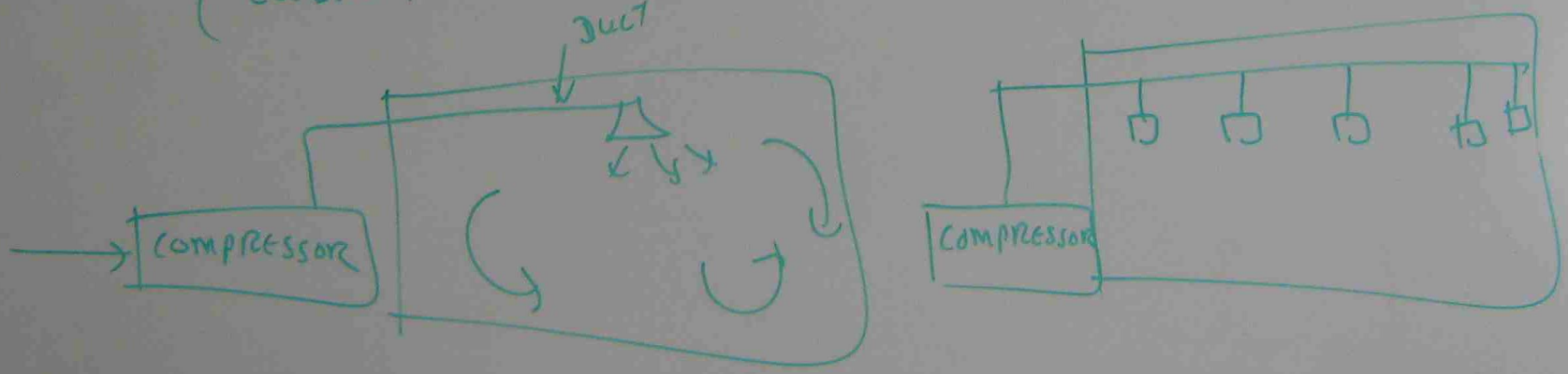
VENTILATION CALCULATION

- TO MAINTAIN ROOM AIR TEMPERATURE
- TO REDUCE THE HUMIDITY

$$\text{AIR FLOW REQUIREMENT} = \frac{\text{HEAT REMOVED (BTU)}}{1.08 \times \text{TEMPERATURE CHANGE (F)}}$$

cfm

(CUBIC FEET PER MINUTE)



THE AIR FLOW RATE CAN BE PROVIDED BY ONE LARGER (OR) SEVERAL SMALLER COOLING UNITS. DEPENDING ON POSSIBLE ZONE WITH IN THE BUILDING

pb / A 4000 sq ft RETAIL STORE NEAR TUSON, ARIZONA HAS BEEN CALCULATED TO HAVE SENSIBLE HEAT GAIN OF 100,000 BTU AT SUMMER DESIGN CONDITIONS (105 DB, 66 WB) FOR THIS LOCATION) CALCULATE HEAT REMOVED AND AIR FLOW RATE INDOOR TO REDUCE 7 F TEMPERATURE.

$$\text{AIR FLOW RATE (CFM)} = \frac{\text{HEAT REMOVED (BTU)}}{1.08 \times \text{TEMPERATURE DIFFERENCE}}$$

$$= \frac{100,000}{1.08 \times 7}$$

$$= 13227 \text{ CFM}$$

PROPORTION OF AIR VOLUME FOR EACH PART OF BUILDING

$$\text{AIR VOLUME FOR PARTICULAR PART OF BUILDING} = \text{TOTAL AIR VOLUME} \times \frac{\text{FLOOR AREA OF PARTICULAR PART}}{\text{TOTAL FLOOR AREA}}$$

Pb / THE WHOLE HOUSE NEEDS 13227 CFM AIR FOR TOTAL FLOOR AREA 4000 SQ FT. CALCULATE THE AIR REQUIREMENT FOR EACH PART OF THE HOME. ASSUME 66% of AIR IS APPLIED.

ALSO SKETCH THE OVERVIEW OF AIR DUCTS.

FAMILY ROOM $= \frac{60}{4000} \times 13227 \times 0.66 = 131$ CFM

LIVING ROOM $= \frac{55}{4000} \times 13227 \times 0.66 = 120$ CFM

BED ROOM 1 $= \frac{44}{4000} \times 13227 \times 0.66 = 96$ CFM

BED ROOM 2 $= \frac{50}{4000} \times 13227 \times 0.66 = 110$ CFM

Bed Room 3 = $\frac{44}{4000} \times 13227 \times 0.66 = 96.$ CFM

DINING ROOM = $\frac{52}{4000} \times 13227 \times 0.66 = 113$ CFM

KITCHEN = $\frac{72}{4000} \times 13227 \times 0.66 = 157$ CFM

ENTRY = $\frac{25}{4000} \times 13227 \times 0.66 = 54.5$ CFM

MAIN DUCT CAPACITY = $131 + 120 + 96 + 110 + 96 + 113 + 157 + 54.5$

$= 877.5$ CFM

BED ROOM 3 = $\frac{44}{4000} \times 13227 \times 0.66 = 96.$ CFM

DINING ROOM = $\frac{52}{4000} \times 13227 \times 0.66 = 113$ CFM

KITCHEN = $\frac{72}{4000} \times 13227 \times 0.66 = 157$ CFM

ENTRY = $\frac{25}{4000} \times 13227 \times 0.66 = 54.5$ CFM

MAIN DUCT CAPACITY = 131 + 120 + 96 + 110 + 96 + 113 + 157 + 54.5

= 877.5 CFM

AVERAGE HEAT LOSS PER MONTH $= \sum UA\,(T_i - T_a) \times N \times 0.0864$

T_i = AVERAGE INTERNAL TEMPERATURE

T_a = AVERAGE MONTHLY AIR TEMPERATURE

N = NO. OF DAYS IN MONTH

TOTAL MONTHLY HEAT LOSS DUE TO VENTILATION + CONDUCTION $= \left[\sum UA \times 0.0864 + Ac \times V \times 0.0286\right] \times N$

Ac = AIR CHANGE PER HOUR

V = VOLUME OF BUILDING