL

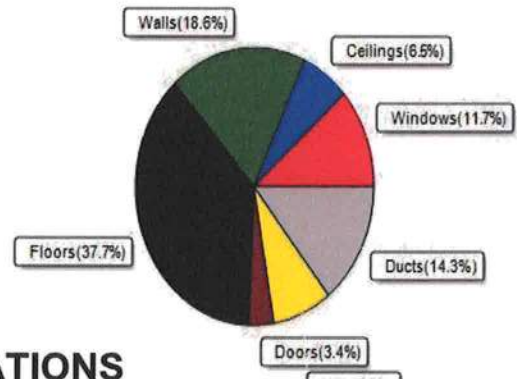
2022-09-14

|                                                                                                       |                   |                                       |                    |
|-------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------|--------------------|
| Location for weather data: Gainesville, FL - Defaults: Latitude(29.7) Altitude(152 ft.) Temp Range(M) |                   |                                       |                    |
| Humidity data: Interior RH (50%) Outdoor wet bulb (77F) Humidity difference(51gr.)                    |                   |                                       |                    |
| Winter design temperature(TMY3 99%)                                                                   | 30 F              | Summer design temperature(TMY3 99%)   | 94 F               |
| Winter setpoint                                                                                       | 70 F              | Summer setpoint                       | 75 F               |
| Winter temperature difference                                                                         | 40 F              | Summer temperature difference         | 19 F               |
| <b>Total heating load calculation</b>                                                                 | <b>24801 Btuh</b> | <b>Total cooling load calculation</b> | <b>23240 Btuh</b>  |
| Submitted heating capacity                                                                            | % of calc Btuh    | Submitted cooling capacity            | % of calc Btuh     |
| Total (Electric Heat Pump)                                                                            | 108.9 27000       | Sensible (SHR = 0.75)                 | 101.3 20250        |
| Heat Pump + Auxiliary(0.0kW)                                                                          | 108.9 27000       | Latent                                | 207.4 6750         |
|                                                                                                       |                   | <b>Total (Electric Heat Pump)</b>     | <b>116.2 27000</b> |

## WINTER CALCULATIONS

Winter Heating Load (for 1500 sqft)

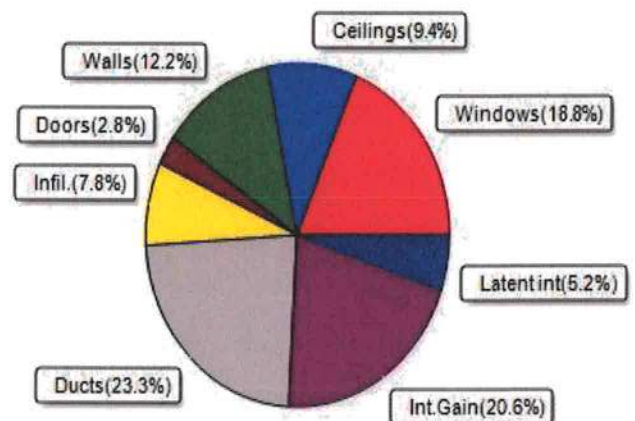
| Load component         |           | Load              |  |
|------------------------|-----------|-------------------|--|
| Window total           | 219 sqft  | 2891 Btuh         |  |
| Wall total             | 1298 sqft | 4607 Btuh         |  |
| Door total             | 53 sqft   | 853 Btuh          |  |
| Ceiling total          | 1600 sqft | 1624 Btuh         |  |
| Floor total            | 1500 sqft | 9346 Btuh         |  |
| Infiltration           | 44 cfm    | 1922 Btuh         |  |
| Duct loss              |           | 3558 Btuh         |  |
| <b>Subtotal</b>        |           | <b>24801 Btuh</b> |  |
| Ventilation            | 0 cfm     | 0 Btuh            |  |
| <b>TOTAL HEAT LOSS</b> |           | <b>24801 Btuh</b> |  |



