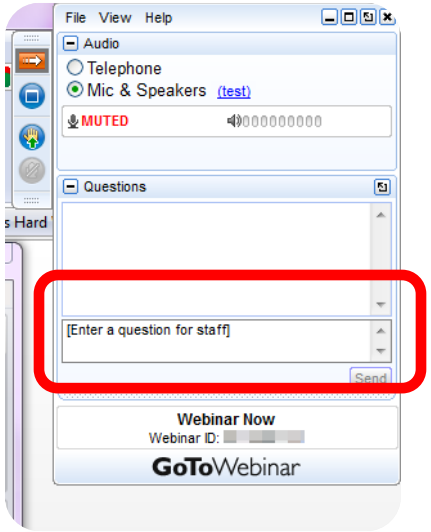
Selection of Heating Equipment for the Home Performance Salesforce

June 17, 2015

Questions



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Agenda

- Importance of Involving the Client
  - Phone survey!
  - Field visit!
- Design
  - NYSERDA Home Performance with ENERGY STAR® & EmPower Programs Material & Installation Guidelines
  - Load calculation requirements!
- Furnace Replacements!
- Hot Water Boiler Replacements!
- Steam Boiler Replacements!

Importance of Involving the Client

- Phone survey
  - How old is the equipment?
    - ✓ Secondary systems?
  - Is the equipment working order?
  - Why are you looking for new equipment?
    - ✓ Comfort Issues, where?
    - ✓ Noise Issues?
    - ✓ Health Issues?
    - ✓ High bills?
    - ✓ Other Issues?
  - What are the energy bills?
    - ✓ Request copy of bills and size of house.
  - What temperatures do they maintain, heating, and cooling?
  - Who will be at the home during the sales call; how long will the visit take?
- Maximize face time with customer!

Importance of Involving the Client

- Field visit
  - Using your senses!
  - What to test!

Importance of Involving the Client

- One thing salespeople could do to potentially increase sales, is include some form of HVAC performance testing on each sales call.
- Do something to differentiate your company from everyone else that is just box swapping and trying to win the race of the lowest price.
- Testing sets you apart from your competition and distinguishes you as an HVAC professional.
- The reason to test is that testing identifies unseen system defects.
- Testing will help you find, and then provide the solutions your customers are really looking for.
- Most companies imply new equipment will solve comfort and efficiency problems, but new equipment cannot solve most comfort and efficiency problems.

Importance of Involving the Client

- Common thinks to look, hear, and smell for during sales call:
  - Venting
    - ✓ Location
    - ✓ Vent sizing
    - ✓ Existing chimney
  - Gas/Oil Piping
    - ✓ Leaks
    - ✓ Sizing
  - Thermostat
    - ✓ Type
    - ✓ Location
    - ✓ Wiring/Wireless
  - Leaks, Smells, and Noises
    - ✓ Water, air leaks
    - ✓ Mold, Mildew, and Asbestos like substances
    - ✓ Unusual noises

Design

- NYSERDA Home Performance with ENERGY STAR® & EmPower Programs Material & Installation Guidelines:
  - This presentation assumes contractors have the current version of the guidelines and have reviewed and understand these guidelines.
  - Where applicable we will refer to certain sections of the guidelines during this presentation. This is not a complete review of the Heating & Cooling sections of the guidelines.
- Manual J:
  - ACCA's Manual J is the first step in the design process of a new heating and air conditioning system.
  - There are two types of Manual J load calculations:
    - ✓ Whole House (Block) HVAC Load Calculations
    - ✓ Room-by-Room Load Calculations
  - Oversized furnaces and air conditioners cost too much, waste energy, and potentially provide lower levels of comfort along with shortened equipment life.

Design

- Manual S:
  - Manual S instructs designers how to select equipment which meets the application requirements (heating, sensible cooling, and latent cooling) at the design conditions that were used for calculating the loads.
  - Manual S provides sizing requirements for different types of cooling and heating equipment, as well as in-depth explanations and examples of how to use manufacturer's performance data.
  - New update to Manual S is now available and includes the following:
    - ✓ Contains new sizing rules that recognize multi- and variable speed equipment with larger over sizing limits.
    - ✓ Covers 11 types of equipment (previous version covered only 4).
    - ✓ Heat pumps in heating dominated locations have an optional oversizing procedure.
    - ✓ There are an increased number of example problems for Manual S procedures, as well as explanations of details/nuances (for contractors and educators).
    - ✓ The book is reformatted so the first sections contain mandatory code official language.
- New Manual S is available at ACCA.org.

