

Quality and Consistency

Quality \neq Consistency
Quality \leftrightarrow Consistency

Solving for X

3. Find x.

High Quality?	YES	YES
	NO	YES
	Consistent Results?	

Here it is

Here it is!

First – Let's Define our Terms

- Quality
 - *how good or bad something is*
 - *a characteristic or feature that someone or something has something that can be noticed as a part of a person or thing*
 - *a **high** level of value or excellence*
- Consistency
 - *conformity in the application of something, typically that which is necessary **for the sake of logic, accuracy, or fairness.***

Quality means
doing it right when
no one is looking
-Henry Ford

repeatedly do.

Excellence then is
not an act, but a
habit.

-Aristotle

How is RESNET QA like Grief?

THE 5 STAGES OF GRIEF



Denial



Anger



Bargaining



Depression



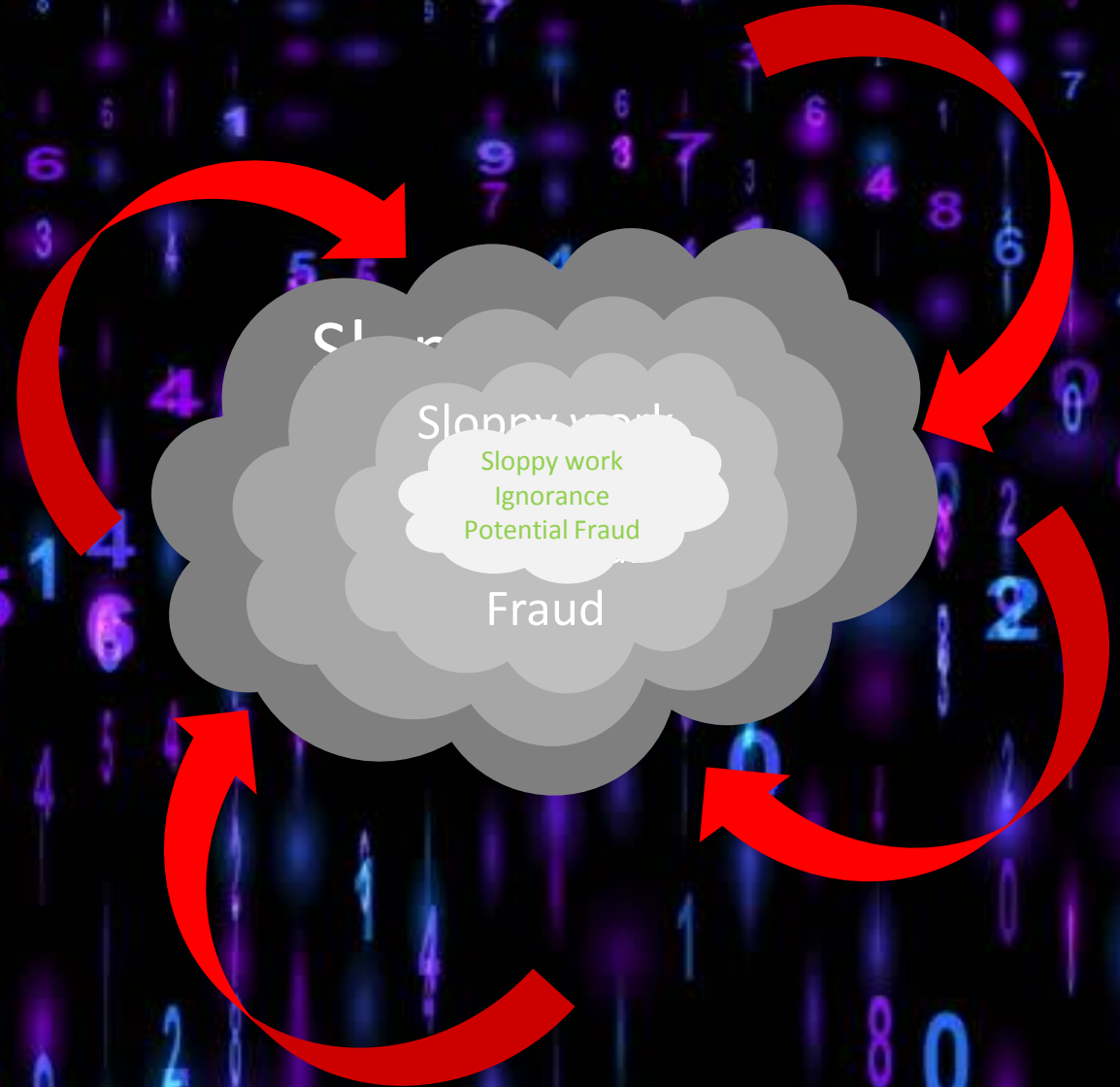
Acceptance

How will we get there?

