RESNET Rating Sampling Standard

Implementation Opportunities and Challenges

Presented by

Emelie Cuppernell, PSD
Daran Wastchak, D.R. Wastchak, LLC

February 26, 2014

RESNET *Atlanta*

RESNET.
RESIDENTIAL ENERGY SERVICES NETWORK

Setting the **Standards** for
Home Energy Efficiency

High-lights of Standard

- ☐ 601 – General Provisions
    - ■ 601.1 – Purpose
        - ☐ Certification via the Sampling Standard does not constitute a "confirmed" rating
        - ☐ HERS Index can be assigned, but must be the same for each home plan and equal to the threshold specification determined from plans
        - ☐ Sampling Providers assume all warranties and liabilities with the sampling of homes

High-lights of Standard

☐ Definitions (Appendix B)

- **Sample Set** - A specific group of homes from which one or more individual homes are randomly selected for sampling controls.

- **Sampling Controls** - A collection or set of required tests and inspections performed for a sample set of homes in order to confirm that the threshold specifications have been met. "Sampling controls" may refer to the entire set of tests and inspections, or to a particular phase that constitutes a defined subset of those tests and inspections (e.g. pre-drywall, final, HVAC, windows and orientation, etc).

High-lights of Standard

☐ 602 – Definitions

- **Threshold Specifications** - A set of qualification criteria, which are established for a sample set, based on worst-case Projected Ratings with consideration of all options, and in worst-case orientation, or a set of prescriptive specifications such as the ENERGY STAR prescriptive path adopted by the U.S. Environmental Protection Agency.

- **Failed Item –** A "failed item" constitutes a category of failure, such as insulation installation, duct leakage, prescriptive air sealing requirements, insulation enclosure, eave baffles, mechanical system efficiency, window specifications, etc. For the purpose of follow-up inspections, a "failed item" is not limited to the specific instance in a home but to that category of the minimum rated features as it applies to that home design.

High-lights of Standard

□ 602 – Definitions

- ■ *Failure* - When one or more of the threshold specifications is not met during the testing and inspection process.

- ■ *Initial Failure* - When one or more failure(s) are first identified in a home during the sampling process.

- ■ *Additional Failure* – When additional instances of initial failure(s) are identified in one or more of the other homes in the sample set being tested or inspected.

High-lights of Standard

□ 603 – Technical Requirements For Sampling

- ■ 603.2 – Homes eligible to be sampled

  - □ Homes of "same construction type using the same envelope systems"

- ■ 603.3 – Analysis of Homes

  - □ Worst-case analysis of floor plans: worst-case orientation, all known option packages, and applicable site location(s).

High-lights of Standard

- ☐ 603 – Technical Requirements (cont'd)
  - ■ 603.4 – Labeling of Homes

    - ☐ "This home has been certified using a sampling protocol in accordance with Chapter 6 of the RESNET Standards (see http//resnet.us.standards)."

    - ☐ Label to be located on the electrical panel, minimum of 10 pt font

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High-lights of Standard

- ☐ 603 – Technical Requirements (cont'd)
  - ■ 603.5 - Creating a "Sample Set" (i.e. "batch")

    - ☐ Homes to be sampled can be selected within the same subdivision or metropolitan area and climate zone

    - ☐ All "sampling controls" (i.e. tests and inspections) for a sample set at a particular stage of construction, must be completed within 30 days

    - ☐ Sample sets do not have to consist of the same 7 homes throughout all the stages of construction

    - ☐ Participating subdivisions must be subject to "sampling controls" at least once every 90 days <u>and</u> have a minimum of 1 home start every 90 days

High-lights of Standard

☐ 603 – Technical Requirements (cont'd)
- 603.7 – Sampling Controls

  ☐ Sample controls must be completed at a minimum ratio of one (1) test or inspection per seven (7) homes

  ☐ A certified Rater must oversee the sampling process

  ☐ Sampling controls can be completed on a single home or several homes within a given sample set

  ☐ Builders qualify for sampling by first completing seven (7) consecutive homes without failure

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High-lights of Standard

☐ 603 – Technical Requirements (cont'd)
- 603.7 – Sampling Controls (cont'd)
  ☐ New subdivisions require three (3) consecutive homes to pass without failure before starting sampling

