**Field Measurements: Building Energy and IEQ Course**

**HW 3 Due: April 19, 2012**

**Problem 1) Building envelope characterization**

If the blower door test for the return duct is below:

Delta P (Pa) | Flow Rate (m3/hr)
30.7 | 144
25.5 | 130
18.7 | 104
13.7 | 86
10.7 | 73

Calculate the maximum leakage that can happen in the system if P before the fan is 50 Pa.

**Problem 2) HVAC system characterization ( COP measurement)**

For an outdoor air temperature of 28 C, and measured indoor temperature (HOBO T22 in the handouts section of the website) and supply temperature (HOBO T26) calculate the COP of the system if the energy rate of the outdoor compressor condenser unit was 1.5kW.

Measured flow rate through the AHU was 976 and 991 m3/hr.

**Problem 3)**

Use the data measured during the filed measurements to develop a flow-pressure curve:  and calculate the Equivalent Leakage Area (ELA) for the house.

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| Pressurization Test (Blower Door Test) |
|  | **Pressure Difference(Pa)** | **Volume Flow Rate (m3/hr)** |
|  | 24.2 | 5308 |
|  | 24.4 | 5340 |
|  | 24.7 | 5326 |
|  | 24.5 | 5340 |
|  | 24.8 | 5362 |
|  | 24.8 | 5358 |
|  | 25.3 | 5286 |
|  | 51.6 | 8732 |
|  | 50.8 | 8724 |
|  | 50.2 | 8818 |
|  | 50.2 | 8751 |
|  | 51.7 | 8720 |
|  | 50.4 | 8724 |
|  | 50.2 | 8611 |
|  | 50.5 | 8652 |

**Problem 4) Garage door energy performance estimate**

Calculate the infiltration rate in the garage (infiltration primarily through the garage door) using CO2 decay test (CO2 HOBO in the handouts section of the website). If the door has U-value of 6 W/m2K and area of 10m2, check if it is justifiable to put insulation that will reduce the U-value to 1.2 W/m2K.