EarthLinked®
SYSTEM SIZING WORKSHEET
RADIANT PANEL
HYDRONIC HEATING

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This worksheet applies to systems using a hydronic water module (HWM) or a compressor equipped with an internal refrigerant to water heat exchanger, to supply heat in a climate where the <u>heating load of the structure dominates.</u>

1. Determine heating and cooling requirements of the structure, based on ACCA Manual J (latest edition) procedure using the **99.6% heating design temperature** and the **0.4% cooling design temperature** from the **<u>EarthLinked® Geothermal Heating and Cooling System Application and Sizing Guide.</u>** Elite RHVAC or Wrightsoft Right-J software is recommended.
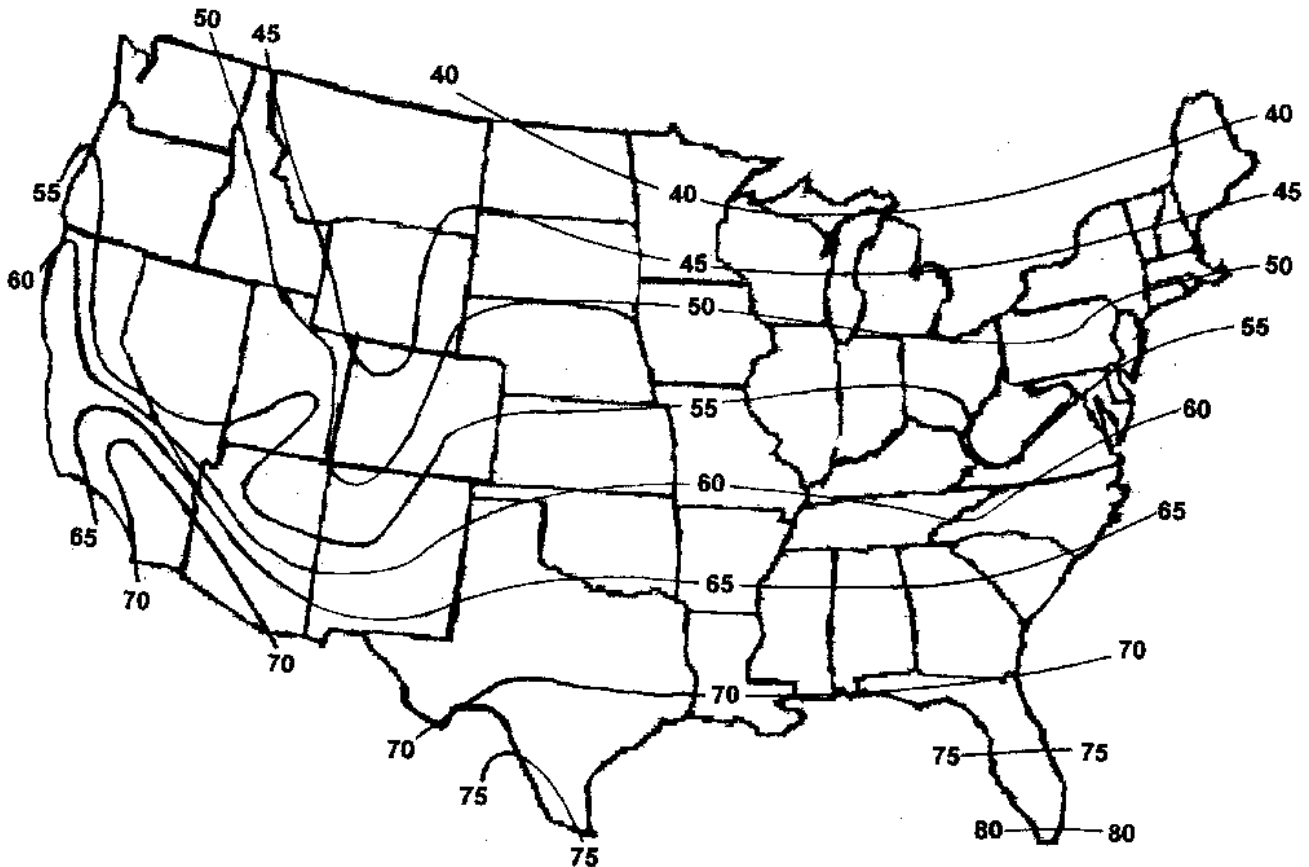
   If domestic water heating by desuperheater is part of the system, add 2,000 BTUH for each adult and teenager to the Design Heating Load.

   Winter Design Temp: _____ °F   Design Heating Load: _____ BTUH

   Summer Design Temp: _____ °F   Design Cooling Load: _____ BTUH

2. Determine local earth temperature from Temperature Map:

   Site Location: _____ _____ Earth Temp.: _____ °F
                         city   state/prov.