  ☐ "When a failure occurs, the failed item(s) shall be tested or inspected in two (2) additional homes"

  ☐ "When an additional failure occurs, in one or more of the two (2) additional homes, the failed item(s) shall be tested or inspected in the remaining four (4) homes" in the sample set

  ☐ "Until the failure is corrected in all identified (failed) homes in the sample set, none of the homes shall be deemed to meet the threshold or labeling criteria"

High-lights of Standard

☐ 603 – Technical Requirements (cont'd)

■ 603.8 – Multiple "Additional Failures"

☐ If three (3) "additional failures" occur within a ninety (90) day period <u>on the same item</u>, the <u>failed item</u> must pass in seven (7) consecutive homes before it can be sampled again

☐ If three (3) "additional failures" occur within a ninety (90) day period <u>on several different items</u>, the builder must re-qualify to sample by completing seven (7) consecutive homes without failure,

or

Builder can do a "root cause analysis"

RESNET Sampling Standard   **February 26, 2014**

Updates to Sampling Standard

☐ ANSI Standard Development

■ Update minimum requirements to become a Sampling Provider
■ Technical update and improvements to Chapter 6
■ Multifamily buildings
■ Modular and manufactured homes

RESNET Sampling Standard   **February 26, 2014**

Lessons Learned

- Sampling at 3 phases
- Spreadsheets to track
- Databases to track
- Spreadsheets to track
- Retesting "culture"
- Builder inspection "dry runs" in lieu of doing their job
- Re-inspection fees
- We charge MORE for sampling, and spend a LOT more on testing and inspections

Questions?

Rater Providership

Sampling – a little clarity

The PSD Experience

Emelie Cuppernell, PSD
Daran Wastchak, D.R. Wastchak, LLC
February 26th 2014

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PSD as a RESNET QA Provider

- QA Provider for independent Raters in the "Northeast"

- 1 or 2 Raters working on a project

- Majority of sampling projects are units within multifamily buildings

Tip of the Day

Read the Standards

- Chapter 6

Interpret the standards

Check with your Provider

Slide 1

Determine Eligibility → Perform Plan Reviews → Determine Sample Sets → Onsite Verification → Modeling → Submit to Provider for Processing → QA

- ✓ Sampling Provider
- ✓ Same construction type and envelope systems
- ✓ Specific compliance program allows sampling
- ✓ Construction schedule is conducive to sampling
- ✓ Builder has a track record

Slide 2

Determine Eligibility → Perform Plan Reviews → Determine Sample Sets → Onsite Verification → Modeling → Submit to Provider for Processing → QA

- ➢ Worst-case Projected Rating must be performed for each individual floor plan
- ➢ Take into account:
  - › Orientation
  - › All known option packages
  - › Applicable site/building locations
- ➢ Determine threshold specifications for all controls

Worst case model for each home plan

3 story multifamily building

C	C	D	D	C	C
A	B	A	A	B
A	B	A	A	B
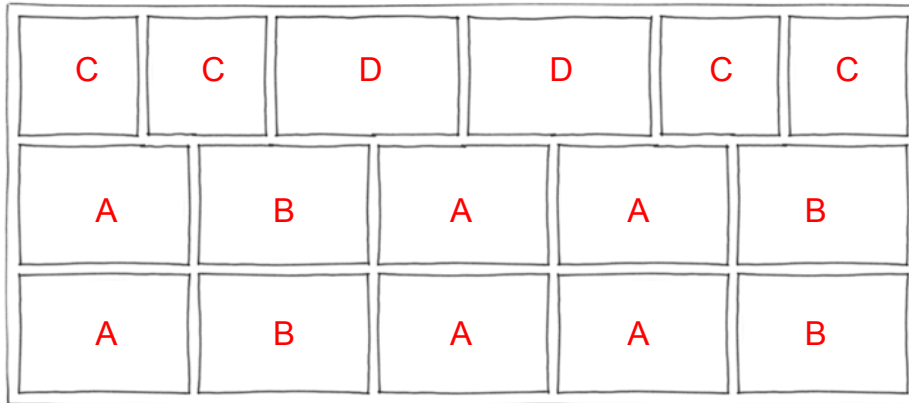
At minimum 4 plan review models

