

**NANTUCKET
BUILDERS ASSOCIATION
OCTOBER 12, 2016**

Course objectives

- Course time 1.5 hours
- There is no test or other assessment
- What's happening in the Building Department
- Over view of applicable codes
- Status of proposed changes
- summary of changes IRC & IECC
- Sheet metal permits
- Overview of IECC on renovations

What's going on

- Number of building permits issued
- Moving, raising or relocation the DPW now requires a sewer disconnect permit & inspection prior to a building permit
- Differs from previous reconnection permit
- Check with Health for similar requirement

CODES WE USE

The Ninth Edition of the Massachusetts Building Code

Comprised of the following I-Codes

- 2015 International Residential Code
- 2015 International Building Code
- 2015 International Existing Buildings Code
- 2015 International Energy Conservation Code
- 2015 International Mechanical Code
- 2015 International Swimming Pool & Spa Code
- 2015 International Fire Code
- As Amended by the BBRS



Code updates

- 1100.1 Adoption. Buildings shall be designed and constructed in accordance with the 2015 International Energy Conservation Code (IECC), as amended by 780 CMR 51.00
- sections N1100.1 through N1111.2, as amended.
- Concurrency. Applications for building permits and related construction and other documents filed through January 1, 2017, may comply either with 780 CMR 13.00: Energy Efficiency, 51.00, and 115.00 Appendix AA effective August 12, 2016, or with the versions of those provisions in effect immediately prior to August 12, 2016, but not a mix of both. After January 1, 2017, concurrency with the prior versions ends, and all applications for building permits and related construction and other documents shall comply with the amended provisions only.

Changes

- Climate Zone 5 and Marine 4 Fenestration U Factor shall be “0.30”.
- Currently 0.32
- R402.4.2 New wood burning fire places shall have tight fitting OR doors and outside air.
- BUT now doors have to be tested and labeled in accordance with UL 907
- **N1102.1.5.1 Approved Software for Total UA Alternative:** The following software is
- approved for demonstrating Total UA compliance:
- 1. REScheck Version 4.6.2 or later, available at
- <http://www.energycodes.gov/rescheck>
- 2. REScheck-Web available at
- <https://energycode.pnl.gov/REScheckWeb/>

WIND BORNE DEBRIS

Transition to the Ninth Edition

DESIGN CRITERIA

R301.2.1.2 Protection of openings.

- For high wind locations (typically the southeast shore of MA, the Cape and the Islands) the Residential code requires protection against windborne debris for building openings such as doors and windows. This requirement can be satisfied by using debris resistant windows or providing a special shutter system. Although recent data, research and modeling indicate slightly less wind speeds than historically predicted, the IRC 2015 has increased the geographical area requiring windborne debris protection.
- Further detailed investigation by staff indicates the new wind speeds in this extended windborne area are less than the wind speed that triggered windborne debris requirements in the 2009 IRC. With that consideration, and not finding any historical evidence indicating windborne debris has been the primary cause of major structural damage after much investigation, the windborne debris requirement has been eliminated. This simplifies design and construction and significantly reduces cost.



WIND BORNE DEBRIS

- 9th Edition: IRC
- • Wind Borne Debris: Reserve the definition which
- in essence makes the requirement null.
- – Wind ‘pressure’ in South East MA has dropped slightly
- – Impact windows twice the cost of non impact and
- take 20 minutes on average longer to install.
- – No evidence of structural damage directly attributable
- to wind in pre 1975 one- and two-family dwellings.
- • Use of Maps and GPS for 1 mile determination no
- longer required



Retaining walls

Transition to the Ninth Edition

- **Retaining Walls R404.4** - Retaining walls, freestanding walls not supported at the top, with more than 48ins of unbalanced backfill must be designed by an engineer. Retaining walls resisting additional lateral loads and with more than 24ins of unbalanced backfill must also be designed in accordance with accepted engineering practice.



HVAC

2009 International Residential Code

- Heating and Cooling Sizing
 - Before you can start a plan review you must understand what you are reviewing. The 2009 IRC Chapter 14 sec.M1401.3 "Sizing" State that the heating and cooling equipment shall be sized in accordance with The Air Conditioning Contractors of America ACCA Manual "J" and ACCA Manual "S".
 - Let's look into the Manual J load calculation. The Manual J load calculation contains a simplified method of calculating heating and cooling loads for winter and summer.

2009 International Residential Code

- If you follow the 40 verification points you will notice they build and reference each components, I found it is very difficult to doctor or fudge these numbers if you follow the “rules of thumb” and the residential plans examiner review form for HVAC system design.
- In addition to this form you should be receiving a full set of plans and calculations including the Manual “J” J-1 form, OEM performance data for heating, cooling and blower... in compliance with Manual “S” equipment selection, Manual “D” friction rate worksheet and a duct distribution system sketch.



