Energy Verification Sheet - DCRA

Mechanical Notes & 2012 IECC Applicable Sections

1) 302.1, 403.6

Heating and cooling equipment is sized per ACCA Manual S based on loads calculated per ACCA Manual J. per iecc 403.6. 1.

- DCRA: please show how the hvac equipment is properly sized. verify that hvac equipment is correctly sized according to acca manual ”s“ based on building loads calculated according to manual “j”. please provide the “u” and shgc values for your manual “s” input data. not having the “u” and shgc values affects the final output. ensure you provide the project summary report and the component construction report. provide heat loss for ducts in unconditioned spaces and ensure the temperature design features have the proper values. a. after talking with the wrightsoft software developers we were able to determine how you can provide us with the reports that print the solar heat gain coefficient (shgc) they account for somewhere around 50-70% of the cooling load. b. have the person who does the manual j inputs after opening the program go to window properties – radial buttons –custom value drop down- glazing types- put a check in the nfrc box – then print the “component construction report,” the “load short form,” and “rightj worksheet.” this will provide us with the information we need to evaluate the system correctly. also, the system or systems that are depicted on the drawings should be the same system or systems that are used with the manual j calculations.
- **Response to questions**:
    - Manual J calculations were done with ACCA approved load software https://www.coolcalc.com/
    - See attached three Manual J calculation reports and three corresponding Manual S speed sheets. These reports correspond to one heating zone and two cooling zones. Also see attached Manual J input spread sheet which contains requested information on component construction, including U and SHGC values.
    - Refer to drawing plan A-O, MP-1, MP-2, MP-3 for corresponding system values with manual J calculations.
- **Edits to plans**: Generally editing the plans to match the Manual J calculations
- **Edits to plans**: Page MP-3: Replace Zone descriptions with the following three zone/system descriptions.
    - Zone/System 1 – **USE EXISTING** – Mech. Equipment Schedule
    - **Cooling**
    - Basement (720 SF), 1st Floor (848 SF)
    - Cooling Load Area = 1414 SF, Sensible Cooling Load = 12755 BTU/h, Latent Cooling Load = 1214 BTU/h
    - Summer Outdoor F: 92, Summer Indoor F: 75, Winter Outdoor F: 20, Winter Indoor F: 70
    - Design Grains: 41, Daily range: Medium, Cooling RH: 50%, Elevation (Ft): 66
    - Fan-Coil Manufacturer: Bryant, Model: PDS FK4C NF002 (at basement)
    - Condenser Manufacturer: Carrier 38TRA 024321 (at yard)
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    - Zone/System 2 – **USE EXISTING** – Mech. Equipment Schedule
    - **Cooling**
    - 2nd Floor (848 SF), 3rd Floor (720 SF)

- Cooling Load Area = 2645 SF, Sensible Cooling Load = 14249 BTU/h, Latent Cooling Load = 2585 BTU/h
- Summer Outdoor F: 92, Summer Indoor F: 75, Winter Outdoor F: 20, Winter Indoor F: 70
- Design Grains: 41, Daily range: Medium, Cooling RH: 50%, Elevation (Ft): 66
- **Existing** Fan-Coil Manufacturer: Bryant, Model: PDS FK4C NF002 (move to 3rd floor)
- **Existing** Condenser Manufacturer: Carrier 38TRA 024321 (at yard)
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- Zone/System 3 – **USE EXISTING** – Mech. Equipment Schedule
- **Heating**
- Basement (720 SF), 1st Floor (848 SF), 2nd Floor (848 SF), 3rd Floor (720 SF)
- Heating Load Area = 4386 SF, Heat Loss 61,657 BTU/h
- Summer Outdoor F: 92, Summer Indoor F: 75, Winter Outdoor F: 20, Winter Indoor F: 70
- Design Grains: 41, Daily range: Medium, Cooling RH: 50%, Elevation (Ft): 66
- **Existing** Boiler: Weil McLain, Model: CGA5 spdn, Input Capacity: 140,000 BTU/h, Output Capacity: 117,000 BTU/h, AFUE=83 (at basement)
- **Existing** Hot Water Heater Manufacturer: AO Smith, Model: GCV 50 300 (at basement)

