



Understanding Select Fields on the Residential Plans Examiner Review Form for HVAC System Design



HVAC LOAD CALCULATION (IRC M1401.3)

Design Conditions

For the location closest to the site of the home:

- The **Winter Design Conditions** outdoor temperature should be the temperature from the **Heating (99% Dry Bulb)** column.
- The **Summer Design Conditions** outdoor temperature should be the temperature from the **Cooling (1% Dry Bulb)** column.

ACCA Manual J Outdoor Design Temperatures for Virginia

Map Letter	Location	Heating (99% Dry Bulb)	Cooling (1% Dry Bulb)
A	Charlottesville	18	91
B	Danville AP	16	92
C	Fort Belvoir	18	93
D	Fredericksburg	14	93
E	Hampton Langley AFB	24	91
F	Harrisonburg	16	91
G	Lynchburg AP	17	90
H	Newport News	22	92
I	Norfolk AP	24	91
J	Oceana NAS	25	91
K	Petersburg	17	92
L	Quantico MCAS	21	92
M	Richmond AP	18	92
N	Roanoke AP	17	89
O	Staunton	16	91
P	Sterling	14	90
Q	Washington, National AP	20	92
R	Winchester	10	90

Design Conditions

Winter Design Conditions

Outdoor temperature °F

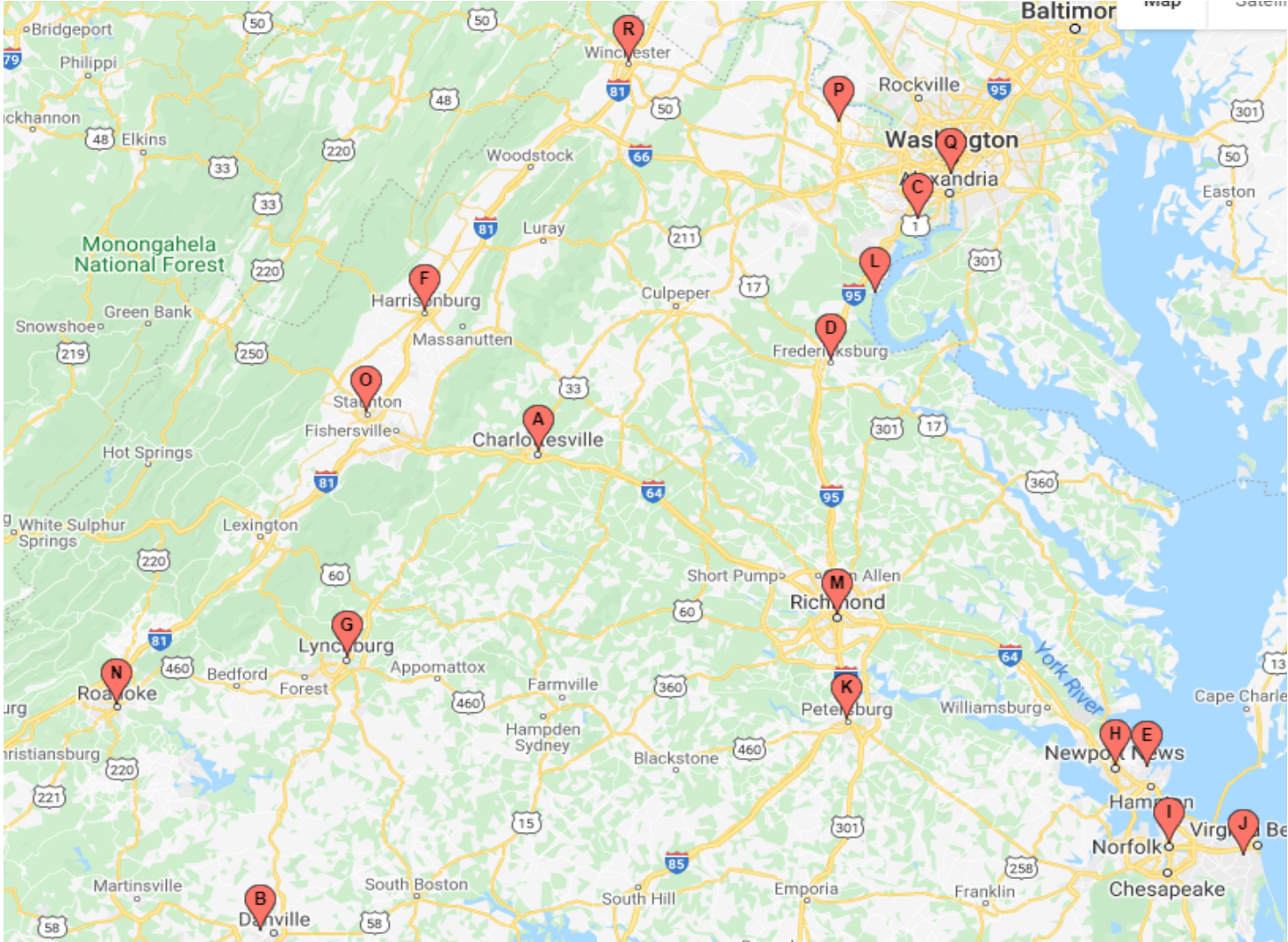
Indoor temperature °F

Total heat loss Btu

Summer Design Conditions

Outdoor temperature °F

Map of Virginia Design Temperature Locations



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Design Conditions

Winter Design Conditions

Outdoor temperature °F

Indoor temperature °F

Total heat loss Btu

Summer Design Conditions

Outdoor temperature °F

Indoor temperature °F

The **Winter Design Conditions** indoor temperature should be 70° or per Local Code.

The **Summer Design Conditions** indoor temperature should be 75° or per Local Code.

Design Conditions

Winter Design Conditions

Outdoor temperature °F

Indoor temperature °F

Total heat loss Btu

Summer Design Conditions

Outdoor temperature °F

Indoor temperature °F

Grains difference $\Delta Gr @$ % Rh

Sensible heat gain Btu

Latent heat gain Btu

Total heat gain Btu

In the Manual J reports, there will be a section that defines the building loads.

There will be different language used in different software platforms. The manual J reports may not directly list **Total Heat Loss** and may instead show **Total Heating Required**. The value in the HVAC System Design form should match the manual J report values.

Building Loads

Total Heating Required Including Ventilation Air: 12,616 Btu/h

Total Sensible Gain: 7,962 Btu/h

Total Latent Gain: 1,859 Btu/h

Total Cooling Required Including Ventilation Air: 9,821 Btu/h

