

COURSE OUTLINE

MMC 2015 – Chapter 3, Section 312

ACCA MANUAL J LOAD CALCULATION

Section 312 Heating & Cooling Load Calculations

1 Credit Specialty

Lesson Goals: After completing this course, the attendees will be able to understand:

Purpose: the purpose of the standard is to define the Heating and Cooling system design loads for the purpose of sizing systems. **15 minutes**

Scope: The requirements of this standard shall be determined in accordance with the procedures described in the ASHRAE/ACCA Standard 183. **15 minutes**

Definitions: **30 minutes**

ACCA Manual J Load Calculation

Block Load

Whole House Load

Room by Room

Building Envelope

Sensible Loads

Latent Loads

Compliance: HVAC

2015 MMC Chapter 3, 312.1

International Energy Conservation Code

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MMC 2015 – Chap 3, Sec 312
 ACCA Manual J Load Calculations
 1 Credit Specialty

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ACCA MANUAL J LOAD CALCULATION

What is the purpose of a Manual J Load Calculation?

A Load Calculation is a method of evaluating the total sum of all of the heating and cooling loads for the home or structure.

Note: Do not use ACCA Manual J Load Calculations for Commercial jobs or projects.

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ACCA MANUAL J LOAD CALCULATION

For a simple Block Load calculation (Four walls, a floor and the ceiling) you would use the Air Conditioning Contractors of America (ACCA) MJ8ae form.

A Block Load is a combined space load based on the equipment that is required to heat or cool the house or space.

The equipment load is the load that the Heating and /or Air Conditioning equipment needs to satisfy for the occupants to be comfortable throughout the year as the seasons change.

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ACCA MANUAL J LOAD CALCULATION

To do a Whole House (Room by room) or a full load calculation you would use the ACCA MJ8 full form.

Note: These forms are available from ACCA by contacting them at (703)-575-4477 or www.acca.org

To determine a Room by Room Load or a Whole House Load calculation more specific information from the house or structure is required, to be more accurate than a Block Load calculation.

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ACCA MANUAL J LOAD CALCULATION

When you are doing a ACCA Manual J Load Calculation you need to evaluate the sources of heat gains and heat losses for the load on the building or structure in BTU/hour.

Heat travels from hot to cold, so in the winter if it is 68F inside the house and it is 0F outside of the house then the heat from inside of the house will want to travel to the outside of the house or structure.

During the summer if it is 95F outside of the house and 74F inside of the house then the heat from the outside of the house will want to travel to the inside of the house.

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ACCA MANUAL J LOAD CALCULATION

There are different types of Building Envelope Loads like the heating and cooling loads based on the home or the structure.

The Building Envelope Load depends on what the ambient conditions are on the inside and the outside of the home or structure.

The Building Envelope Load is the sum of the component loads like wall(s), ceiling, windows, door, appliance(s) and people loads.

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A Building Envelope load can be a Sensible or a Latent load.

Sensible loads affect the dry bulb temperature in the house.

Latent loads affect the amount of moisture in the house.

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Design conditions for the house or structure is based on temperature, humidity and wind conditions that are used to determine the heating and cooling load requirements.

The **Duct Load** is a system of round or rectangular duct that is used to direct air from one point in the house or structure to another dedicated point to provide heating or cooling.

Equipment Load in a house or structure is the sum of the Building Envelope loads and the heating and cooling equipment loads. For more information refer to ACCA Manual S equipment sizing book.

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ACCA MANUAL J LOAD CALCULATION

To perform an accurate ACCA Manual J Load calculation use a J1AE form or a J1 form.

To complete a ACCA Manual MJ8AE worksheet use:

- Worksheet A: Design conditions.
- Worksheet B: Window, glass door loads.
- Worksheet C: Skylight loads.
- Worksheet D: Opaque Surface loads.
- Worksheet E: Infiltration loads.
- Worksheet F: Internal Loads.
- Worksheet G: Duct loads.
- Worksheet H: Ventilation loads.

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ACCA MANUAL J LOAD CALCULATION

Note: ACCA has a Form J-1 that is helpful for gathering job or project information.

Worksheet for Manual J, Page 1:

Job information: Customer name and address.

Design conditions: Winter and Summer information.

Heating Summary:

Cooling Summary:

Equipment Summary: Manufacturer , Model #, Type, capacity, ect...

Construction Data: Windows, Doors, Walls, Roof, Ceiling, Floor, Partitions, Basement walls, Ground slabs.

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ACCA MANUAL J LOAD CALCULATION

Worksheet for Manual J, Page 2:

Calculation Procedures A, B, C and D.

Procedure A: Winter Infiltration HTM (Heat Transfer Multiplier) calculation.

