



2013 Building Energy Efficiency Standards Staff Workshop

Residential Mandatory Airflow and Fan Watt
Draw Requirements, Return Duct Sizing
Tables, and Mandatory Duct Sealing
Measures

May 31, 2011



Background

- Proposal sponsored by the California Statewide Utilities Codes and Standards Program as a Codes and Standards Enhancement (CASE) study
- CASE study author Doug Beaman



Residential Duct Efficiency

- Maximum Duct Pressure Drop
- Cooling Coil Airflow
- Fan Watt Draw
- Duct Sealing and Testing

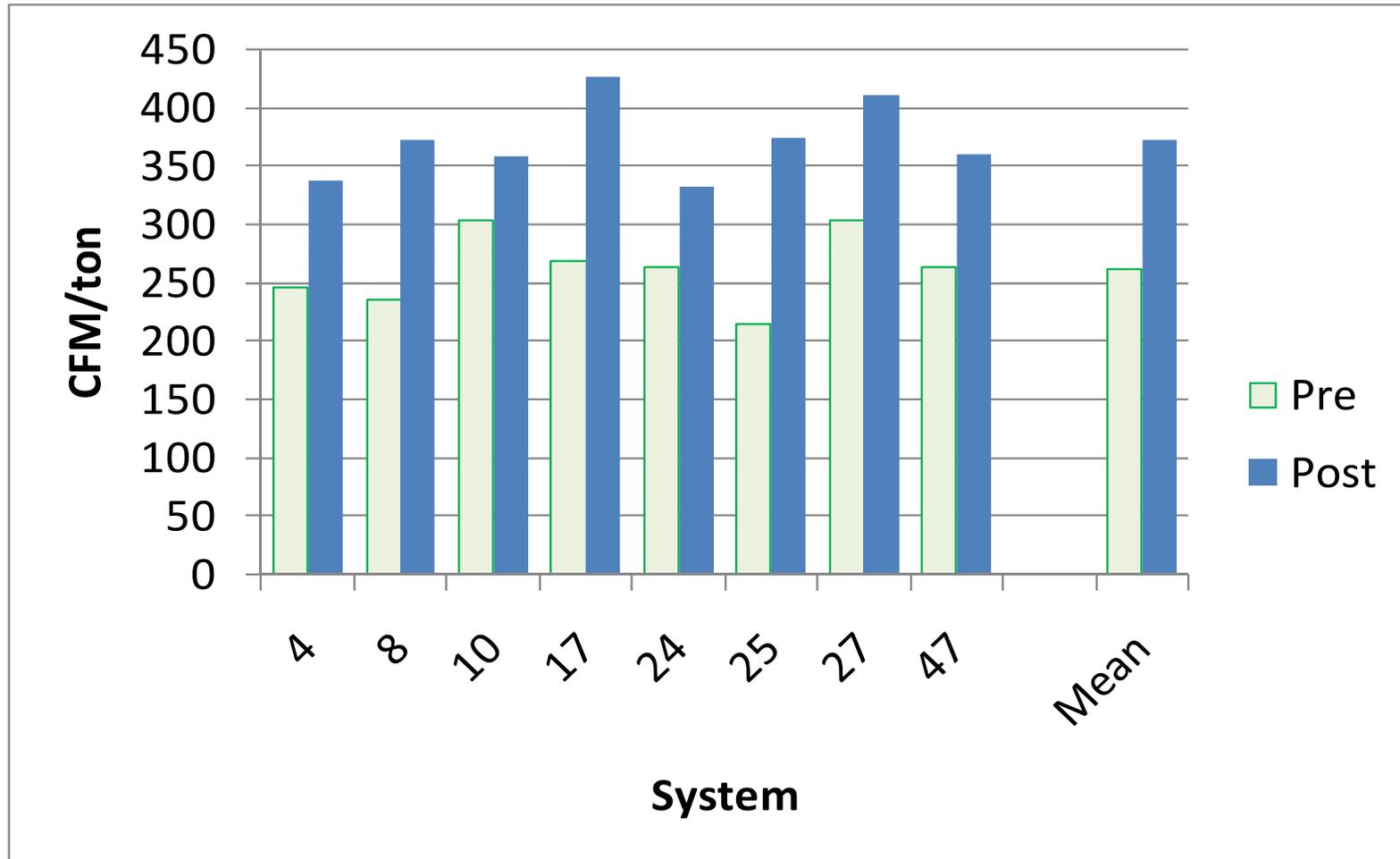


Residential Duct Efficiency

- Survey Results
- Proposed Approach
- Cost Effectiveness

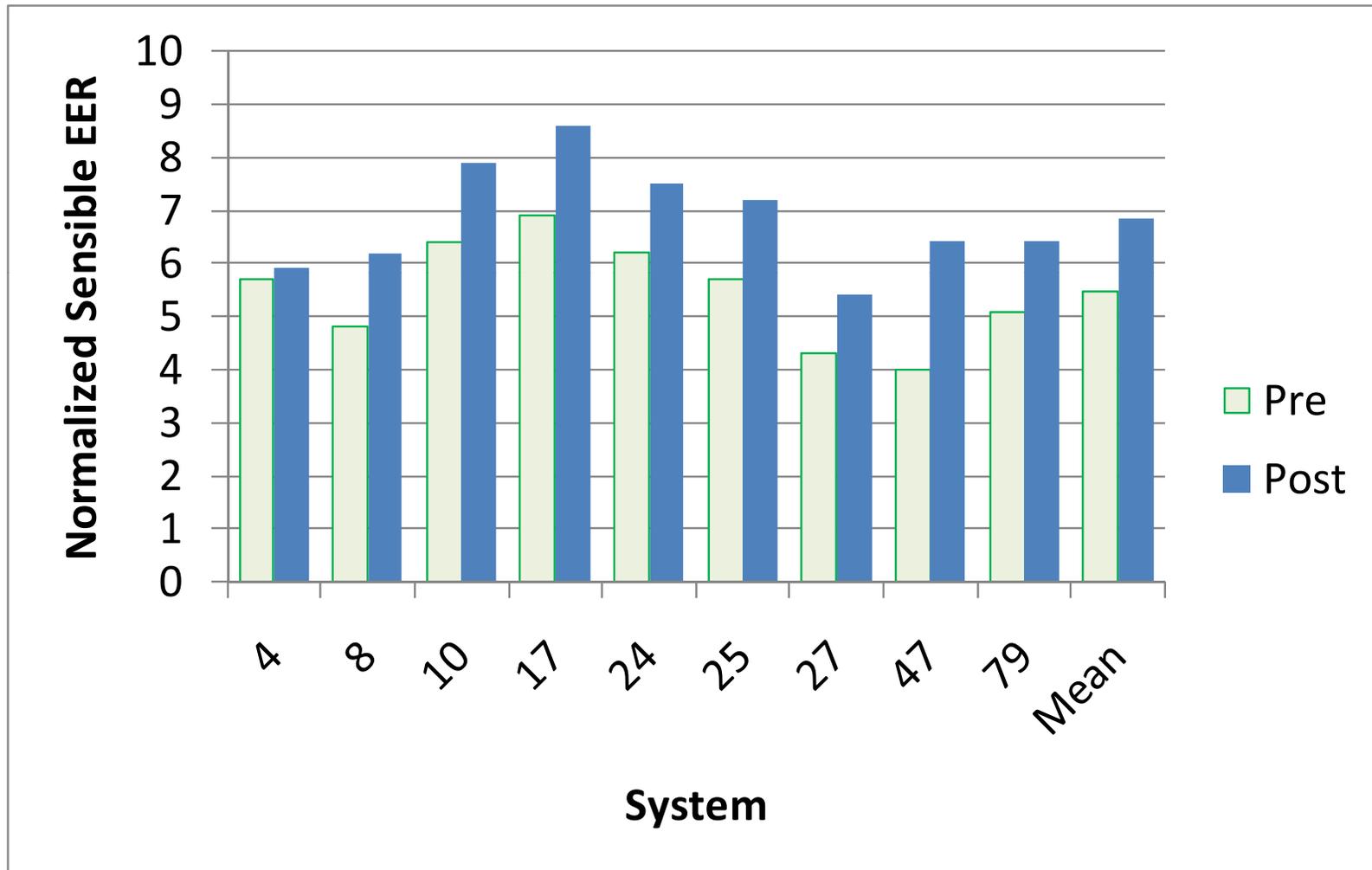


Simple Duct System Improvements





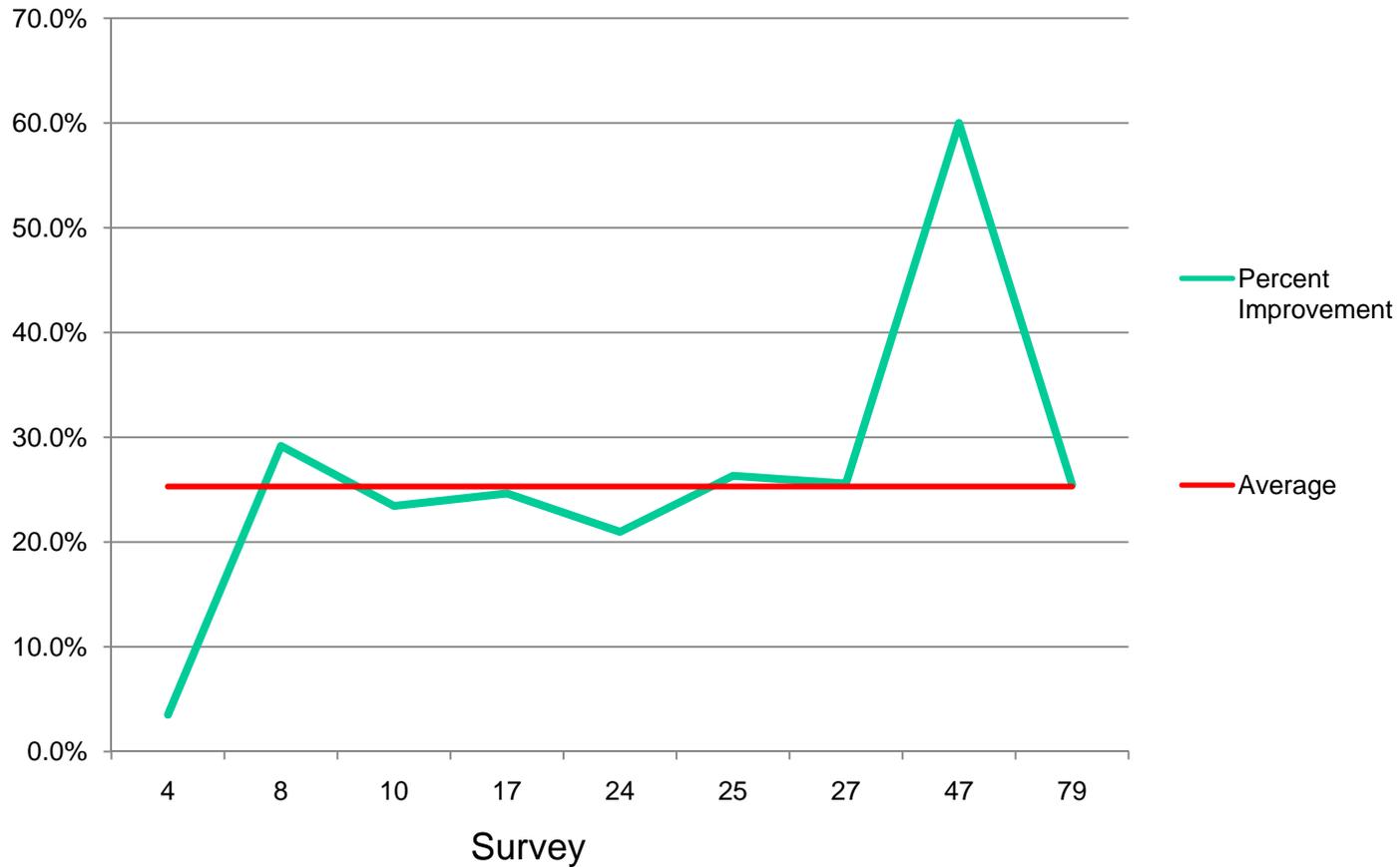
Significantly Increase Sensible EER





25% Average Efficiency Increase

Percentage Improvement System EER – Survey Homes





Mandatory Requirement for Air Flow

For Ducted Heating & Cooling System, two options are available to meet mandatory requirement:

- Comply with the Return System Sizing Table, or
- Measure Airflow (350 cfm/ton Min) & Fan Watt Draw (0.58 watts/cfm Max)



Single Zone Systems

- The Return System Sizing Table may only be used for single zone systems.
- Systems with zonal control must meet specified fan watt draw and airflow requirements.