- Not by doing the same old stuff
- What tools do we have at our disposal?
 - Data
 - Committed stakeholders
 - By and large "good" and well meaning people
 - RESNET taking the lead

Multi-pronged Campaign

- Software
- Training
- Quality Assurance
 - Quality Agents
 - Financial independence
 - Elite Cadre
- And another thing...



QA Genie

Introducing



INVESTMENT

QA Genie

- Data driven approach to QA
- Accomplishes 3 objectives
 - Identify "odd" files – direct Humans to look more closely
 - Identify consistency issues and competency problems – pass that information on
 - Create a complete database of building characteristics

Examples – Individual file report

1001 First Street	Valerie Jimenez	7936139	10/22/14	10924	12	Conditioned area, Building volume, Window U-value(s), Window SHGC value(s), Door-to-floor ratio, Blower door infiltration, Ventilation CFM, Wall assembly calculated R-value, Ceiling assembly calculated R-value, Refrigerator kWh/yr, No window overhang(s), Ventilation watts/CFM,	5	Window U-value(s), Door-to-floor ratio, Blower door infiltration, Wall assembly calculated R-value, Ceiling assembly calculated R-value,
1002 First Street	Valerie Jimenez	7936139	12/10/13	10925	8	Conditioned area, Building volume, Attic area-to-attic exterior ratio, Window SHGC value(s), Furnace AFUE, Water heater EF, Clothes washer changed from preset, Clay or cement tile roofing OR sub tile ventilation,	3	Window SHGC value(s), Furnace AFUE, Water heater EF,
1003 First Street	Valerie Jimenez	7936139	6/10/15	10926	6	Number of bedrooms, Blower door infiltration, Refrigerator kWh/yr, Dishwasher EF or kWh/year, Estimate supply duct surface area, Estimate return duct surface area,	0	
1004 First Street	Valerie Jimenez	7936139	05/29/2015	10927	6	Attic area-to-attic exterior ratio, Duct leakage testing, Window SHGC value(s), Blower door infiltration, Ceiling assembly calculated R-value, No window overhang(s),	0	

Rater summary report

		Name	Total Files	Average Outlier Score	Most Common Outlier Flags		Count
Rater Number:	2502906	Milton Barber	102	0.83	1	Ratio of slab and framed floor areas to roof area,	22
					2	Duct leakage testing,	11
					3	Conditioned crawl without adiabatic framed floor,	7
					4	Walkout slab perimeters,	7
					5	No window overhang(s),	5
					6	Average wall height,	4
					7	Sealed attic ceiling area-to-attic exterior ratio,	3
					8	Attic area-to-attic exterior ratio,	3
					9	Estimate return duct surface area,	3
					10	Conditioned square footage-to-framed floor and slab ratio,	2
Date Range (mm/dd/yyyy):							
From:	01/01/2015						
To:	07/29/2015						
% SFD:		99.0%					
% Attached:		1.0%					
					Average Red-Flag Score		
					0.07		
					Most Common Red Flags		
					1	Sealed attic ceiling area-to-attic exterior ratio,	3
					2	Furnace AFUE,	2
					3	Number of bedrooms,	1
					4	Conventional NG WH EF,	1
					5	Climate zone,	0
					6	Window-to-wall ratio,	0
					7	Window-to-floor ratio,	0
					8	Window U-value(s),	0
					9	Window SHGC value(s),	0
					10	Window interior shading,	0

Rater summary report

		Name	Total Files	Average Outlier Score	Most Common Outlier Flags		Count
Rater Number:	2040679	Mack Newman	333	5.78	1	Mechanical equipment set to default EAE,	331
					2	Ratings in one day,	297
					3	Estimate supply duct surface area,	223
					4	Estimate return duct surface area,	193
					5	Attic area-to-attic exterior ratio,	163
					6	Ventilation CFM,	72
					7	Door-to-wall ratio,	66
					8	Ratio of slab and framed floor areas to roof area,	64
					9	Duct leakage testing,	61
					10	Ceiling gypsum thickness,	61

