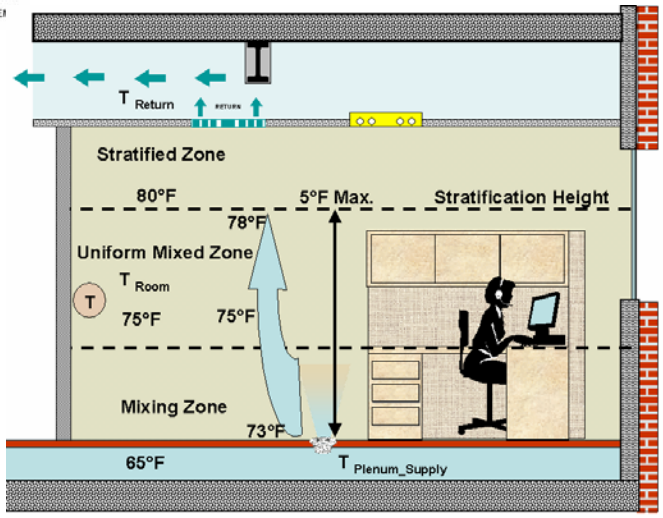
UFAD Model



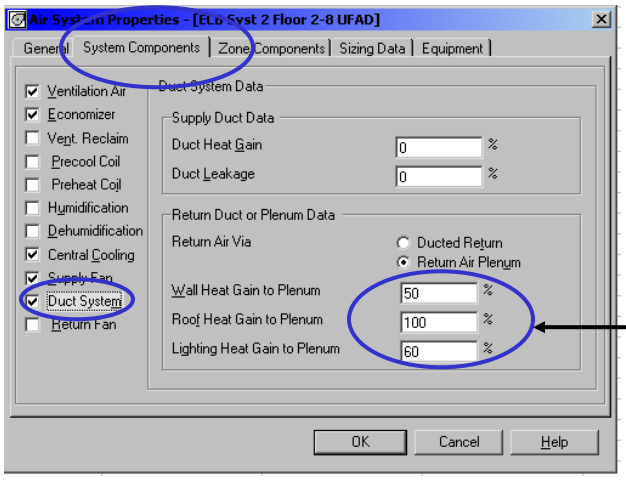
Carrier Access Floor Systems

Calculate UFAD Loads

- Calculate load for UFAD system – need for determining zone air requirement and return temperatures
  - 63 F Supply temperature – or desired floor plenum temperature
  - Split loads for stratification model to plenum load components
  - HAP ECB Example
    - Spaces are done as in UFAD run

Carrier Access Floor Systems

System Inputs



UFAD Stratification model

UFAD Outputs

Zone Sizing Summary for ECB Syst 2 Floor 2-8 UFAD

Project Name: Chicago UFAD Project — 03/30/2004
Prepared by: — 09:43AM

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM ..... **Peak zone sensible load**
Space CFM ..... **Individual peak space loads**
Calculation Months ..... **Jan to Dec**
Sizing Data ..... **Calculated**

Zone Sizing Data

Zone Air Required

Zone Name	Maximum Cooling Sensible (MBH)	Design Air Flow (CFM)	Minimum Air Flow (CFM)	Time of Peak Load	Maximum Heating Load (MBH)	Zone Floor Area (ft²)	Zone CFM/ft²
Zone 1	8.0	635	255	Jan 1700	0.0	312.5	2.03
Zone 2	6.7	526	204	Jul 1400	6.0	312.6	1.68
Zone 3	9.0	709	510	Jan 1700	0.0	500.0	1.42
Zone 4	20.0	1581	170	Jul 0900	24.2	1250.4	1.26
Zone 5	29.6	2337	340	Jul 1700	48.3	2500.8	0.93
Zone 6	46.3	3664	340	Sep 1400	48.3	2500.8	1.47
Zone 7	30.8	2438	213	Jul 1700	30.2	1563.0	1.56
Zone 8	3.1	243	21	Jul 1500	6.0	156.3	1.55
Zone 9	3.6	288	21	Jul 1700	6.0	156.3	1.84
Zone 10	4.1	323	21	Aug 1500	6.0	156.3	2.06
Zone 11	3.7	293	21	Aug 1400	6.0	156.3	1.87
Zone 12	76.2	6022	1530	Jan 1700	0.0	11253.6	0.54
Zone 13	76.2	6022	1530	Jan 1700	0.0	11253.6	0.54

