CMGT 235 – Mechanical and Electrical Systems

Homework #7 – Air Distribution Systems Design - ACCA Manual D

**Show all work for full credit.**

Due: 9/15

20 points

Solution

**Name**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Diagram, engineering drawing

Description automatically generated

**2,706 BTUH**

**2,706 BTUH**

**2,706 BTUH**

**1,353 BTUH**

**4,058 BTUH**

**4,058 BTUH**

**1,353 BTUH**

**13,528 BTUH**

**5,411 BTUH**

The Room-By-Room Cooling Load calculation has been completed for the home used in HW#5 and the room loads are shown on the plan on the previous page.

**Size of HVAC Unit Required**

To calculate the required equipment size, divide the HVAC load for the entire home by 12,000. One ton equals 12,000 BTUs, so if a house or office needs 24,000 BTUs, it will take a 2-ton HVAC unit. If you get an uneven number, such as 2.33 for a 28,000 BTU load capacity, round up to a 2.5-ton unit.

From HW#5

Peak Cooling Load = 37,878 BTUH

HVAC Unit Size = 37,878 BTUH / 12,000 = 3.16 tons Round to 3.5 tons

1. Using the industry standard of 400 CFM per ton determine the required Total Ventilation Rate (CFM)

Ventilation Rate = 3.5 tons X 400 CFM /ton = 1400 CFM

1. Using the equation shown below, calculate the required CFM per room and complete the table shown below. Round CFM to whole number (No Decimal Values).

Room Ventilation (CFM) = [Room Heat Gain (Btuh) / Total Heat Gain (Btuh)] X Total Ventilation Rate (CFM)

|  |  |  |
| --- | --- | --- |
| **Room** | **Heat Gain (BTUH)** | **Required CFM** |
| Family, dining, kitchen | 13,528 | 500 |
| bed 1 / ens | 5,411 | 250 |
| bed 2 | 4,058 | 150 |
| bed 3 | 4,058 | 150 |
| bath | 1,353 | 50 |
| bed 4 | 2,706 | 100 |
| l’dry | 2,706 | 100 |
| study/bed 5 | 2,706 | 100 |
| Totals | 33,878 | 1400 |

1. Write the required CFM for each room on the plan shown on the next page in the corresponding room.

Diagram, engineering drawing

Description automatically generated

**500 CFM**

**250 CFM**

**100 CFM**

**100 CFM**

**50 CFM**

**100 CFM**

**150 CFM**

**150 CFM**

**SA 2**

**SA 1**

**AHU**

**RA**

1. Determine the total CFM as shown below (Show All Calculations):

|  |  |
| --- | --- |
| **Duct** | **Total CFM** |
| Supply Air Duct (SA 1) | 850 |
| Supply Air Duct (SA 2) | 550 |
| Return Air Duct (RA) | 1400 |