Design

- NYSERDA Home Performance with ENERGY STAR & EmPower Programs Material & Installation Guidelines. Manual J & S requirements.
  - All installed space conditioning equipment must be sized in accordance with ACCA Manual-J or equivalent.
  - Room by room load calculations must be performed for all new ductwork installations.
  - Blower Door (cfm50) testing on existing homes must be performed to estimate building air leakage rate for infiltration load assessment.
  - Supplemental heat / emergency heat must be sized to meet design load.
  - Ventilation calculations must be performed for every HVAC system installation/replacement with a proposal for new ventilation system when needed.
  - Space conditioning equipment must be selected using ACCA Manual-S or other approved equivalent.

Polling Question

Which is your main ACCA Manual J software do you use for equipment load sizing?

1. Wrightsoft Right-J
2. HVAC-Calc-v4.0
3. Elite RHVAC or Adtek AccuLoads or CarmelSoft HVAC ResLoad-J
4. Cool Calc Manual J or Florida Solar Energy Center's EnergyGauge or Avenir MJ8 Editions of HeatCAD® and LoopCAD®
5. Other (please input software name into question box)

Polling Question

Which is your main ACCA Manual D software does your company use for duct sizing?

1. Wrightsoft Right-D
2. Elite DUCTSIZE
3. Adtek AccuDuct
4. Other (please input software name into question box)

Polling Question

After you have completed the Manual J load. What does your company use to select equipment size?

1. Manual S
2. Manufacturer's recommendations
3. What is in stock

Polling Question

What is the most important Manual to get correct for a furnace installation?

1. Manual J
2. Manual S
3. Manual D

Furnace Replacements!

- What to look for!
  - Ductwork
    - ✓ Location
    - ✓ Insulation
    - ✓ Sealing
    - ✓ Balancing Dampers / Zoning
    - ✓ Duct Geometry
    - ✓ Sizing
    - ✓ Disconnected ductwork
    - ✓ Register/Grille location and type

Furnace Replacements!

- What to test for!
  - Air Temperature/Pressure Diagnostic Techniques
    - ✓ Delta T Furnace
    - ✓ Delta T Plenum to Register/Grille
    - ✓ External Static Pressure
    - ✓ Room to Room Pressure

Furnace Replacements!

Air Temperature Diagnostic

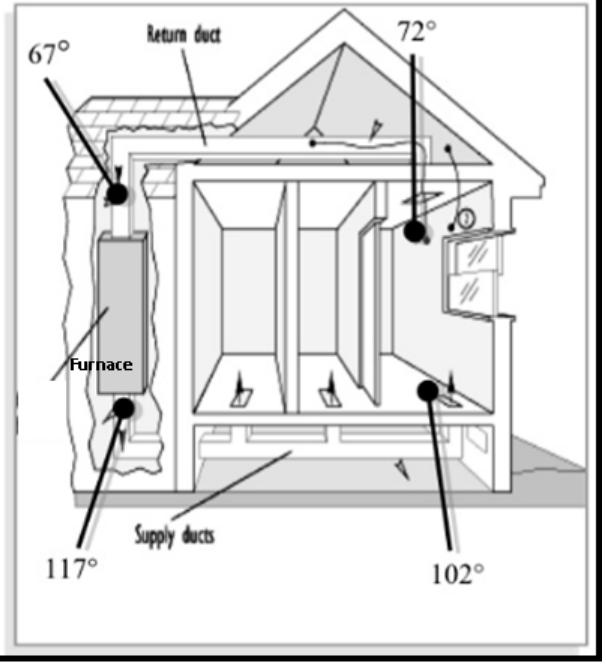
Duct Loss Example (Sensible BTUs)

Heating Mode

Equipment ΔT	**50°**
System ΔT	**30°**
Return Duct Loss	**5°**
Supply Duct Loss	**15°**

What would the supply register temp be if there was no duct loss?

122°



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Furnace Replacements!

- Air Temperature Diagnostic
  - Equipment Delta T – 50^0F
  - System Delta T – 30^0F
  - Return Duct Loss – 5^0F
  - Supply Duct Loss – 15^0F
- Estimated Supply Duct Loss
  - Supply Duct Loss 15^0F/Equipment Delta T 50^0F
  - = 30% Supply Duct Loss
- Estimated Return Duct Loss
  - Return Duct Loss 5^0F/Equipment Delta T 50^0F
  - =10% Return Duct Loss
- Estimated Total Duct Loss 40%

Hot Water Boiler Replacements!