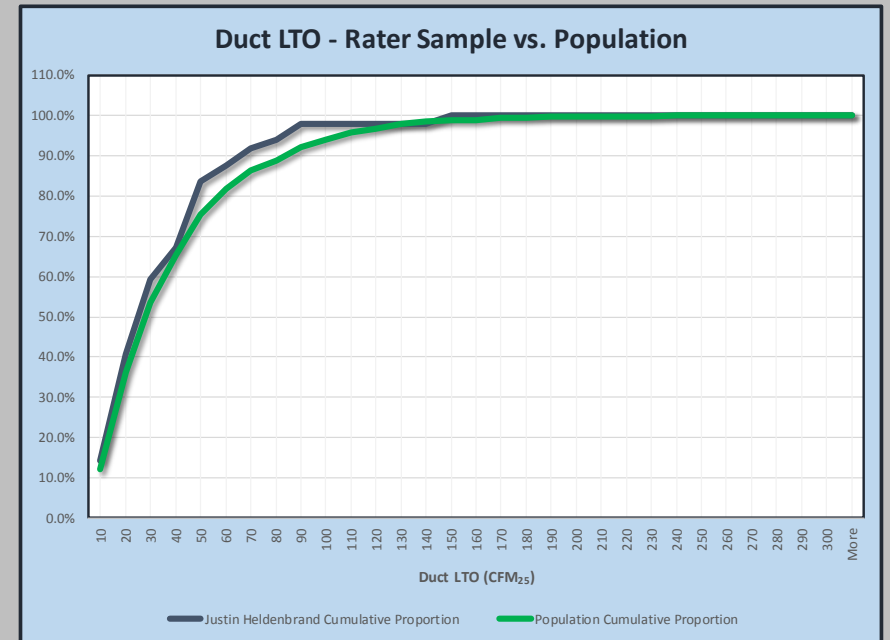
Date Range (mm/dd/yyyy):	
From:	01/01/2013
To:	06/30/2015

% SFD:	9.0%
% Attached:	91.0%

Average Red-Flag Score	Most Common Red Flags		Count
0.55	1	Conventional NG WH EF,	53
	2	Ceiling assembly calculated R-value,	43
	3	Duct LTO testing repeat values,	36
	4	Window interior shading,	24
	5	Sealed attic ceiling area-to-attic exterior ratio,	10
	6	Window SHGC value(s),	9
	7	Window-to-floor ratio,	5
	8	Blower door infiltration,	3
	9	Door-to-floor ratio,	1
	10	Climate zone,	0