Procedure B: Summer Infiltration HTM (Heat Transfer Multiplier) calculation.

Procedure C: Latent Infiltration Gain.

Procedure D: Equipment Sizing loads.

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ACCA MANUAL J LOAD CALCULATION

ACCA J1 AE Form, Abridged Version of Manual J, 8th Edition.

Project name: Example

Design State and City: Trenton, MI

Indoor Design Heating db (Dry bulb): 70F

Outdoor (Winter) 99% db (Dry bulb): 0F

HTD (Heating Temperature Difference): 70

Indoor Design Cooling db (Dry bulb): 75F

Outdoor (Summer) 1% db (Dry bulb): 86F

CTD (Cooling Temperature Difference): 11

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Indoor Design Cooling RH (Relative Humidity): 50%

Grain Difference: (Grains is a unit of measurement that refers to the weight of an object, about 7000 grains in a pound): 42.14

Daily Range: Medium

Latitude (Is the measurement of a part of the Earth in relation to the North or South of the Equator):

Elevation: (Is the height above a given level, like sea level): 577

ACF (Altitude Correction Factors for the Sensible and Latent Heat Equations): 0.978

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6A Windows & Glass Doors: Fenestration is any window, skylight or glass door assembly, internal and external shading devices and insect screens.

6B Skylights: Normally an opening in a roof with glass and a framed opening.

7 Wood & Metal Doors: Insulated and Non-insulated doors.

8 Above Grade Walls: Is the volume of the conditioned space that is above the grade line. This includes the part of the basement volume that is above the grade line.

Partition Walls: A vertical panel or a horizontal panel that separates a conditioned space from an unconditional space or separates two conditioned spaces.

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9 Below Grade Walls: Is the volume of the conditioned space that is below the grade line. This includes the part of a basement volume that is below the grade.

10 Ceilings

Partition Ceilings

11 Passive Floors: Is a floor that is not equipped with radiant heat coils.

Exposed Floors

Slab (Perimeter Feet): A concrete floor that has been poured on grade, over a prepared base of stone and vapor retarding film. These floors are normally insulated along the edge, no insulation below the floor.

Basement Floor

Partition Floors

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12 Infiltration: Uncontrolled outdoor air leakage into a conditioned space that leaks through cracks and openings in the exposed surfaces, for example air leakage through an attic, walls, ceilings, crawlspace or a leaky basement.

13 Internal Gains: Internal Loads estimates the Sensible and Latent loads generated by occupants, appliances, lights, electronics, ect...

14 Sub Totals: Equals the sum of the components heating and cooling load values that were selected in the ACCA Load calculation.

15 Duct Loss & Gain: Leakage of the ambient air through cracks and openings in the supply and return ducts.

16 Ventilation: Is the controlled engineered movement of air from outdoors of the house or structure. This could be an Energy Recovery Ventilator (ERV) or a Heat Recovery Ventilator (HRV).

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19 Blower Heat Gain: Is the amount of Sensible heat that a fan or blower puts into the air that is flowing through the space conditioning equipment. Blower heat should be added to the Sensible load.

20 Total Sensible Loss or Gain: Is the instantaneous flow of heat across the boundaries of the air conditioned space.

21 Latent Infiltration Loads: Moisture migration through porous materials is a Latent gain or Latent loss.

Latent infiltration loads for cooling: Moisture removal by a dehumidifier produces a Latent load on the device and reduces the Latent load on the central cooling system.

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Latent load for occupants: Moisture emissions from occupants are Latent gains.

Latent load for plants.

Latent load for duct in unconditioned space.

Latent ventilation load for cooling.

Total Latent Gain.

Note: The accuracy of each load estimate is a reflection of the users input information. One of the problems in doing a Load calculation is that the user has to make choices or choose a value that is not completely accurate because all of the exact choices are not all available when they are making the selection for the building material(s).

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The user will have to interpolate between the two closest building material choices that will affect the accuracy of the total Heat Loss and/or Heat Gain on the house or structure.

The more that the user interpolates or guesses at the building material(s) choices the more it will affect the total Load summary accuracy on their ACCA Manual J report.

There needs to be some basic knowledge and basic math skills that are required to perform an ACCA Manual J Load calculation.

There is ACCA Manual J Load application software available from various sources.

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Some of the Load calculation software that is available are:

Wrightsoft Right-Draw in the Right-Suite program by contacting them at 1-800-225-8697 (Option 3) or www.wrightsoft.com

Cool Calc that ACCA has recognized as "Powered by Manual J"

ACCA reminds contractors that only the software listed as approved by ACCA at <http://www.acca.org/software> is considered compliant in regards to Manual J Load calculation software.

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