UFAD Outputs

System Psychrometrics for ECB Syst 2 Floor 2-8 UFAD

Project Name: Chicago UFAD Project — 03/30/2004
Prepared by: — 09:44AM

August DESIGN COOLING DAY, 1500

Return Air Temperature

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°F)	Specific Humidity (lb/lb)	Airflow (CFM)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	91.0	0.01458	4177	50276	48269
Vent - Return Mixing	Outlet	82.6	0.01255	22666	-	-
Central Cooling Coil	Outlet	62.2	0.01157	22666	488359	102920
Supply Fan	Outlet	63.0	0.01157	22666	19495	-
Cold Supply Duct	Outlet	63.0	0.01157	22666	0	-
Zone Air	-	76.7	0.01209	21483	327694	54613
Zone Direct Exhaust	Outlet	76.7	0.01209	1183	-	-
Return Plenum	Outlet	80.7	0.01209	21483	90894	-
Return Fan	Outlet	80.7	0.01209	21483	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.054 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4632.3 BTU/(hr-CFM)
Site Altitude = 673.0 ft

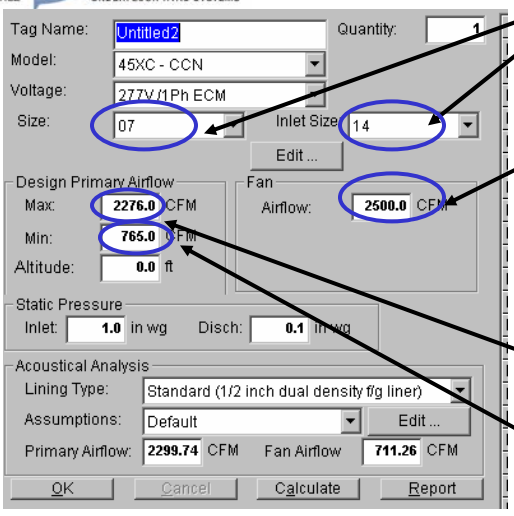
Determine the # of floor Diffusers

- Use the maximum zone CFM based on the plenum supply and divide by about 100 cfm / diffusers
- Use at least that many
- Example
  - Zone 12A has 3011CFM @ .1 inch about 100 CFM / diffuser = Min 31 Diffusers

Size Zone Mixing Box

- Use the E-cat selection input
  - Minimum cfm – based on ventilation in conventional model
  - Primary air temperature – assumed for conventional load estimate
  - Primary Air flow based on the conventional load – meets zone sensible
  - Use return air temperature calculated from UFAD loads

E-cat Calculate Tab



Adjust size to deliver primary requirement – no longer red

Pick a value within the range – calculate – adjusts to required amount

Primary Airflow from conventional load

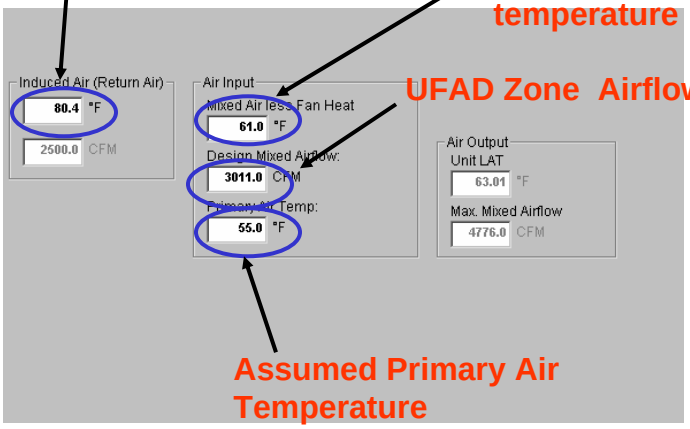
Min Ventilation Airflow

E-cat Calculate Tab

Return Air Temperature

Input a value 1 to 2 degrees below desired plenum temperature

UFAD Zone Airflow



Assumed Primary Air Temperature

Determine Return to AHU

Find the return air quantity :

Return Air Cfm = Primary Cfm – direct exhaust

Both from conventional load

Find the return air temperature :

Return Air temperature = return temperature from the UFAD load estimate

Find the mixed air temperature :

Mix temp=(RA temperature x RA CFM + Ventilation temperature x Ventilation CFM)/ Primary air cfm

Size AHU

- Use the E-cat selection input
  - Use the calculated mix conditions
  - Use primary airflow cfm
  - Check for adequate latent heat removal