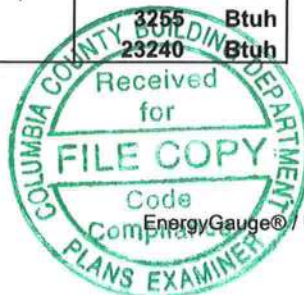
## SUMMER CALCULATIONS

Summer Cooling Load (for 1500 sqft)

| Load component                        |           | Load              |  |
|---------------------------------------|-----------|-------------------|--|
| Window total                          | 219 sqft  | 4371 Btuh         |  |
| Wall total                            | 1298 sqft | 2824 Btuh         |  |
| Door total                            | 53 sqft   | 640 Btuh          |  |
| Ceiling total                         | 1600 sqft | 2193 Btuh         |  |
| Floor total                           |           | 0 Btuh            |  |
| Infiltration                          | 33 cfm    | 685 Btuh          |  |
| Internal gain                         |           | 4780 Btuh         |  |
| Duct gain                             |           | 4492 Btuh         |  |
| Sens. Ventilation                     | 0 cfm     | 0 Btuh            |  |
| Blower Load                           |           | 0 Btuh            |  |
| <b>Total sensible gain</b>            |           | <b>19985 Btuh</b> |  |
| Latent gain(ducts)                    |           | 918 Btuh          |  |
| Latent gain(infiltration)             |           | 1136 Btuh         |  |
| Latent gain(ventilation)              |           | 0 Btuh            |  |
| Latent gain(internal/occupants/other) |           | 1200 Btuh         |  |
| <b>Total latent gain</b>              |           | <b>3255 Btuh</b>  |  |
| <b>TOTAL HEAT GAIN</b>                |           | <b>23240 Btuh</b> |  |



8th Edition



EnergyGauge® System Sizing  
PREPARED BY: Evan Beamsley  
DATE: 2022-09-14

EnergyGauge® / USRCZB v7.0.00

# System Sizing Calculations - Winter

## Residential Load - Whole House Component Details

Murtagh Custom - 1500 Model

Project Title:  
221073 Murtagh Custom  
Building Type: User

Lake City, FL

2022-09-14

Reference City: Gainesville, FL (Defaults) Winter Temperature Difference: 40.0 F (TMY3 99%)