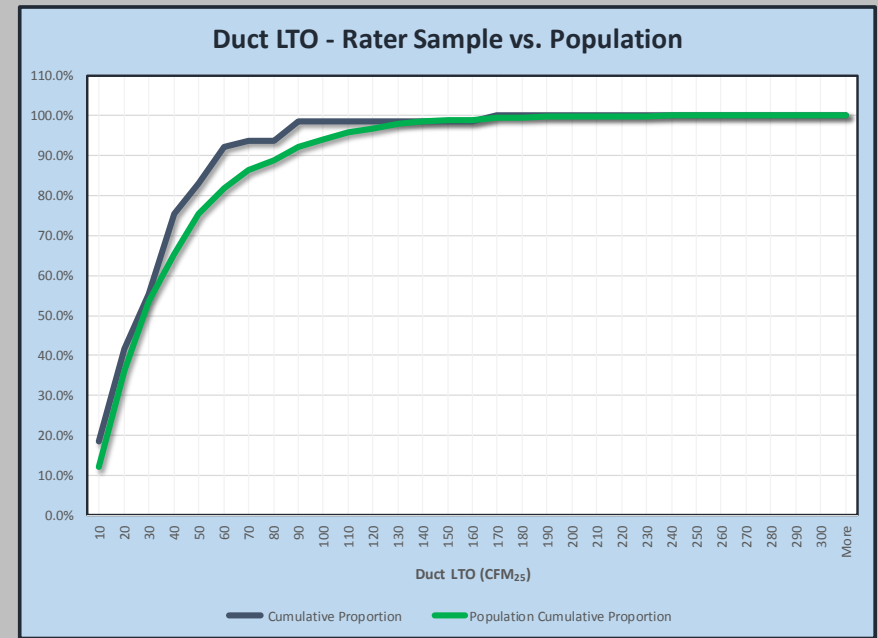
Duct leakage comparison

		Name	BIN	Duct LTO Count	Proportion	Justin Heldenbrand Cumulative Proportion	Population Duct LTO Count	Population Proportion	Population Cumulative Proportion	Difference
Rater Number:	2502906	Milton Barber	10	7	14.3%	14.3%	113	12.2%	12.2%	2.1%
Date Range (mm/dd/yyyy):			20	13	26.5%	40.8%	222	24.0%	36.3%	4.6%
From:		01/01/2015	30	9	18.4%	59.2%	158	17.1%	53.4%	5.8%
To:		07/29/2015	40	4	8.2%	67.3%	111	12.0%	65.4%	2.0%
Max Difference:		8.1%	50	8	16.3%	83.7%	94	10.2%	75.5%	8.1%
Allowed:		19.4%	60	2	4.1%	87.8%	58	6.3%	81.8%	5.9%
Severity:		N/A	70	2	4.1%	91.8%	42	4.5%	86.4%	5.5%
			80	1	2.0%	93.9%	23	2.5%	88.9%	5.0%
			90	2	4.1%	98.0%	32	3.5%	92.3%	5.6%
			100	0	0.0%	98.0%	15	1.6%	93.9%	4.0%
			110	0	0.0%	98.0%	18	1.9%	95.9%	2.1%
			120	0	0.0%	98.0%	9	1.0%	96.9%	1.1%
			130	0	0.0%	98.0%	9	1.0%	97.8%	0.1%
			140	0	0.0%	98.0%	6	0.6%	98.5%	0.5%