- **Edits to plans**: MP-1: Update to match Manual J calculations.
  - MECHANICAL EQUIPMENT AND DUCTING: **USE EXISTING CONDENSER AND AHU.** Existing condenser is a Carrier, Model 38TRA 024321. Existing Fan-Coil AHU is a Bryant, Model PDS FK4C NF002. Equipment shall be reconnected to meet the specifications, requirements and recommendations of the manufacturer for the installation required. All HVAC equipment and duct sizing shall follow ACCA Manuals D, J and S. If any mechanical equipment is to be replaced, provide the following, as applicable: high efficiency air handler; 20 SEER or better condensing unit and evaporator coil; electronic air cleaner microelectronic programmable thermostat. All trunk lines and main run-outs shall be hard ducted, flex ducting shall be limited to final runs not to exceed six feet in length. All miscellaneous materials and anchoring devices shall be provided and all equipment shall be installed in accordance with the manufacturer's specifications, recommendations and requirements for a complete installation. Coordinate with plumbing and electrical sub-contractors as required for equipment hookups. Isolate all equipment as required to properly reduce noise transmission.
  - MECHANICAL DESIGN: Mechanical (heating and cooling) design shall meet or exceed all requirements of the 2012 International Energy Conservation Code as applicable to a residential installation. Provide provisions for make-up air, coordinating with high CFM range hood exhaust system. Manual J inputs: Summer Outdoor F: 92, Summer Indoor F: 75, Winter Outdoor F: 20, Winter Indoor F: 70, Design Grains: 41, Daily range: Medium, Cooling RH: 50%, Elevation (Ft): 66. Assume shades to direct light; a clean filter; normal occupancy; normal cooking; doors to remain closed during cooling season. All HVAC equipment and duct sizing shall follow ACCA Manuals D, J and S.
  - VENTS (NOT HVAC): Vent for range hood to have a minimum efficiency of 2.8 CFM/Watt. Vent for 2nd floor master bath (128 sf) and 3rd floor bathroom (70 sf) to be rated at least 120 cfm and 2.8 CFM/Watt.

2) 403.2.1

Supply ducts in attic are insulated to >R-8. All other ducts in unconditioned spaces or outside the building envelope are >R-6. per iecc 403.2.1

- DCRA: please show how supply ducts in the attic are insulated to ? r8. all other ducts in unconditioned spaces or outside the building envelope are ? r6.
- **Response**: Update division 7.03 and 15.10 to say, "Insulate HVAC supply ducts to >R-8 and to >R-6 in unconditioned spaces or outside building."
- **Response**: Point to duct work in mechanical drawings (and other drawings where duct work appears) and add text like above.
- **Response**: Add a detail drawing of insulation covering ductwork.

3) 403.2.2

All joints and seams of air ducts, air-handlers, and filter boxes are sealed. per iecc 403.2.2

- DCRA: please indicate how all joints and seams of air ducts and air handlers are sealed.
- **Response**: Update division 7.03 and 15.10 to include, "Seal all air-ducts, air-handlers, and filter boxes with metal cleats and Design Polymetrics DP 1030 water based duct sealant or equivalent. Contractor to provide duct-leakage test. Leakage shall be less than 8 CFM/100 sft with air handler installed."
- **Response**: Point to duct work in mechanical drawings (and other drawings where ducts appear) and add text like above.

4) 403.2.3

Building cavities are not used as ducts or plenums.

5) 403.3

HVAC piping carrying fluids > 105ºF or fluids < 55ºF are insulated to > R-3.

6) 403.3.1

Protection of insulation on HVAC piping.

7) 403.4.2

Hot water pipes are insulated to > R-3.

8) 403.5

Auto./Gravity dampers install on all intakes/exhausts. per iecc 403.5

- DCRA: please indicate how dampers are installed in outdoor air intakes and exhausts and have automatic or gravity dampers that close when the ventilation system is not operating.
- **Response:** Add a detail showing how a gravity damper should be installed.

9) 403.1.1

Programmable thermostats installed on forced air furnace.

10) 403.1.2

Heat pump thermostat installed on heat pumps.

11) 403.4.1

Circulating hot water systems have auto. or accessible manual controls.

12) 403.5.1

All mech. vent. system fans not part of tested and listed HVAC equipment meet efficacy and air flow requirements. per iecc 403.5.1

- DCRA: please provide information regarding how the ventilation system meets efficacy and air flow requirements. need performance data for exhaust fans, cfm & wattage.
- **Response:** This appears above (Q1) in the added specification on page MP-1, "VENTS (NOT HVAC): Vent for range hood to have a minimum efficiency of 2.8 CFM/Watt. Vent for 2nd floor master bath (128 sf) and 3rd floor bathroom (70 sf) to be rated at least 120 cfm and 2.8 CFM/Watt."
- **Response:** Point to vents in mechanical drawings (and other drawings where vents appear) and add text like above.