Single Return System

Tons	Minimum Return Duct Size (inches)	Minimum Return Grill Gross Area (square inches)	Example Grill Size (inches)
1.5	16	500"	20 X 25
2	18	600"	20 X 30
2.5	Multiple returns required		
3			
3.5			
4			
5			



Multiple Return System

Tons	Return # 1	Return # 2	Minimum Return Grills Gross Area (square inches)	Return # 1	Return # 2
	Minimum Duct Size (inches)	Minimum Duct Size (inches)		Example Grill Size (inches)	Example Grill Size (inches)
1.5	12	10	500"	15 X 20	10 X 20
2	14	12	600"	15 X 20	15 X 20
2.5	14	14	800"	20 X 20	20 X 20
3	16	14	900"	30 X 20	15 X 20
3.5	16	16	1000"	25 X 20	25 X 20
4	18	18	1200"	30 X 20	30 X 20
5	2-18	14	1500"	2-30 X 20	15 X 20



LCC– Airflow & Fan Watt Draw

Zone	Additional Costs	Present Value of Energy Cost Savings	Life Cycle Cost
1	\$192	\$196	-\$5
2	\$197	\$715	-\$518
3	\$192	\$388	-\$196
4	\$197	\$1,009	-\$812
5	\$197	\$220	-\$23
6	\$192	\$794	-\$603
7	\$192	\$621	-\$430
8	\$197	\$1,397	-\$1,200
9	\$197	\$2,233	-\$2,036
10	\$197	\$2,522	-\$2,326
11	\$308	\$3,989	-\$3,681
12	\$197	\$2,289	-\$2,092
13	\$308	\$3,961	-\$3,653
14	\$340	\$3,200	-\$2,859
15	\$340	\$6,535	-\$6,194
16	\$204	\$1,696	-\$1,492



Airflow / Fan Watt Draw

- Allow compliance credit in the Performance Approach for lower fan watt draw (algorithms already in ACM).
- Airflow & Fan Watt Draw – HERS Verification
- Return System Sizing Table – Building Department Inspection



Airflow / Fan Watt Draw

- Forced Air Heating & Cooling Systems Only (excludes heating only systems)
- Newly Constructed Homes
- Alterations if New Duct System
- Single Family & Multifamily



Return Grill and Filter Labelling

Home occupants, who replace filters, believe that the highest filter efficiency is best, and have no way to select the right filter based on air flow. This problem could be solved by:

1. An installers “Total Minimum CFM = XXX” label inside each filter grill and
2. Filters labeled by the manufacturer “Clean Filter CFM = XXX” (@ 0.05 inches W.C.).



Duct Sealing and Testing

- Survey showed that majority of newly constructed single family homes had reasonable duct leakage rates.
- Multifamily homes significantly worse duct leakage rates than single family.



Proposed Code Change

Mandatory Measure

- Use the same criteria as current Standards except move duct sealing and testing from prescriptive to mandatory measure.
- Allow the current exceptions for Alterations such as ducts constructed with asbestos.



LCC– Duct Sealing

Zone	Additional Costs	Present Value of Energy Cost Savings	Life Cycle Cost
1	\$700	\$1,569	-\$869
2	\$700	\$2,121	-\$1,421
3	\$700	\$15,391	-\$14,691
4	\$700	\$1,920	-\$1,220
5	\$700	\$939	-\$239
6	\$700	\$1,317	-\$617
7	\$700	\$859	-\$159
8	\$700	\$1,724	-\$1,024
9	\$700	\$2,840	-\$2,140
10	\$700	\$8,539	-\$7,839
11	\$700	\$6,063	-\$5,363
12	\$700	\$3,919	-\$3,219
13	\$700	\$5,797	-\$5,097
14	\$700	\$6,516	-\$5,816
15	\$700	\$10,869	-\$10,169
16	\$700	\$5,049	-\$4,349



New Construction

Duct Sealing & Testing Mandatory Measure

- All forced air systems – heating only included.
- Single family homes – ducts in unconditioned space.
- Multifamily homes - ducts in conditioned or unconditioned space.



Alterations

Duct Sealing & Testing Mandatory Measure

- Same leakage rates as current standards.
- All Climate Zones.
- All Forced Air Systems.



2013 Standards Update

Send related comments by June 30, 2011 to:

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