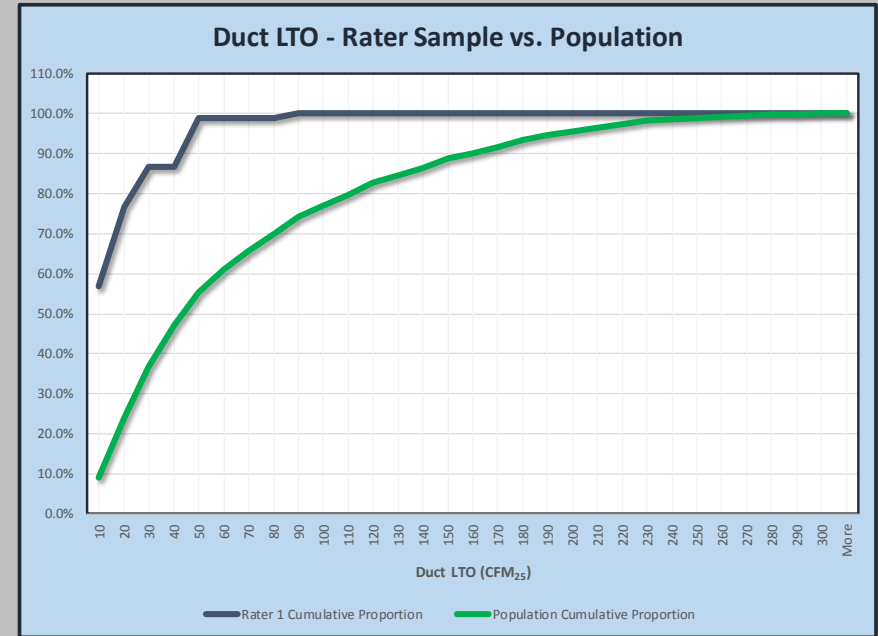
Duct leakage comparison

		Name	BIN	Duct LTO Count	Proportion	Cumulative Proportion	Population Duct LTO Count	Population Proportion	Population Cumulative Proportion	Difference
Rater Number:	4370348	Tony Chambers	10	12	18.5%	18.5%	113	12.2%	12.2%	6.2%
Date Range (mm/dd/yyyy):			20	15	23.1%	41.5%	222	24.0%	36.3%	5.3%
			30	9	13.8%	55.4%	158	17.1%	53.4%	2.0%
From: 01/01/2015			40	13	20.0%	75.4%	111	12.0%	65.4%	10.0%
			To: 07/29/2015			50	5	7.7%	83.1%	94
Max Difference: 10.5%						60	6	9.2%	92.3%	58
			Allowed: 16.9%			70	1	1.5%	93.8%	42
Severity: N/A						80	0	0.0%	93.8%	23
			90	3	4.6%	98.5%	32	3.5%	92.3%	6.1%
100	0	0.0%	98.5%	15	1.6%	93.9%	4.5%			
110	0	0.0%	98.5%	18	1.9%	95.9%	2.6%			
120	0	0.0%	98.5%	9	1.0%	96.9%	1.6%			
130	0	0.0%	98.5%	9	1.0%	97.8%	0.6%			
140	0	0.0%	98.5%	6	0.6%	98.5%	0.0%			



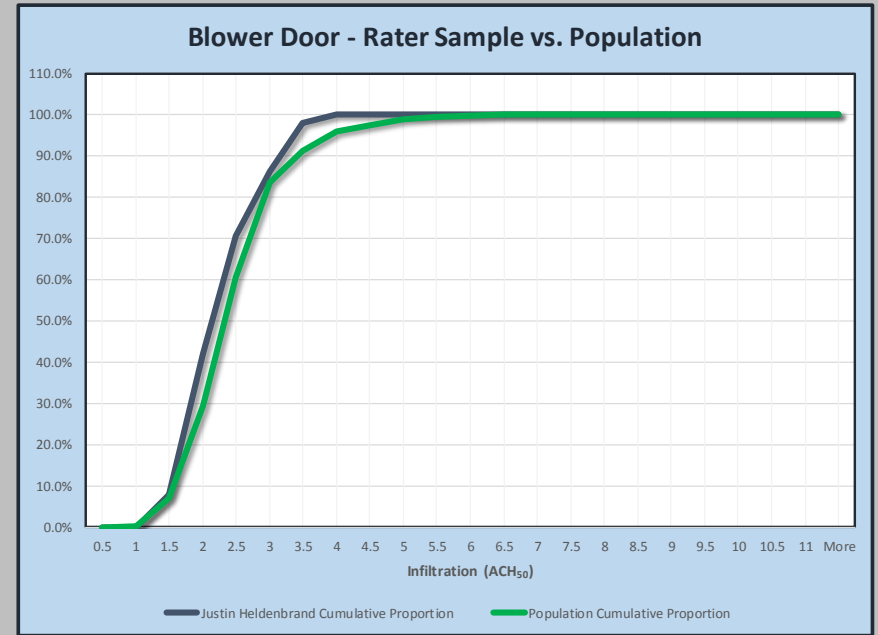
Duct leakage comparison

		Name	BIN	Duct LTO Count	Proportion	Rater 1 Cumulative Proportion	Population Duct LTO Count	Population Proportion	Population Cumulative Proportion	Difference
Rater Number:	2040679	Mack Newman	10	146	56.8%	56.8%	340	9.1%	9.1%	47.7%
Date Range (mm/dd/yyyy):			20	51	19.8%	76.7%	555	14.9%	24.0%	52.7%
From:		01/01/2013	30	26	10.1%	86.8%	478	12.8%	36.8%	50.0%
To:		06/30/2015	40	0	0.0%	86.8%	384	10.3%	47.1%	39.7%
Max Difference:		52.7%	50	31	12.1%	98.8%	302	8.1%	55.2%	43.6%
Allowed:		8.5%	60	0	0.0%	98.8%	215	5.8%	61.0%	37.9%
Severity:		HIGH	70	0	0.0%	98.8%	179	4.8%	65.8%	33.1%
			80	0	0.0%	98.8%	158	4.2%	70.0%	28.8%
			90	3	1.2%	100.0%	158	4.2%	74.3%	25.7%
			100	0	0.0%	100.0%	103	2.8%	77.0%	23.0%
			110	0	0.0%	100.0%	105	2.8%	79.8%	20.2%
			120	0	0.0%	100.0%	103	2.8%	82.6%	17.4%
			130	0	0.0%	100.0%	72	1.9%	84.5%	15.5%
			140	0	0.0%	100.0%	75	2.0%	86.5%	13.5%