Cooling is described by the Sensible Gain (heat gain), Latent Gain (moisture load), and **Total Heat Gain** or **Total Cooling Required**, which is the sum of the Sensible and Latent loads.

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Building Construction Information

The **number of occupants** should be the number of bedrooms + one (this assumes two people in the main bedroom).

On the **manual J Summary Report**, there will be a line for **People**. This should match the number of occupants shown on the Residential Plans Examiner Form.

Building Construction Information

Building

Orientation (Front door faces)
North East West South Northeast Northwest Southeast Southwest

Number of bedrooms

Conditioned floor area Sq Ft

Number of occupants

People:	4	10,027
Equipment:	-	

Building Construction Information

Building

Orientation (Front door faces)
North, East, West, South, Northeast, Northwest, Southeast, Southwest

Number of bedrooms

Conditioned floor area Sq Ft

Number of occupants

Check Figures

Total Building Supply CFM:	220
Square ft. of Room Area:	977
Volume (ft ³):	1,010

The **Conditioned floor area** is found in the manual J in several places as **Square Foot of Room Area**. In the manual J, this may be either the entire building square footage or the square footage served by a system or contained in a zone, depending on which report is being viewed.

Quick Check

The **square feet per ton** is a quick metric to assess. Historically, this value was 400-600 square feet per ton. In new construction homes this will typically fall between 800-1300 square feet per ton. Values outside of that may not be incorrect but may be worth closer scrutiny.

Check Figures			
Total Building Supply CFM:	330	CFM Per Square ft. :	0.338
Square ft. of Room Area:	977	Square ft. Per Ton:	1,104
Volume (ft ³):	7,816		

This value is part of the manual J reports. If it hasn't been included, it can be checked with data in the Residential Plans Examiner Review form.

1. Take the Total Heat Gain value from the Summer Design Conditions section
2. Divide that number by 12,000 to get tons
3. Divide the conditioned floor area by the result from step 2.

Example:

Total heat gain: 15,189

Conditioned square footage: 1,340

1. 15,189 Btu
2. $15,189 / 12,000 = 1.27$ tons
3. $1,340 / 1.27 = 1,055$ sq ft per ton

Summer Design Conditions

Outdoor temperature	<input type="text"/>	°F
Indoor temperature	<input type="text"/>	°F
Grains difference	<input type="text"/> Δ Gr @ <input type="text"/> % Rh	
Sensible heat gain	<input type="text"/>	Btu
Latent heat gain	<input type="text"/>	Btu
Total heat gain	<input type="text"/>	Btu