- NYSERDA Home Performance with ENERGY STAR & EmPower Programs Material & Installation Guidelines:
  - As an alternative to Manual-J, IBR load calculations or an approved equivalent may be used.
  - New installed radiation must be sized using Manual J, IBR, or approved equivalent.
  - Boiler, pump, and system piping must be sized per manufacturer's specifications, IBR, or approved equivalent.
  - Open expansion tanks must be replaced with sealed and pressurized expansion tanks.
  - New boilers must not have a tankless coil installed.

Hot Water Boiler Replacements!

- What to look for!
  - Near Boiler Piping
  - Circulator vs. Zone Valves
  - Air Elimination/Water Expansion System
  - Leaks
  - Third floor or higher radiation
  - Radiation Piping, Insulation and Piping Support
    - ✓ Reverse Return
    - ✓ Direct Return
    - ✓ Monoflo
    - ✓ Series

Hot Water Boiler Replacements!

- What to test for!
  - Boiler Pressure
  - Boiler Temperature
  - Boiler Delta T
  - Boiler Water Condition

Steam Boiler Replacements!

- NYSERDA Home Performance with ENERGY STAR & EmPower Programs Material & Installation Guidelines:
  - Steam boiler to be sized using existing radiation: square feet of "Equivalent Direct Radiator" (EDR). Base the size of the replacement boiler on the connected load, not the building's heat loss. If the home is over-radiated, consider removing radiators. Conduct room to room survey of the radiators or other approved equivalent.
  - New installed radiation must be sized using Manual J, IBR, or approved equivalent.
  - Boiler piping and system piping: sized per manufacturer's specifications, IBR, or approved equivalent.
  - New boilers must not have tankless coil installed.

Steam Boiler Replacements!

EXAMPLE:

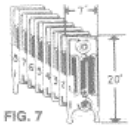

FIG. 7

Figure 7 is a tube type radiator, 20" high by 7" wide. There are 4 tubes per section and 8 sections. Table F shows this size tube type radiator has 2¼ square feet of radiation per section. 2¼ times 8 (the number of sections) equals 18 square feet of direct radiation. 18 times 240 (BTU/hr.) equals 4320 BTU/hr. for this radiator.

TABLE F
SQUARE FEET OF RADIATION PER RADIATOR SECTION

OLD STYLE COLUMN RADIATORS

	NO. OF TUBES OR COLUMNS					
	1	2	3	4	5	6
Width	4½"	7⅜"	9"	11½"	12⅓"	12½"
Height In.						
45"	3½	5	6	10	—	—
38"	3	4	5	8	10	—
32"	2½	3⅓	4½	6½	8½	—
26"	2	2⅔	3¾	5	7	7
23"	1⅘	2⅓	3¼	4½	—	—
22"	1⅘	2¼	3	4	6	6
20"	1½	2	2¾	3½	5	5
18"	1⅓	1¾	2¼	3	5	4⅓
17"	—	—	—	—	—	4
16"	—	—	—	—	4	3¾
15"	—	1½	—	—	—	—
14"	—	—	—	—	4	3
13"	—	—	—	—	3	3

THIN TUBE RADIATORS

	NO. OF TUBES				
	2	3	4	5	6
Width	3½"	4"	4¾"	6"	7⅞"
Height In.					
38"	2½	2⅔	—	—	—
32"	2	2⅓	—	—	3⅘
26"	—	—	2⅓	3	3
25"	1½	1⅔	2	—	3
23"	—	—	—	2	—
22"	1⅓	1⅓	1⅘	—	—
20"	—	—	1⅘	—	2⅓
19"	1	1¼	1⅔	—	2⅓
17"	—	—	—	2	—

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Steam Boiler Replacements!

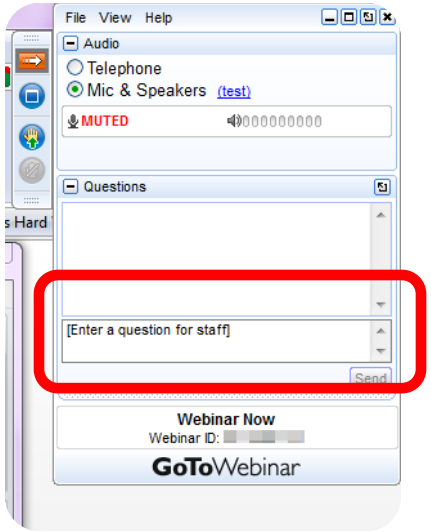
- What to look for!
  - Near Boiler Piping
  - Dry/Wet Return
  - Condensate/Long Horizontal Runs
  - Water Condition
  - Leaks

Steam Boiler Replacements!

- What to test for!
  - Steam Vent Operation
  - Condensate Return
  - Water Condition
  - Leaks
  - Noises

Questions

Questions



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Thank You