

FLORIDA SOLAR ENERGY CENTER

No Longer Just a Black Box

Proposed RESNET Software Testing Specifications and Verification Procedures

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Background

- ❖ HERS BESTEST – Required since 1st adoption of Technical Guidelines by NASEO in 1999.
- ❖ BESTEST tests:
 - Building load computations
 - Building load computation differences
- ❖ BESTEST does not test:
 - Reference home configuration
 - Energy use computations
 - Rating method calculations

Our Objective

Increase market confidence in RESNET-accredited Rating software tools by:

- Decreasing the potential for HERS score and energy use differences among Rating software tools
- Providing additional quality assurance tests protocols for Rating Systems
- Reducing the potential for “gaming” through the use of multiple Rating software tools.

Preferred Methods

- ❖ Create additional test protocols using:
 - Existing HERS BESTEST building descriptions (L100 for most test cases)
 - Smallest number of additional tests possible
- ❖ Test using % differences between cases rather than absolute results
 - If % difference is about the same among software tools, relative changes in energy use and HERS scores also will be about the same.

Reference Home Tests

Given a set of Rated home specifications,
can the software Rating Tool:

- Accurately determine the correct component characteristics for the Reference home
- Rate the resulting Reference home and achieve a HERS score of 80 ($\pm 1\%$)
- Do the above in multiple climate locations?

Energy Use Tests

Given a set of Rated home specifications, can the software Rating Tool accurately predict difference in energy use when:

- Equipment efficiencies are changed
 - For electric furnaces & air conditioners
 - For natural gas furnaces
 - For service hot water systems
- Duct system characteristics are changed
 - For insulation changes
 - For air leakage changes
 - For location changes
- Thermostat types are changed

Rating Method Test

Given a set of Rated home specifications, can the software Rating Tool:

- Determine Reference and Rated loads and energy uses in an internally consistent manner
 - Do Reference loads change when fuel types change?
 - Do HERS scores change when only the hot water fuel type changes?
- Calculate a HERS Score in accordance with the designated Rating Method (normalized modified loads)

Proposed Test Standard

- ❖ Minimum reporting requirements
 - Reference home end use loads
 - Rated home end use loads
 - Rated home end use energy consumption
 - Rated home Manufacturer's Equipment Performance Ratings
- ❖ Five coordinated test cases
- ❖ Acceptance criteria

Rating Method Test Cases

- ❖ Case 1: BESTEST base case (L100) with
 - Minimum standard electric equipment
 - Perfect duct systems (inside conditioned space with zero air leakage)
- ❖ Case 2: Same as #1 except minimum standard natural gas hot water
- ❖ Case 3: Same as #1 except minimum standard natural gas furnace
- ❖ Case 4: Same as #1 except very high efficiency heat pump
- ❖ Case 5: Same as #1 except very high efficiency natural gas furnace

Acceptance Criteria

- ❖ Reference home end use loads vary by less than 0.2% across all cases
- ❖ Difference between the reported HERS scores for cases 1 and 2 is less than 0.2% of the smaller score
- ❖ Difference between the HERS scores calculated by the software tool and those calculated by this test protocol's protected spreadsheet is less than 0.4% of the score reported by the software tool for all cases.