THRESHOLD SPECIFICATION

- Ex. Infiltration:
  - › Code requirement?
  - › ENERGY STAR v3.0 prescriptive value?
  - › Incentive level requirement?
- This is the number to beat to "pass" and the value that will be assigned to all units of that floor plan regardless of actual tested data.
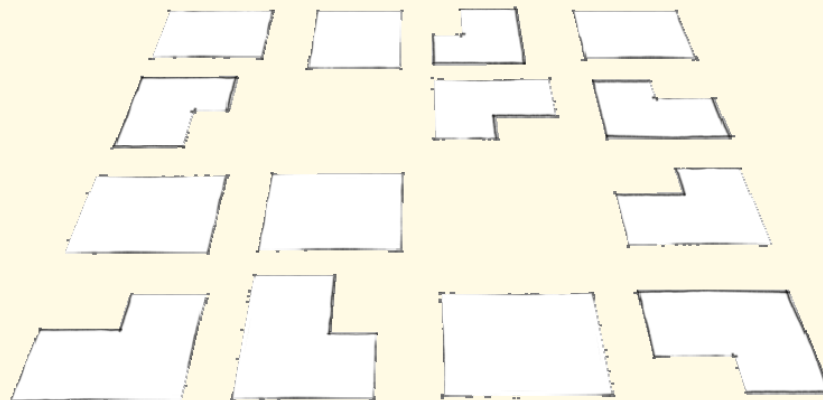
PERFORMANCE SYSTEMS
D E V E L O P M E N T

| Determine Eligibility | Perform Plan Reviews | **Determine Sample Sets** | Onsite Testing | Modeling | Submit to Provider for Processing | QA |

- Determine sampled sets
  - › PSD experience: typically sampling is done on diagnostic tests at final when a large number of units are at the same phase during a 30-day window
  - › Highly dependent on construction schedule
  - › This may change
  - › How many controls and at what stages of construction does inspection need to happen?

PERFORMANCE SYSTEMS
D E V E L O P M E N T

| Determine Eligibility | Perform Plan Reviews | Determine Sample Sets | **Onsite Verification** | Modeling | Submit to Provider for Processing | QA |
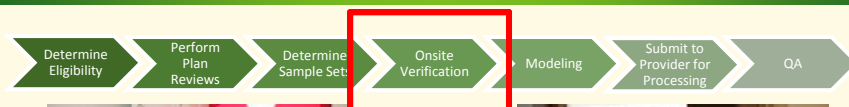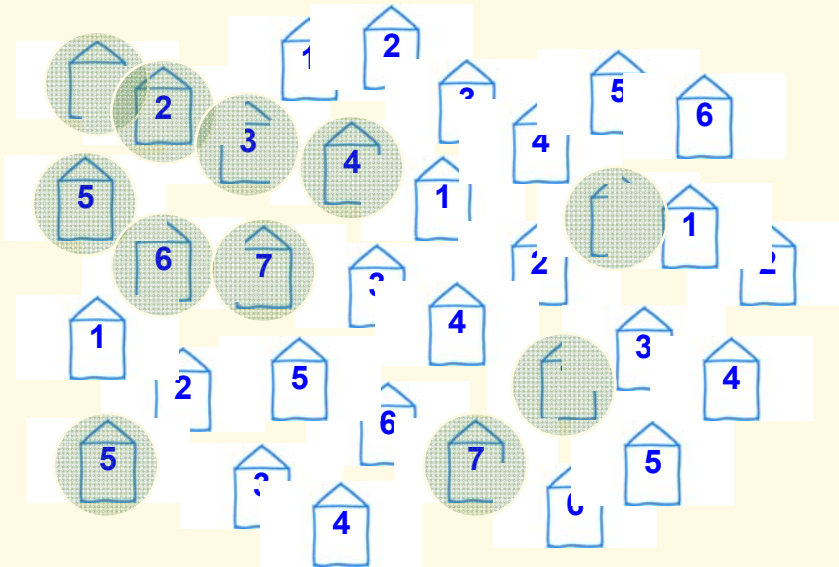
Performance Testing on Sample Sets