2009 International Residential Code

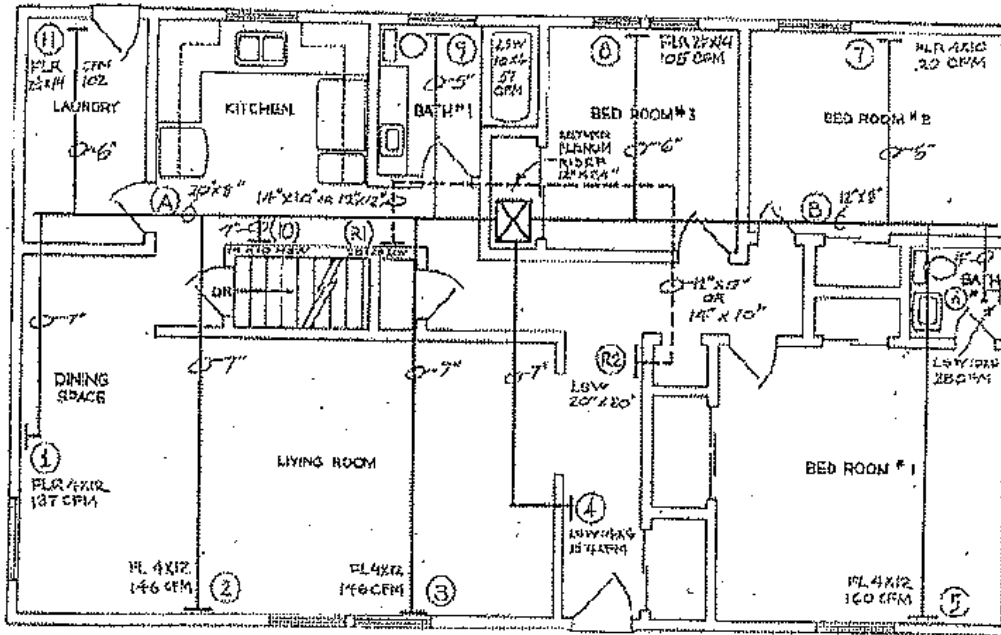
Manual "J" Load Calculation Method

- Manual "J" requires two sets of design conditions
- Heat loss (Winter Peak Loads)
- *Heat loss (*winter*) - Outdoor design temperature-heating 99% dry bulb (db)
- *Indoor design temperature - 70 degrees f db
- Heat gains (*Summer Peak Loads*)
- *Heat gain (*summer*) - Outdoor design temperature-cooling 1% db

*Indoor design temperature 75 degrees f db



REGISTER, DIFFUSER AND GRILLE SIZES



MANUAL J HOUSE
EXTENDED PLENUM DUCT DESIGN

Figure 6.22

FINAL DUCT DESIGN FOR THE HOUSE

2009 International Residential Code

- **HVAC Load Calculation -**
- **Line # 1- Winter outside design temperature:** Ensure this value comes from Manual "J" Table 1A or 1B. Manual J sec. A.5-1 "use of this set of conditions is mandatory, unless a code or regulations specifies another set of regulations".
- **Line # 2- Winter Indoor Temperature:** Should be 70 degrees. Manual J sec. A.5-3 "Heating and cooling load estimates shall be based on indoor design conditions... ANSI/ASHREA values which are 70 degrees.
- **Line # 3- Summer Outdoor Temperature:** Ensure this value comes from Manual "J" Table 1A or 1B "Use of this set of conditions is mandatory, unless a code or regulation specifies another set of conditions".



2009 International Residential Code

- **HVAC Load Calculation –**
- **Line # 4 - Summer Indoor Design Conditions:** Manual “J” sec. A5-3 “Heating and cooling loads estimates shall be based on shall be based on indoor design conditions... ANSI/ASHRAE values of 75 degrees.
- **Line # 5 - Summer Design Grains:** Design Grains correspond to Relative Humidity, this value is to be determined by Manual “J” Table 1A.
- **Line # 6 - Relative Humidity:** IECC Fig. 301.1 “Climate Zones”.
- **Line # 7 - Orientation:** Verification must be made to the structures orientation. Manual “J” sec. A5-4 Plans, Sketches and Notes states, “sketches and notes shall provide the following information. Sketches based on plan take-offs or field observations must have an arrow or directional that points to the north”.