| Component Loads for Whole House |                       |       |         |                     |             |   |      |           |
|---------------------------------|-----------------------|-------|---------|---------------------|-------------|---|------|-----------|
| Window                          | Panes/Type            | Frame | U       | Orientation         | Area(sqft)  | X | HTM= | Load      |
| 1                               | 2, NFRC 0.22          | Metal | 0.33    | N                   | 15.0        |   | 13.2 | 198 Btuh  |
| 2                               | 2, NFRC 0.22          | Metal | 0.33    | NE                  | 10.0        |   | 13.2 | 132 Btuh  |
| 3                               | 2, NFRC 0.22          | Metal | 0.33    | N                   | 45.0        |   | 13.2 | 594 Btuh  |
| 4                               | 2, NFRC 0.22          | Metal | 0.33    | NW                  | 13.3        |   | 13.2 | 176 Btuh  |
| 5                               | 2, NFRC 0.22          | Metal | 0.33    | N                   | 30.0        |   | 13.2 | 396 Btuh  |
| 6                               | 2, NFRC 0.22          | Metal | 0.33    | E                   | 30.0        |   | 13.2 | 396 Btuh  |
| 7                               | 2, NFRC 0.22          | Metal | 0.33    | E                   | 6.0         |   | 13.2 | 79 Btuh   |
| 8                               | 2, NFRC 0.22          | Metal | 0.33    | S                   | 30.0        |   | 13.2 | 396 Btuh  |
| 9                               | 2, NFRC 0.22          | Metal | 0.33    | S                   | 30.0        |   | 13.2 | 396 Btuh  |
| 10                              | 2, NFRC 0.22          | Metal | 0.33    | S                   | 6.7         |   | 13.2 | 88 Btuh   |
| 11                              | 2, NFRC 0.22          | Metal | 0.33    | W                   | 3.0         |   | 13.2 | 40 Btuh   |
| Window Total                    |                       |       |         |                     | 219.0(sqft) |   |      | 2891 Btuh |
| Walls                           | Type                  | Ornt. | Ueff.   | R-Value<br>(Cav/Sh) | Area        | X | HTM= | Load      |
| 1                               | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 118         |   | 3.55 | 420 Btuh  |
| 2                               | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 17          |   | 3.55 | 59 Btuh   |
| 3                               | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 24          |   | 3.55 | 85 Btuh   |
| 4                               | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 60          |   | 3.55 | 214 Btuh  |
| 5                               | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 13          |   | 3.55 | 47 Btuh   |
| 6                               | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 24          |   | 3.55 | 85 Btuh   |
| 7                               | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 63          |   | 3.55 | 225 Btuh  |
| 8                               | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 328         |   | 3.55 | 1165 Btuh |
| 9                               | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 63          |   | 3.55 | 222 Btuh  |
| 10                              | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 53          |   | 3.55 | 189 Btuh  |
| 11                              | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 52          |   | 3.55 | 185 Btuh  |
| 12                              | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 60          |   | 3.55 | 213 Btuh  |
| 13                              | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 21          |   | 3.55 | 76 Btuh   |
| 14                              | Frame - Wood          | - Adj | (0.089) | 13.0/0.0            | 40          |   | 3.55 | 142 Btuh  |
| 15                              | Frame - Wood          | - Adj | (0.089) | 13.0/0.0            | 67          |   | 3.55 | 239 Btuh  |
| 16                              | Frame - Wood          | - Adj | (0.089) | 13.0/0.0            | 19          |   | 3.55 | 66 Btuh   |
| 17                              | Frame - Wood          | - Adj | (0.089) | 13.0/0.0            | 69          |   | 3.55 | 246 Btuh  |
| 18                              | Frame - Wood          | - Ext | (0.089) | 13.0/0.0            | 205         |   | 3.55 | 728 Btuh  |
| Wall Total                      |                       |       |         |                     | 1298(sqft)  |   |      | 4607 Btuh |
| Doors                           | Type                  | Storm | Ueff.   |                     | Area        | X | HTM= | Load      |
| 1                               | Insulated - Exterior, | n     | (0.400) |                     | 7           |   | 16.0 | 107 Btuh  |
| 2                               | Insulated - Exterior, | n     | (0.400) |                     | 7           |   | 16.0 | 107 Btuh  |
| 3                               | Insulated - Exterior, | n     | (0.400) |                     | 20          |   | 16.0 | 320 Btuh  |
| 4                               | Insulated - Garage,   | n     | (0.400) |                     | 20          |   | 16.0 | 320 Btuh  |
| Door Total                      |                       |       |         |                     | 53(sqft)    |   |      | 853Btuh   |
| Ceilings                        | Type/Color/Surface    |       | Ueff.   | R-Value             | Area        | X | HTM= | Load      |
| 1                               | Vented Attic/D/Shing  |       | (0.025) | 38.0/0.0            | 1600        |   | 1.0  | 1624 Btuh |
| Ceiling Total                   |                       |       |         |                     | 1600(sqft)  |   |      | 1624Btuh  |



# Manual J Winter Calculations

## Residential Load - Component Details (continued)

Murtagh Custom - 1500 Model

Project Title:  
221073 Murtagh Custom  
Building Type: User

Lake City, FL

2022-09-14

|                     |                                                               |                        |                       |                                         |              |                                |
|---------------------|---------------------------------------------------------------|------------------------|-----------------------|-----------------------------------------|--------------|--------------------------------|
| <b>Floors</b><br>1  | Type<br>Slab On Grade<br>Floor Total                          | Ueff.<br>(1.180)       | R-Value<br>0.0        | Size X<br>198.0 ft(perim.)<br>1500 sqft | HTM=<br>47.2 | Load<br>9346 Btuh<br>9346 Btuh |
| Envelope Subtotal:  |                                                               |                        |                       |                                         |              | 19321 Btuh                     |
| <b>Infiltration</b> | Type<br>Natural                                               | Wholehouse ACH<br>0.22 | Volume(cuft)<br>12000 | Wall Ratio<br>1.00                      | CFM=<br>43.9 | 1922 Btuh                      |
| <b>Duct load</b>    | Average sealed, R6.0, Supply(Att), Return(Att) (DLM of 0.167) |                        |                       |                                         |              | 3558 Btuh                      |
| <b>All Zones</b>    | Sensible Subtotal All Zones                                   |                        |                       |                                         |              | 24801 Btuh                     |