For example: sample control is blower door

Each floor plan has its own threshold

A $\longrightarrow$ 1200 CFM$_{50pa}$
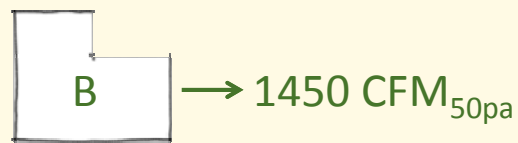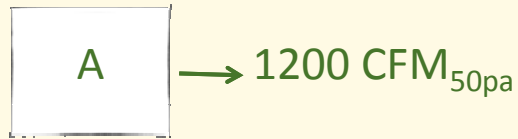
B $\longrightarrow$ 1450 CFM$_{50pa}$

Blower Door Sample Set #1

Unit tested @
987 CFM$_{50pa}$
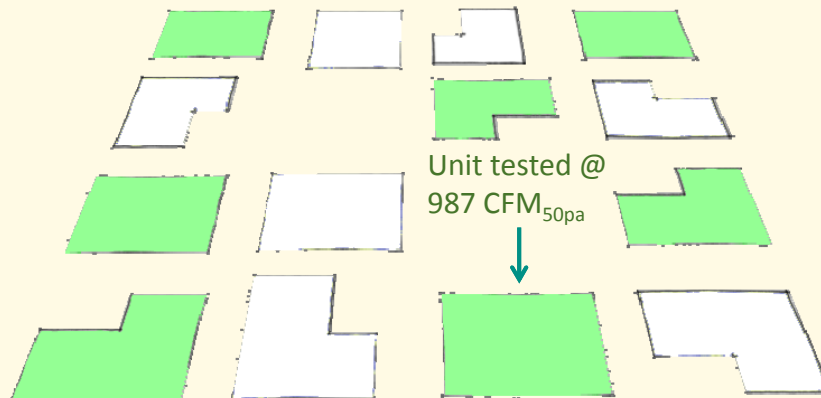
Blower Door Sample Set #2

Unit tested @ 1300 CFM$_{50}$
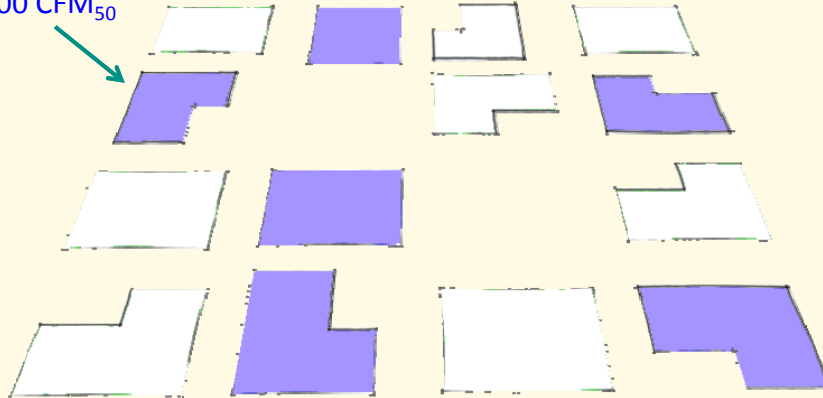
Both sample sets *pass* BD testing
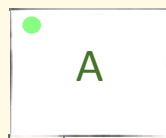
A $987 < 1200$ CFM$_{50pa}$
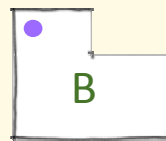
B $1300 < 1450$ CFM$_{50pa}$

(phew!)

TRACKING INFORMATION

Tested Unit #1

	Building	Unit Ty	Unit #	Address	Area	Volume	Date of Test	Infiltration Sampled	Verified	Value	Threshold	Duct Leakage Total Sampled	Verified	Value	Threshold	Duct Leakage to Outside Sampled	Verified	Value	
1	A	1	1	101 Sample Way	860	6880	7/12/2013	X		374	580	X		66	70	X		27	34.4

Tested Unit #2

1	A	1	2	103 Sample Way	860	6880	7/12/2013	X		247	580	X		67	70	X		24	34.4

Tested Unit #3

| 1 | A | 2 | 3 | 105 Sample Way | 1219 | 9754 | 7/12/2013 | X | | 830 | 850 | X | | 96 | 100 | X | | 29 | 48. |

