



Code Outreach Program – Residential HVAC System Sizing

This edition of the Code Outreach Program discusses the requirements for sizing heating ventilation and air conditioning (HVAC) systems in residential buildings according to the State Energy Conservation Construction Code and the Uniform Fire Prevention and Building Code, which include the [2015 International Energy Conservation Construction Code](#) (2015 IECC), the [2016 Energy Code Supplement](#) (2016 EC Supplement), and [2015 International Residential Code](#) (2015 IRC).

Mandatory Requirement

Section R403.7 of the 2015 IECC is a mandatory section that deals with equipment sizing and efficiency ratings. According to Section R403.7, *“heating and cooling equipment shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.”* Section M1401.3 of the 2015 IRC includes the same requirement. (See Section R106 of the 2016 EC Supplement for adopted referenced standards.)

In large part, the practice of specifying HVAC equipment for the homebuilding industry, has historically followed a rule-of-thumb method of HVAC equipment sizing. As energy codes have become more stringent, both in required R-values and U-factors, and in tightness of the building envelope, HVAC equipment sizing has become more crucial. Tighter homes require smaller heating and cooling loads due to the decrease in loss of conditioned air through building infiltration and the decreased thermal loss resulting from a better insulated building envelope.

A properly sized HVAC system operates more efficiently and extends the equipment’s service life. A piece of mechanical heating and or cooling equipment which experiences “short cycling” never reaches its tested efficiency rating, since industry test standards are based on equipment operating at long run times. Further, cooling equipment which experiences “short cycling” does not efficiently remove or reduce humidity (latent heat) levels within the dwelling, thereby requiring a cooler thermostatic set point to reach occupant comfort levels. Another benefit to be realized from lower humidity is the potential of reduced mold and mildew within the dwelling.

Manual J Method

Load calculations according to Manual J include all relevant considerations of heat loss and heat gain, such as local climatic conditions, building orientation, building insulation, fenestration, building tightness and exterior boundary elements of heat loss. The Manual employs a simplified method of calculating building loads. It includes a room-by-room calculation that allows the designer to determine the required capacities of the heating and cooling equipment. In addition, the Manual J method generates information which can be used to estimate duct airflow requirements for each room of the dwelling. The calculated heating and cooling capacity along with overall airflow provides a means to determine the correct required mechanical system. By providing the proper airflow, the correct level of BTU/hr is supplied to each room or space, thereby achieving building occupant comfort while meeting the energy efficiency goals of the code.

Manual S Method

Manual S completes the design process by enabling the selection of equipment based on the information generated by Manual J calculations. Sensible and latent heat gain are critical inputs of Manual S. Equipment manufacturer’s expanded performance tables are the heart of Manual S procedures for HVAC equipment. Lacking the Manual S selection procedure, even when the correct total BTU/hr requirement for the equipment is selected, the sensible and latent heat removal capacities of the equipment could be out of balance, thereby not achieving the efficiencies and comfort levels intended by the code.

Other Methods

As indicated above, other heating, cooling and equipment sizing methodologies may be used, subject to the approval of the Code Enforcement official.

Please look for our next edition of the Code Outreach Program at the beginning of next month.

In-Service Training

How to check In-Service Training credits: <https://www.dos.ny.gov/DCEA/pdf/Check%20training%20credits.pdf>

How to View Your Training Credits in SLMS: <https://youtu.be/jgMPIQtV17c>

DBSC - A Division of Department of State
OFPC – An Office of the Division of Homeland Security & Emergency Services

If you have questions pertaining to the Code Outreach Program, email us at COP.codes@dos.ny.gov

If you have questions pertaining to the Uniform Code or Energy Code, email our technical support group at: codes@dos.ny.gov.

To cancel your subscription to this email list, click on the unsubscribe link found [here](#).