### WHOLE HOUSE TOTALS

|                           |                                                                                  |                                    |
|---------------------------|----------------------------------------------------------------------------------|------------------------------------|
| <b>Totals for Heating</b> | Subtotal Sensible Heat Loss<br>Ventilation Sensible Heat Loss<br>Total Heat Loss | 24801 Btuh<br>0 Btuh<br>24801 Btuh |
|---------------------------|----------------------------------------------------------------------------------|------------------------------------|

### EQUIPMENT

|                       |   |            |
|-----------------------|---|------------|
| 1. Electric Heat Pump | # | 27000 Btuh |
|-----------------------|---|------------|

Key: Window types - NFRC (Requires U-Factor and Shading coefficient(SHGC) of glass as numerical values)  
or - Glass as 'Clear' or 'Tint' (Uses U-Factor and SHGC defaults)

U - (Window U-Factor)

HTM - (ManualJ Heat Transfer Multiplier)



Version 8

# System Sizing Calculations - Summer

## Residential Load - Whole House Component Details

Murtagh Custom - 1500 Model

Project Title:  
221073 Murtagh Custom

Lake City, FL

2022-09-14

Reference City: Gainesville, FL

Temperature Difference: 19.0F(TMY3 99%) Humidity difference: 51gr.

### Component Loads for Whole House

| Window        | Type*                    |            |    |      |         | Overhang |            | Window Area(sqft) |        |                     | HTM    |           | Load |        |      |
|---------------|--------------------------|------------|----|------|---------|----------|------------|-------------------|--------|---------------------|--------|-----------|------|--------|------|
|               | Panes                    | SHGC       | U  | InSh | IS Ornt | Len      | Hgt        | Gross             | Shaded | Unshaded            | Shaded | Unshaded  |      |        |      |
| 1             | 2 NFRC                   | 0.22, 0.33 | No | No   | N       | 1.5ft    | 0.0ft      | 15.0              | 3.7    | 11.3                | 11     | 27        | 350  | Btuh   |      |
| 2             | 2 NFRC                   | 0.22, 0.33 | No | No   | NE      | 3.5ft    | 0.0ft      | 10.0              | 0.0    | 10.0                | 11     | 21        | 211  | Btuh   |      |
| 3             | 2 NFRC                   | 0.22, 0.33 | No | No   | N       | 7.5ft    | 1.0ft      | 45.0              | 45.0   | 0.0                 | 11     | 27        | 490  | Btuh   |      |
| 4             | 2 NFRC                   | 0.22, 0.33 | No | No   | NW      | 10.0f    | 0.0ft      | 13.3              | 13.3   | 0.0                 | 11     | 22        | 145  | Btuh   |      |
| 5             | 2 NFRC                   | 0.22, 0.33 | No | No   | N       | 1.5ft    | 0.0ft      | 30.0              | 7.5    | 22.5                | 11     | 27        | 701  | Btuh   |      |
| 6             | 2 NFRC                   | 0.22, 0.33 | No | No   | E       | 1.5ft    | 0.0ft      | 30.0              | 0.0    | 30.0                | 11     | 11        | 327  | Btuh   |      |
| 7             | 2 NFRC                   | 0.22, 0.33 | No | No   | E       | 1.5ft    | 0.0ft      | 6.0               | 0.0    | 6.0                 | 11     | 11        | 65   | Btuh   |      |
| 8             | 2 NFRC                   | 0.22, 0.33 | No | No   | S       | 1.5ft    | 0.0ft      | 30.0              | 7.5    | 22.5                | 11     | 27        | 701  | Btuh   |      |
| 9             | 2 NFRC                   | 0.22, 0.33 | No | No   | S       | 1.5ft    | 0.0ft      | 30.0              | 7.5    | 22.5                | 11     | 27        | 701  | Btuh   |      |
| 10            | 2 NFRC                   | 0.22, 0.33 | No | No   | S       | 9.0ft    | 0.0ft      | 6.7               | 6.7    | 0.0                 | 11     | 27        | 73   | Btuh   |      |
| 11            | 2 NFRC                   | 0.22, 0.33 | No | No   | W       | 1.5ft    | 0.0ft      | 3.0               | 3.0    | 0.0                 | 11     | 13        | 33   | Btuh   |      |
| Excursion     |                          |            |    |      |         |          |            |                   |        |                     |        |           |      | 576    | Btuh |
| Window Total  |                          |            |    |      |         |          |            |                   |        | 219 (sqft)          |        |           |      | 4371   | Btuh |
| Walls         | Type                     |            |    |      |         | U-Value  | R-Value    | Area(sqft)        |        | HTM                 |        | Load      |      |        |      |
|               |                          |            |    |      |         |          | Cav/Sheath |                   |        |                     |        |           |      |        |      |
| 1             | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 118.3             |        | 2.3                 |        | 268 Btuh  |      |        |      |
| 2             | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 16.7              |        | 2.3                 |        | 38 Btuh   |      |        |      |