EARTH TEMPERATURES IN CONTIGUOUS UNITED STATES AND SOUTHERN CANADA

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3. Locate the System Performance Data for **Hydronic Heating*** based on the following parameters:

- Refrigerant: ☐ R-410A

- Power: ☐ 230-1-60 ☐ 230-3-60 (check one box)

- Local Earth Temperature: _____ °F (enter temperature from map)

- Earth Loop Configuration: _____ (V1, H5, etc. based upon available land area and geology of the earth at the site)

4a. The size of the system will be determined by the **heat output of the system at the Winter Design Temperature (DT)**, from the Hydronic Heating Performance Table selected, based on steps 2 and 3. The initial selection of a system size (capacity) should have a heat output of at least 100% of the Design Heating Load in step 1. **Electrical supplemental heat of at least 20% of the design heating load, in BTUH, is a required component of the storage water heater. Enter information below:**

System Size	Heat Output @ DT	Design Heating Load
_____ Tons	_____ BTUH	_____ BTUH

4b. **Adjusted Heating Output Capacity**

The adjusted heating output capacity for a system utilizing an ETI hydronic water module (HWM) is INCREASED by the power input to the HWM circulating pump.

(1) For the HWM, the heating output capacity increase is 1360 BTUH.

(2) For a system utilizing an SCW compressor unit, a field supplied circulating pump increases the heating output capacity as follows:
Power input to pump motor (watts) X 3.412 = _____ BTUH

Adjusted Heating Output Capacity =

Heating Capacity (corrected from tables) + Pump capacity increase [(1) or (2)]=

_____ BTUH

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4c. **Adjusted Coefficient Of Performance (COP)**

The adjusted coefficient of performance (COP) for the system utilizing an ETI Hydronic water module or a field supplied circulating pump is DECREASED, due to the power input to the HWM or field specified pump motor, and is determined as follows:

Determine the compressor power input =

Heating capacity (corrected from tables) / COP (corrected from tables) = _____ BTUH

Total Power Input to the system = Compressor power unit + [4a.(1) + 4a.(2)] = _____ BTUH

Adjusted Coefficient Of Performance =

Adjusted Heating Output Capacity / Total Power Input = _____ = COP

5. From the appropriate **Hydronic Water Cooling** (for a chilled water air handler) Performance Table of the selected system size (in Tons), **enter the Tons and Total Cooling Output values below.**

System Size _____ Tons   Cooling Output Total: _____ BTUH   Cooling Load _____ BTUH

Check to verify that the **Actual Cooling Output is 10% greater than the Total Cooling Load** as determined in 1.

Is Total Cooling Output 10% greater than Total Cooling Load? ☐ YES   ☐ NO

Total Cooling Output (BTUH) ÷ Total Cooling Load (BTUH) = _____

This value should be at least 1.1.

6. Final system size is as follows:

   System Size: _____ Tons   Compressor Unit Model: _____

   Earth Loop Model: _____

   Domestic Water Module Model: _____

   Hydronic Water Module Model: _____

   Desuperheater Model: _____

   Supplemental Electric Heat Element: _____ KW

7. When the system size has been determined, the primary circuit must be designed in accordance with the Specification Guidelines to ensure proper water solution flow rate for the system size and best overall system performance.

8. **Balance Point Temperature**

   The balance point temperature for a heating system must be determined if an outdoor thermostat is installed to initiate supplemental heat. The outdoor thermostat set point is adjusted to be the balance point temperature.

   For EarthLinked® R-410A systems three values must be known to determine balance point temperature:

   - **Adjusted heating output capacity @ design point temperature**, determined in 4b.

   - **Adjusted COP as determined in 4c.**

   - **Adjusted heating output capacity @ 65°F**, determined by the procedure that follows.

   Adjusted heating output capacity @ 65°F = 1.57 X Adjusted heating output capacity @ design point temperature x Factor from Table = _____ BTUH

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With the above information and the building heating load determined by the Manual J method, access the Earthlinked Technologies website at www.earthlinked.com to access the **Balance Point Calculator.**

Under the heading **"Dealer Info",** scroll down and click on **"Dealers Login only".**

Go to **"Dealer Resource Center"** and scroll down to **"Forms and Policies".**

Click on **"Balance Point Calculator"** and you will see the following:

BALANCE POINT CALCULATOR
(Applies only to Heating—do not use for Cooling)

enter data

BUILDING LOAD AT DESIGN TEMP IN BTUH = [   ]

OUTDOOR DESIGN TEMP = [   ]

EQUIPMENT CAPACITY @ 65°F VALUE = [   ]

EQUIPMENT CAPACITY @ DESIGN TEMP = [   ]

- -

results

BALANCE POINT CAPACITY = [   ]

BALANCE POINT TEMPERATURE = [   ] 70°F INDOOR DESIGN (fixed)

Under "ENTER DATA", input the values for Building Heating Load (from 1.); Outdoor Winter Design Temperature (from 1.); Adjusted Heating Output (Equipment) Capacity @ 65°F (from 8. above); and Adjusted Heating Output (Equipment) Capacity@ Design Temperature (from 4.b.).

The resulting balance point capacity and temperature can be read under "RESULTS".

Balance Point Capacity = _____ **BTUH**

Balance Point Temperature = _____ **°F**