2009 International Residential Code

- HVAC Load Calculation -
- Line # 8 - Number of Bedrooms: Verify the number of bedrooms match the plan.
- Line # 9 - Floor Area: Ensure the floor area matches the plans.
- Line # 10 - Occupants: Ensure this value equals the number of bedrooms plus one. Manual "J" sec. 3.11 "occupants produce sensible and latent heat loads"
- Line # 11-Window overhangs: Manual "J" sec. 2-3 (Manual J Mandatory Requirements) Item # 6 "...overhangs adjustments shall be applied to all windows and glass doors. Including purpose-built day-lighting windows"



2009 International Residential Code

- **HVAC Load Calculation -**
- **Line # 12 - Window Internal Shade:** Manual "J" sec. 2-3 (Mandatory Requirements) item # 7 "Take credit for internal shade (the default is a medium color blind with slats at 45 degrees, or the use of the actual device, this applies to all vertical glass, this does not apply to purpose-built day-light windows)" unless there is contrary evidence, HVAC system designers shall default to a "medium color blind with slats at 45 degrees".
- **Line # 13 - Number of Skylights:** Skylights have a large impact on the heating and cooling load calculations. Ensure the number of skylights on the building plans are represented accurately.



2009 International Residential Code

- **HVAC Load Calculation -**
- **Line # 14 - Total Heat Loss:** This value is used to select the heating system, you may wish to verify this value is the sum of all the individual loads.
- **Line # 15 - Sensible Heat Gain:** This value represents the amount of dry heat the cooling system must remove according to the calculations.
- **Line # 16 - Latent Heat Gain:** This value represents the amount of moist heat (humid) the cooling system must remove according to the calculations.
- **Line # 17 - Total Heat Gain:** This value is used to size the cooling system; the total cooling capacity shall equal the sensible and latent heat gains (lines 15 & 16 must equal line 17).
- **Manual "S" HVAC Equipment Selection.**



• **2009 International Residential Code**

- **HVAC Load Calculation -**
- **Line # 18 - Equipment Type:** A description of the type of heating source used: furnace, Boiler...
- **Line # 19 - Model of Heating Equipment:** List the model(s) of heating equipment (should be verified)
- **Line # 20 - Heating Output Capacity:** The amount of maximum OUTPUT heating capacity available from the heating unit shall be equal to, but not to exceed 140% of heat loss value found on Line 14.
- **Line # 21 - Auxiliary Heating Output Capacity:** If a heat pump is to be used supplemental heat may be required, consult the designer for justification.

2009 International Residential Code

- **HVAC Load Calculation -**
- **Line # 22 - Cooling Equipment Type:** A description of the cooling equipment that will be installed: air conditioner, heat pump, ect...
- **Line # 23 - Model of Cooling Equipment:** The model of cooling equipment to be installed.
- **Line # 24 - Sensible Cooling Capacity:** The sensible cooling capacity of the equipment should satisfy the sensible cooling requirements on line 15.
- **Line # 25 - Latent Cooling Capacity:** Latent cooling capacity is rarely listed on the manufacturer's performance data plate. However, it can be derived from subtracting the sensible cooling(dry) line 24 from the total cooling capacity line 26.
- **Line # 26 - Total Cooling Capacity:** The amount of maximum cooling capacity available from the equipment shall not exceed 115% of heat gain value of line 17.



2009 International Residential Code

HVAC Load Calculation -

Manual "D" HVAC Duct Distribution system Design

Line # 27 - Heating CFM (*cubic feet per minute*): The volume of air required to deliver the heating BTUs for the structure.

Line # 28 - Cooling CFM: The volume of air to deliver total cooling capacity to the structure.

Line # 29 - Design Air Flow: The volume of air delivered by a piece of equipment at a given fan speed, voltage, and amount of pressure (the larger of heating or cooling CFM line 27 and 28)

Line # 30 - Static pressure: The static pressure is the amount of pressure in inches of water column the appliance's blower can push through and still deliver the stated volume of air in line 29.

2009 International Residential Code

- **Line # 31 - Component Pressure Loss:** The total resistance or pressure created by accessories like filters, refrigeration coils, grills, registers, dampers...
- **Line # 32 - Available Static Pressure (ASP):** The difference between the static pressure (line 30) and the component pressure loss (line 31)
- **Line # 33 - Longest Supply duct:** The effective length of the longest supply duct run. Different duct fittings create differing amounts of resistance. The calculation is based on the resistance factor of a straight run in feet.
- **Line # 34 - Longest Return Duct:** same properties as line 33 but applies to the return ducts.



HVAC

2009 International Residential Code

- **Line # 35 - Total Effective Length:** The sum total of supply and return effective lengths add line 33 and 34.
- **Line # 36 - Friction Rate** (ASP×100) divided by TEL = FR) WHAT! Line 32 multiply by 100 then divide by line 35 this will give the friction loss. Friction loss must be greater than .06 IWC. and less than 0.18 IWC (yes another “rule of thumb”).
- **Line # 37 - Duct Material used.** Have the designer to justify the material used and the calculated friction properties.
- **Line # 38 - Branch Duct:** specify Type must verify.
- **Line # 39 - Contractor's printed name.**
- **Line # 40 - *Contractor's Signature.***