| 3             | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 24.0              |        | 2.3                 |        | 54 Btuh   |      |        |      |
| 4             | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 60.3              |        | 2.3                 |        | 137 Btuh  |      |        |      |
| 5             | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 13.3              |        | 2.3                 |        | 30 Btuh   |      |        |      |
| 6             | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 24.0              |        | 2.3                 |        | 54 Btuh   |      |        |      |
| 7             | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 63.3              |        | 2.3                 |        | 143 Btuh  |      |        |      |
| 8             | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 328.0             |        | 2.3                 |        | 742 Btuh  |      |        |      |
| 9             | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 62.7              |        | 2.3                 |        | 142 Btuh  |      |        |      |
| 10            | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 53.3              |        | 2.3                 |        | 121 Btuh  |      |        |      |
| 11            | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 52.0              |        | 2.3                 |        | 118 Btuh  |      |        |      |
| 12            | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 60.0              |        | 2.3                 |        | 136 Btuh  |      |        |      |
| 13            | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 21.3              |        | 2.3                 |        | 48 Btuh   |      |        |      |
| 14            | Frame - Wood - Adj       |            |    |      |         | 0.09     | 13.0/0.0   | 40.0              |        | 1.7                 |        | 67 Btuh   |      |        |      |
| 15            | Frame - Wood - Adj       |            |    |      |         | 0.09     | 13.0/0.0   | 67.3              |        | 1.7                 |        | 114 Btuh  |      |        |      |
| 16            | Frame - Wood - Adj       |            |    |      |         | 0.09     | 13.0/0.0   | 18.7              |        | 1.7                 |        | 31 Btuh   |      |        |      |
| 17            | Frame - Wood - Adj       |            |    |      |         | 0.09     | 13.0/0.0   | 69.3              |        | 1.7                 |        | 117 Btuh  |      |        |      |
| 18            | Frame - Wood - Ext       |            |    |      |         | 0.09     | 13.0/0.0   | 205.0             |        | 2.3                 |        | 464 Btuh  |      |        |      |
| Wall Total    |                          |            |    |      |         |          |            | 1298 (sqft)       |        |                     |        | 2824 Btuh |      |        |      |
| Doors         | Type                     |            |    |      |         |          |            | Area (sqft)       |        | HTM                 |        | Load      |      |        |      |
| 1             | Insulated - Exterior     |            |    |      |         |          |            | 6.7               |        | 12.0                |        | 80 Btuh   |      |        |      |
| 2             | Insulated - Exterior     |            |    |      |         |          |            | 6.7               |        | 12.0                |        | 80 Btuh   |      |        |      |
| 3             | Insulated - Exterior     |            |    |      |         |          |            | 20.0              |        | 12.0                |        | 240 Btuh  |      |        |      |
| 4             | Insulated - Garage       |            |    |      |         |          |            | 20.0              |        | 12.0                |        | 240 Btuh  |      |        |      |
| Door Total    |                          |            |    |      |         |          |            | 53 (sqft)         |        |                     |        | 640 Btuh  |      |        |      |
| Ceilings      | Type/Color/Surface       |            |    |      |         | U-Value  | R-Value    | Area(sqft)        |        | HTM                 |        | Load      |      |        |      |
| 1             | Vented Attic/DarkShingle |            |    |      |         | 0.025    | 38.0/0.0   | 1600.0            |        | 1.37                |        | 2193 Btuh |      |        |      |
| Ceiling Total |                          |            |    |      |         |          |            | 1600 (sqft)       |        |                     |        | 2193 Btuh |      |        |      |
| Floors        | Type                     |            |    |      |         |          |            | R-Value           |        | Size                |        | HTM       |      | Load   |      |
| 1             | Slab On Grade            |            |    |      |         |          |            | 0.0               |        | 1500 (ft-perimeter) |        | 0.0       |      | 0 Btuh |      |
| Floor Total   |                          |            |    |      |         |          |            |                   |        | 1500.0 (sqft)       |        |           |      | 0 Btuh |      |