Tested Unit #4

| 1 | A | 3 | 4 | 107 Sample Way | 1408 | 11264 | 7/12/2013 | X | | 769 | 960 | X | | 96 | 120 | X | | 13 | 56. |

Tested Unit #5

| 1 | A | 3 | 5 | 109 Sample Way | 1408 | 11264 | 7/12/2013 | X | | 832 | 960 | X | | 95 | 120 | X | | 17 | 56. |

Tested Unit #6

| 1 | A | 4 | 6 | 111 Sample Way | 1653 | 13227 | 7/12/2013 | X | | 1077 | 1100 | X | | 129 | 150 | X | | 26 | 66. |

Tested Unit #7

| 1 | B | 3 | 8 | 123 Sample Way | 1408 | 11264 | 7/12/2013 | X | | 893 | 960 | X | | 112 | 120 | X | | 49 | 56. |

Sample Set #1

1	B	2	7	121 Sample Way	1219	9754		X			850				100				48.
2	B	3	9	125 Sample Way	1408	11264		X			960				120				56.
3	G	1	32	160 Sample Way	860	6880		X			580				70				34.4
4	G	1	33	162 Sample Way	860	6880		X			580				70				34.4
5	G	3	34	164 Sample Way	1408	11264		X			960				120				56.
6	G	3	35	166 Sample Way	1408	11264	7/12/2013	X		920	960	X		110	120	X		19	56

Tested Unit #1

	Building	Unit Ty	Unit #	Address	Area	Volume	Date of Test	Infiltration Sampled	Verified	Value	Threshold	Duct Leakage Total Sampled	Verified	Value	Threshold	Duct Leakage to Ou Sampled	Verified	Value
3	G	1	32	160 Sample Way	860	6880		X			580				70			
4	G	1	33	162 Sample Way	860	6880		X			580				70			
5	G	3	34	164 Sample Way	1408	11264		X			960				120			
6	G	3	35	166 Sample Way	1408	11264	7/12/2013		X	920	960	X		110	120	X		19
7	G	2	36	168 Sample Way	1219	9754		X			850				100			

Sample Set #2

1	F	4	12	131 Sample Way	1653	13227	7/14/2013		X	964	1100	X		56	150	X		36
2	F	2	13	133 Sample Way	1219	9754		X			850				100			
3	F	3	14	135 Sample Way	1408	11264	7/14/2013		X	850	960				120			
4	F	3	15	137 Sample Way	1408	11264		X			960				120			
5	F	2	16	139 Sample Way	1219	9754		X			850				100			
6	E	1	17	149 Sample Way	860	6880	7/14/2013		X	450	580				70			
7	E	1	18	151 Sample Way	860	6880		X			580				70			

Sample Set #3

| 1	E	2	19	147 Sample Way	1219	9754		X			850				100			
2	E	3	20	145 Sample Way	1408	11264		X			960				120			
3	E	2	22	141 Sample Way	1219	9754	7/14/2013		X	1048	850	X		80	100	X		42

Failure
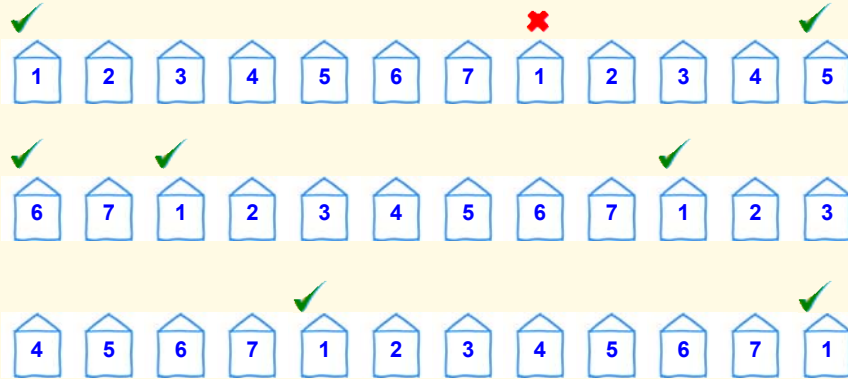
Additional Failure
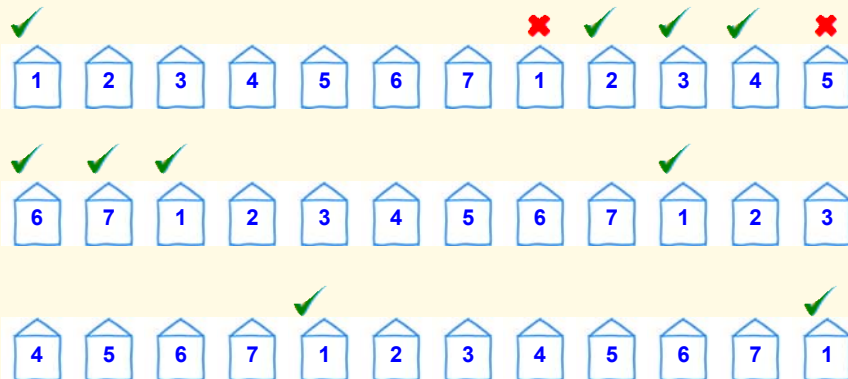
If one or more of the additional two (2) homes fails the item, the remaining homes in the sample set must be tested.