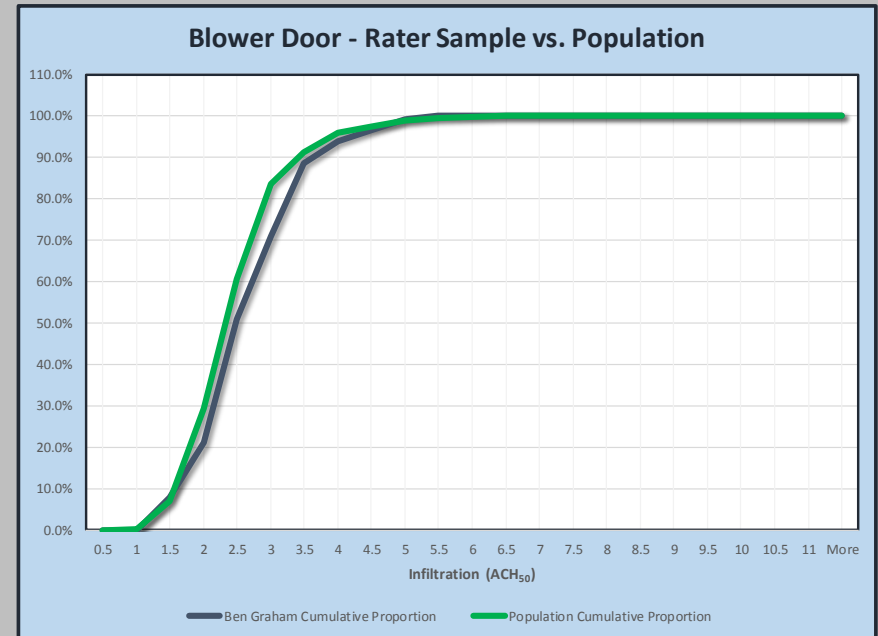
Blower door report

		Name	BIN	Blower Door Count	Proportion	Justin Heldenbrand Cumulative Proportion	Population Blower Door Count	Population Proportion	Population Cumulative Proportion	Difference
Rater Number:	2502906	Milton Barber	0.5	0	0.0%	0.0%	0	0.0%	0.0%	0.0%
Date Range (mm/dd/yyyy):			1	0	0.0%	0.0%	7	0.4%	0.4%	0.4%
From:	01/01/2015		1.5	8	7.8%	7.8%	131	6.7%	7.0%	0.8%
To:	07/29/2015		2	35	34.3%	42.2%	441	22.4%	29.4%	12.7%
Max Difference:	12.7%		2.5	29	28.4%	70.6%	616	31.3%	60.8%	9.8%
Allowed:	13.5%		3	16	15.7%	86.3%	449	22.8%	83.6%	2.7%
Severity:	N/A		3.5	12	11.8%	98.0%	152	7.7%	91.3%	6.7%
			4	2	2.0%	100.0%	90	4.6%	95.9%	4.1%
			4.5	0	0.0%	100.0%	34	1.7%	97.6%	2.4%
			5	0	0.0%	100.0%	24	1.2%	98.8%	1.2%
			5.5	0	0.0%	100.0%	15	0.8%	99.6%	0.4%
			6	0	0.0%	100.0%	6	0.3%	99.9%	0.1%
			6.5	0	0.0%	100.0%	2	0.1%	100.0%	0.0%
			7	0	0.0%	100.0%	0	0.0%	100.0%	0.0%
			7.5	0	0.0%	100.0%	0	0.0%	100.0%	0.0%



