

Manual J8 Load Calculation Training

Course Syllabus: To provide HVAC professionals with an understanding of how to apply ACCA Manual J, 8th Edition, load calculation procedures to a residential design process; and of how to determine the input values for a software program.

Basic Principles and Terminology (2)

Lesson Objectives: The participant will understand the basic heat transfer principles that apply to residential comfort conditioning and the importance of an accurate heat loss and heat gain load calculation for residential applications.

- 1.1 To be able to match a term with the proper definition.
- 1.2 To be able to apply Tables in the manual to determine the R-Factor for building materials used to construct a wall or ceiling component.
- 1.3 To be able to calculate the total R-Value for a structural component with a parallel path for conduction.
- 1.4 To be able to calculate the U-Factor for a building component.
- 1.5 To be able to identify the proper heat transfer formula for calculating a heating or cooling load.

Area Measurement (2)

Lesson Objectives: The participant will understand and apply equations and procedures to accurately measure component areas separating a conditioned space from an unconditioned space or exposed to outside conditions.

- 2.1 To be able to identify building components from plans or site visit during the survey of the dwelling.
- 2.2 To be able to apply equations to calculate areas of typical shapes (rectangle, trapezoid, triangle, circle, oval, hexagon, octagon) that may be determined during the plan survey.
- 2.3 To be able to apply equations to calculate volumes of typical spaces (box, wedge, cylinder, sphere) that may be determined during the plan survey.
- 2.4 To be able to apply measurement protocols to record the width, length, and height for building components.
- 2.5 To be able to identify the construction number assigned to the possible structural components making up the building envelope.

Structural Heat Loss (3)

Lesson Objectives: The participant will understand and apply equations and procedures to accurately determine the heat loss for an in-class residential example.

- 3.1 To be able to select the outdoor design conditions for the example using Table 1 from the manual.
- 3.2 To be able to select the indoor design conditions for the example using default values or customer preference if appropriate.
- 3.3 To be able to calculate the design heating temperature difference (HTD) for the example problem.
- 3.4 To be able to apply the proper formula to calculate the heat loss for each structural component.
- 3.5 To be able to determine the winter infiltration load and HTM using Table 5 and the building tightness description.
- 3.6 To be able to apply tables to calculate the duct heat loss factors for duct locations outside of the conditioned space.
- 3.7 To be able to determine the total heat loss for the in-class residential example.

Structural Heat Gain (4)

Lesson Objectives: The participant will understand and apply equations and procedures to accurately determine the heat gain (sensible and latent) for the in-class residential example used in Lesson 3.

- 4.1 To be able to select the outdoor design conditions for the example using Table 1 from the manual.
- 4.2 To be able to select the indoor design conditions for the example using default values or customer preference if appropriate.
- 4.3 To be able to calculate the design cooling temperature difference (CTD) for the example problem.
- 4.4 To be able to apply the proper formula to calculate the sensible heat gain for each structural component.
- 4.5 To be able to determine the summer infiltration load and HTM using Table 5 and the building tightness description.
- 4.6 To be able to determine the internal sensible heat gain and latent heat load based on the assumptions given in the in-class residential example problem.
- 4.7 To be able to apply Tables to calculate the duct heat gain factors (sensible and latent) for duct locations outside of the conditioned space.
- 4.8 To be able to determine appropriate ventilation considerations for adequate indoor air quality.
- 4.9 To be able to determine the total heat gain for the in-class residential example.

Equipment Selection (5)

Lesson Objectives: The participant will understand and apply techniques to properly size equipment for an example problem to optimize the sensible and latent heat capacities by comparing possible equipment options for an example manufacturer.

- 5.1 To be able to calculate the sensible heat ratio based on the total sensible and total heat gain calculations.
- 5.2 To be able to select the design temperature difference (TD) between the coil entering air temperature (RAT) and the coil leaving air temperature (LAT).
- 5.3 To be able to calculate the approximate or initial cooling cfm for evaluating the sensible and latent heat capacities for possible equipment options.
- 5.4 To be able to interpret performance data for an example manufacturer.
- 5.5 To be able to determine the maximum equipment size for cooling based on industry recommendations.
- 5.6 To be able to determine the maximum equipment size for heating based on industry recommendations.
- 5.7 To be able to calculate the thermal balance point given the total heat loss at a given outdoor design temperature; and heating performance data for a selected heat pump application.
- 5.8 To be able to determine the minimum auxiliary heat requirements (if heat pump).
- 5.9 To be able to determine the recommended auxiliary heat requirement (if heat pump).

Individual Exercise Example – Jay Smith Residence (6)

Lesson Objectives: The participant will apply techniques and skills learned to properly calculate the heating and cooling loads for the example problem.

- 6.1 To be able to complete the Form J-1 and the Average Load Procedure, Single Zone System worksheets for Generic Fenestration. Questions may be asked of the instructor.

Individual Exercise Example – Jay I Residence (7)

Lesson Objectives: The participant will apply techniques and skills learned to accurately calculate the heating and cooling loads for the example problem.

- 7.1 To be able to complete the Form J-1 and the Average Load Procedure, Single Zone System worksheets for Generic Fenestration. Questions may be asked of the instructor.
- 7.2 To be able to record the appropriate areas, etc., on Form J-1 for a room-by-room heat loss and heat gain analysis.

Exam: Individual Demonstration of Learned Skills

General Objective: The participant will individually complete an exam with questions and exercises linked to the **Specific Objectives** for the above lessons.

Performance Standard:

To successfully complete this exam, the participant must attain an overall score of 70 percent or higher.