# Manual J Summer Calculations

## Residential Load - Component Details (continued)

Murtagh Custom - 1500 Model

Project Title: Climate:FL\_GAINESVILLE\_REGIONAL\_A  
221073 Murtagh Custom

Lake City, FL

2022-09-14

|                      |                                                        |                     |                        |                 |                |                   |
|----------------------|--------------------------------------------------------|---------------------|------------------------|-----------------|----------------|-------------------|
|                      | Envelope Subtotal:                                     |                     |                        |                 |                | 10029 Btuh        |
| <b>Infiltration</b>  | Type<br>Natural                                        | Average ACH<br>0.16 | Volume(cuft)<br>12000  | Wall Ratio<br>1 | CFM=<br>32.9   | Load<br>685 Btuh  |
| <b>Internal gain</b> |                                                        | Occupants<br>6      | Btuh/occupant<br>X 230 | Appliance<br>+  | 3400           | Load<br>4780 Btuh |
|                      | Sensible Envelope Load:                                |                     |                        |                 |                | 15493 Btuh        |
| <b>Duct load</b>     | Average sealed, Supply(R6.0-Attic), Return(R6.0-Attic) |                     |                        |                 | (DGM of 0.290) | 4492 Btuh         |
|                      | <b>Sensible Load All Zones</b>                         |                     |                        |                 |                | <b>19985 Btuh</b> |

# Manual J Summer Calculations

## Residential Load - Component Details (continued)

Murtagh Custom - 1500 Model

Project Title: Climate:FL\_GAINESVILLE\_REGIONAL\_A  
221073 Murtagh Custom

Lake City, FL

2022-09-14

### WHOLE HOUSE TOTALS

|                                           |                                                           |                   |
|-------------------------------------------|-----------------------------------------------------------|-------------------|
| <b>Whole House<br/>Totals for Cooling</b> | <b>Sensible Envelope Load All Zones</b>                   | <b>15493 Btuh</b> |
|                                           | Sensible Duct Load                                        | 4492 Btuh         |
|                                           | <b>Total Sensible Zone Loads</b>                          | <b>19985 Btuh</b> |
|                                           | Sensible ventilation                                      | 0 Btuh            |
|                                           | Blower                                                    | 0 Btuh            |
|                                           | <b>Total sensible gain</b>                                | <b>19985 Btuh</b> |
|                                           | Latent infiltration gain (for 51 gr. humidity difference) | 1136 Btuh         |
|                                           | Latent ventilation gain                                   | 0 Btuh            |
|                                           | Latent duct gain                                          | 918 Btuh          |
|                                           | Latent occupant gain (6.0 people @ 200 Btuh per person)   | 1200 Btuh         |
|                                           | Latent other gain                                         | 0 Btuh            |
|                                           | <b>Latent total gain</b>                                  | <b>3255 Btuh</b>  |
|                                           | <b>TOTAL GAIN</b>                                         | <b>23240 Btuh</b> |

### EQUIPMENT

|                 |   |            |
|-----------------|---|------------|
| 1. Central Unit | # | 27000 Btuh |
|-----------------|---|------------|

\*Key: Window types (Panels - Number and type of panes of glass)  
(SHGC - Shading coefficient of glass as SHGC numerical value)  
(U - Window U-Factor)  
(InSh - Interior shading device: none(No), Blinds(B), Draperies(D) or Roller Shades(R))  
- For Blinds: Assume medium color, half closed  
For Draperies: Assume medium weave, half closed  
For Roller shades: Assume translucent, half closed  
(IS - Insect screen: none(N), Full(F) or Half(½))  
(Ornt - compass orientation)



Version 8