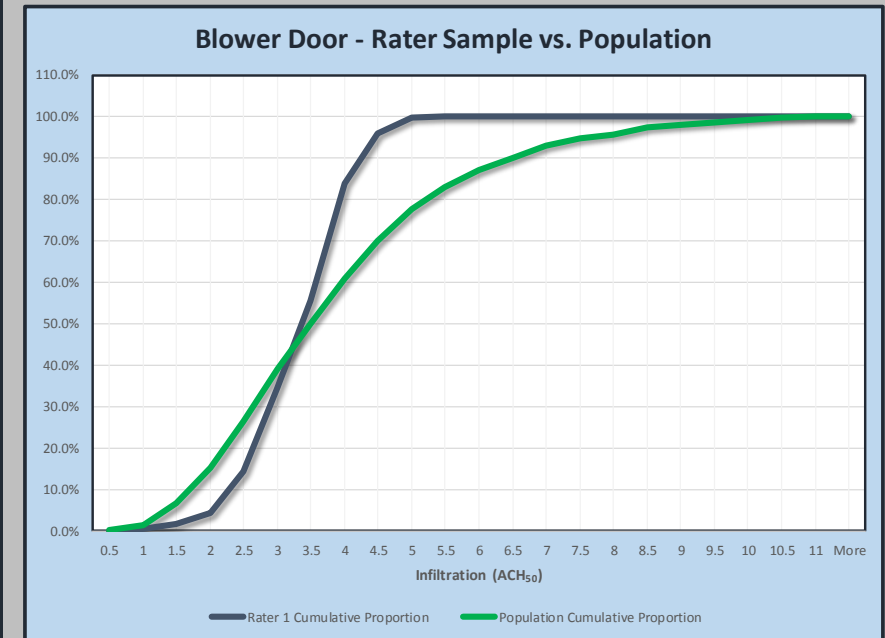
Blower door report

		Name	BIN	Blower Door Count	Proportion	Ben Graham Cumulative Proportion	Population Blower Door Count	Population Proportion	Population Cumulative Proportion	Difference
Rater Number:	4370348	Tony Chambers	0.5	0	0.0%	0.0%	0	0.0%	0.0%	0.0%
			1	0	0.0%	0.0%	7	0.4%	0.4%	0.4%
Date Range (mm/dd/yyyy):			1.5	9	7.9%	7.9%	131	6.7%	7.0%	0.9%
From:	01/01/2015		2	15	13.2%	21.1%	441	22.4%	29.4%	8.4%
To:	07/29/2015		2.5	34	29.8%	50.9%	616	31.3%	60.8%	9.9%
			3	23	20.2%	71.1%	449	22.8%	83.6%	12.5%
Max Difference:	12.5%		3.5	20	17.5%	88.6%	152	7.7%	91.3%	2.7%
Allowed:	12.7%		4	6	5.3%	93.9%	90	4.6%	95.9%	2.0%
Severity:	N/A		4.5	3	2.6%	96.5%	34	1.7%	97.6%	1.1%
			5	3	2.6%	99.1%	24	1.2%	98.8%	0.3%
			5.5	1	0.9%	100.0%	15	0.8%	99.6%	0.4%
			6	0	0.0%	100.0%	6	0.3%	99.9%	0.1%
			6.5	0	0.0%	100.0%	2	0.1%	100.0%	0.0%
			7	0	0.0%	100.0%	0	0.0%	100.0%	0.0%



Blower door report

		Name	BIN	Blower Door Count	Proportion	Rater 1 Cumulative Proportion	Population Blower Door Count	Population Proportion	Population Cumulative Proportion	Difference
Rater Number:	2040679	Mack Newman	0.5	0	0.0%	0.0%	8	0.2%	0.2%	0.2%
			1	2	0.6%	0.6%	43	1.1%	1.3%	0.7%
Date Range (mm/dd/yyyy):			1.5	4	1.2%	1.8%	214	5.4%	6.7%	4.9%
From:	01/01/2013		2	8	2.4%	4.2%	336	8.5%	15.2%	11.0%
To:	06/30/2015		2.5	34	10.3%	14.5%	443	11.2%	26.4%	11.9%
			3	67	20.2%	34.7%	496	12.6%	39.0%	4.3%
Max Difference:	26.0%		3.5	69	20.8%	55.6%	441	11.2%	50.2%	5.4%
Allowed:	7.5%		4	94	28.4%	84.0%	426	10.8%	61.0%	23.0%
Severity:	MEDIUM		4.5	40	12.1%	96.1%	360	9.1%	70.1%	26.0%
			5	12	3.6%	99.7%	303	7.7%	77.7%	22.0%
			5.5	1	0.3%	100.0%	210	5.3%	83.1%	16.9%
			6	0	0.0%	100.0%	158	4.0%	87.1%	12.9%
			6.5	0	0.0%	100.0%	123	3.1%	90.2%	9.8%
			7	0	0.0%	100.0%	119	3.0%	93.2%	6.8%



Let's get interactive!

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Thank you

Steve Byers

EnergyLogic and EPX

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