Multiple additional failures

If three (3) Additional Failures occur for the same inspection item, the given inspection must be performed and found to pass for a minimum of seven (7) homes before sampling of that item may be resumed. (Sampling unrelated to this item may proceed during this process)
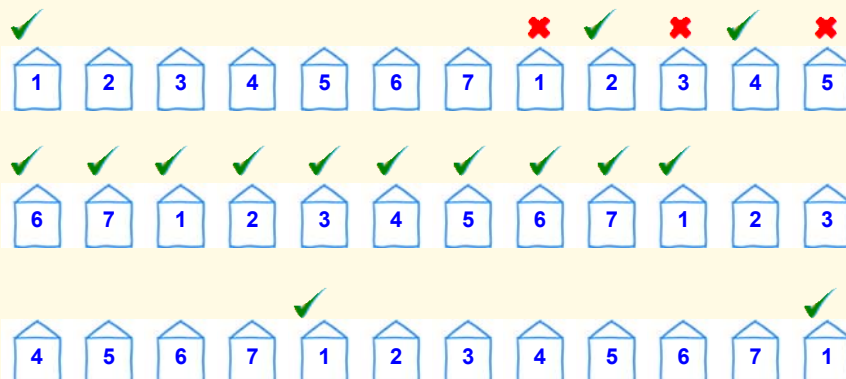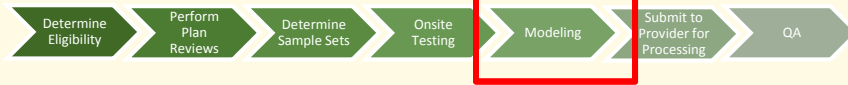
Multiple Additional Failures
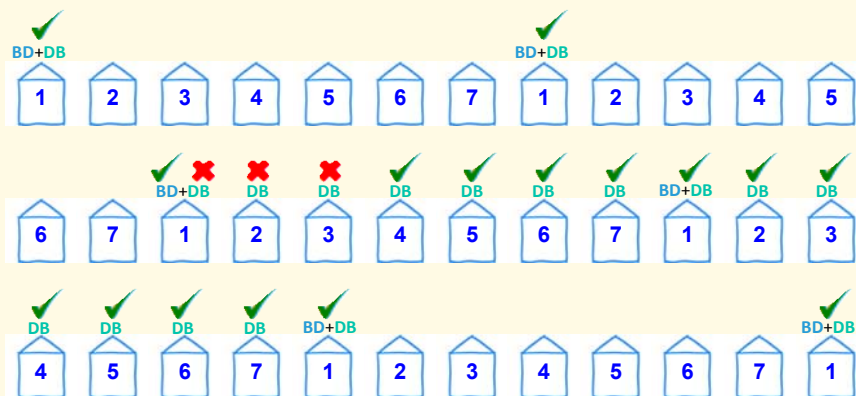
Multiple additional failures of different inspections

- If three (3) Additional Failures occur applying to various failed items (ex 2 blower door inspections and 1 additional duct leakage failure) then the sampling process must stop.
- Seven (7) consecutive homes found not to fail any item, then sampling may continue

Multiple additional failures of different inspections

Determine Eligibility → Perform Plan Reviews → Determine Sample Sets → Onsite Testing → **Modeling** → Submit to Provider for Processing → QA
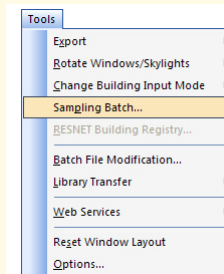
Common Questions

1. Do I enter the results of my performance testing/ onsite verification into my Rating file for sampled items?

     NO!

2. Can the units I tested be submitted as a "Confirmed Rating"?

     NO!

     But…. Maybe?

     "Certifying a group of homes by sampling entitles the customer to documentation certifying that the homes meet the desired threshold; it does not constitute a confirmed HERS rating on any home"

3. Do I need to submit a model for each unit/home?

     YES!

4. What if I want to maximize my savings/incentive/credit for these homes?

     Don't Sample

Modeling

- You need a model for each home
- You don't need to "model" each home

Perform Plan Reviews	Determine Sample Sets	Onsite Testing	Modeling	Submit to Provider for Processing	QA

- Submit a model for each home
- Sampling ID number for Registry

RESNET:
Provider ID (AIN): [-   ] Rater ID (RTIN): [   ]
Sampled Set ID: [00000000] Registry ID: [   ]

- Different labeling for sampled homes

- QA requirement is based on the total number of homes in the project NOT the number of homes tested
- Make sure the plan review models are reviewed
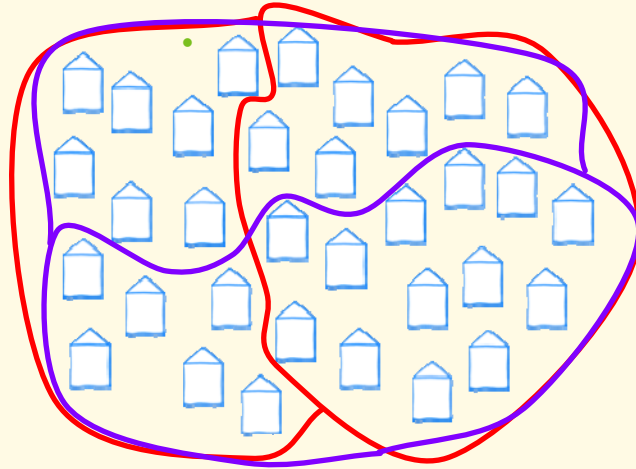

Sample Sets

- Insulation inspection sample set
- All at pre-drywall

stage within 30

day period
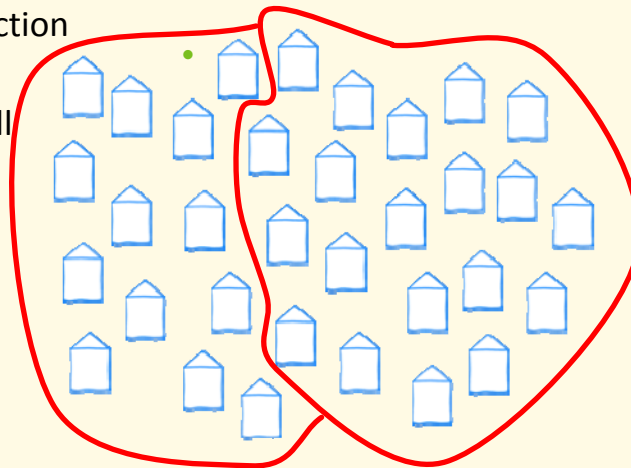
Sample Sets

• Homes ready for Insulation inspection within a 30-day period may not be the same as those ready for duct leakage Inspection within a 30-day period.

Each sample set must be defined separately.

When it's "easy"

- Trusted and competent crews
  › Little to no failures
- Limited number of home plans
- Only sample tests at final or near final inspection
- Construction happening in bulk stages (maximize sample set size)
- Choose to Sampling only a few controls
  › Ex. Ductwork, blower door

When it's difficult

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- When there are failures
- When the construction phases do not regularly fall within 30 days
- When trying to maximize performance based credit or incentives (*all* homes of a certain plan *have the same index*)
- When 7 homes will not be *completed* prior to other homes reaching inspection stages

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Rater
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- QUESTIONS?