

RESNET

Residential Energy Services Network

2006 Mortgage Industry National Home Energy Rating Systems Standards



*This document was developed by
RESNET and the National Association
of State Energy Officials.*

*Setting the **STANDARD**
for **QUALITY***

2006 Mortgage Industry National Home Energy Rating Systems Standards

*These consensus Standards were developed by the
Residential Energy Services Network (RESNET)
as amended in accordance with Chapter 5
of these Standards and adopted by the
RESNET Board of Directors on
January 23, 2007*

Published by:

Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561
<http://resnet.us/>

© Residential Energy Services Network, 2006 All rights reserved

Table of Contents

Chapter One	1
100 ACCREDITATION STANDARD FOR HOME ENERGY RATING PROVIDERS	1
101 GENERAL PROVISIONS	1
101.1 Purpose.....	1
101.2 Scope.....	1
102 ACCREDITATION CRITERIA.....	1
102.1 Minimum Standards for Home Energy Rating	1
102.2 Technical Requirements for Home Energy Rating Software Programs	7
103 ACCREDITATION PROCESS.....	8
103.1 Accreditation Process Requirements	8
104 ACCREDITED HOME ENERGY RATING SYSTEMS	9
104.1 Responsibilities of Accredited Home Energy Rating Systems.....	9
105 QUALITY ASSURANCE.....	9
105.1 RESNET Quality Assurance Review of Accredited Providers	9
106 RESNET ETHICS COMMITTEE.....	9
106.1 Purpose of Committee.....	9
107 ETHICS COMPLAINTS	10
107.1 Filing of Ethics Complaints	10
107.2 Investigation of Complaints.....	10
108 RENEWAL.....	11
108.1 Home energy rating system application for renewal	11
109 SUSPENSION AND REVOCATION OF ACCREDITATION	12
109.1 For failure to correct deficiencies of home energy rating system.....	12
109.2 For Cause	13
109.3 Suspension/Revocation Due Process	14
110 APPLICATION APPEAL PROCESS.....	15
110.1 Notification	15
110.2 Appeal.....	15
Chapter Two.....	1
200 NATIONAL RATER TRAINING AND CERTIFYING STANDARD	1
201 GENERAL PROVISIONS	1
201.1 Purpose.....	1
201.2 Scope.....	1
202 DEFINITIONS AND ACRONYMS	1
203 TRAINING AND EDUCATION COMMITTEE	3
203.1 RESNET Training and Education Committee.....	3
204 ACCREDITED TRAINING PROVIDERS.....	4
204.1 Requirements for Accredited Home Energy Training Providers.....	4
205 HOME ENERGY RATINGS	5
205.1 Home Energy Rating Knowledge Base and Skills Set	5
205.2 Rating Field Inspector Knowledge and Skills Set	13
205.3 Senior Certified Knowledge and Skills Set	13
205.4 Rater Specialty Certification.....	14
206 MINIMUM COMPETENCIES	14
206.1 Minimum Rater Training Provider Competencies.....	14

207	CERTIFIED TRAINING.....	15
207.1	Minimum Certified Training Requirements	15
208	EXAMINATIONS.....	15
208.1	Certified Rater Trainer.....	15
209	CONTINUING EDUCATION	16
209.1	Continuing Education Requirements for Certified Raters	16
210	RATER TRAINING PROVIDERS.....	16
210.1	Accreditation of Rater Training Providers.....	16
211	ACCREDITATION RENEWAL.....	18
211.1	Rater Training Providers Application for Renewal	18
212	SUSPENSION OR REVOCATION OF ACCREDITATION	19
212.1	Suspension or Revocation of Accreditation of Rater Training Providers.....	19
213	APPEALS PROCEDURES	21
213.1	Appeals Procedures for Non-Approved, Suspended, or Revoked Applications	21
214	RECIPROCITY	21
214.1	Reciprocity among Jurisdictions.....	21
Chapter Three.....		1
300	NATIONAL ENERGY RATING TECHNICAL STANDARDS.....	1
301	GENERAL PROVISIONS	1
301.1	Purpose.....	1
301.2	Scope.....	1
302	DEFINITIONS AND ACRONYMS	1
303	TECHNICAL REQUIREMENTS	6
303.1	Rating Procedures	6
303.2	Rating Determination.....	7
303.3	Rating Report.....	9
303.4	HERS Reference Home and Rated Home Configuration	12
303.5	Operating Condition Assumptions.....	25
303.6	Projected and Confirmed Ratings	28
303.7	Minimum Rated Features.....	28
303.8	Software Rating Tools	34
Chapter Four		1
400	NATIONAL BUILDER OPTION PACKAGE PROVIDER ACCREDITATION PROCEDURES.....	1
401	BACKGROUND	1
401.1	Purpose.....	1
401.2	Scope.....	1
402	DEFINITIONS.....	1
403	ACCREDITATION CRITERIA.....	2
403.1	Minimum Standards for BOP Providers	2
404	ACCREDITATION PROCESS.....	6
404.1	National BOP Provider Accreditation	6
404.2	BOP Provider Accreditation Criteria.....	6
404.3	National Registry of BOP Providers.....	6
404.4	Confidentiality of Information.....	6
404.5	Review and Notification	6
404.6	Responsibilities of Accredited BOP Providers	7
405	RENEWAL.....	7
405.1	BOP Provider Application for Renewal	7

405.2	Late Application.....	7
405.3	Successful Renewals.....	7
405.4	Renewal Applications Extending Beyond the Grace Period.....	8
405.5	Accreditation Not Renewed.....	8
405.6	Appeals.....	8
405.7	Program Element Changes.....	8
406	SUSPENSION AND REVOCATION OF ACCREDITATION.....	8
406.1	For Failure to Correct Deficiencies of the Accredited BOP Provider.....	8
406.2	For Cause.....	9
406.3	Suspension/Revocation Due Process.....	9
407	APPEALS PROCEDURES FOR APPLICATION NOT BEING APPROVED, SUSPENSION, OR REVOCATION.....	10
407.1	Notification.....	10
407.2	Appeal.....	11
Chapter Five.....		1
500	REVISION OF STANDARDS.....	1
501	REVISIONS AND AMENDMENTS.....	1
501.1	Periodic Reviews.....	1
501.2	Changes in Law.....	1
501.3	Technical Innovations.....	1
501.4	Proposals for Change.....	1
Chapter Six.....		1
RESNET Standards.....		1
600	ACCREDITATION STANDARD FOR SAMPLING PROVIDERS.....	1
601	GENERAL PROVISIONS.....	1
601.1	Purpose.....	1
601.2	Scope.....	1
602	DEFINITIONS AND ACRONYMS.....	1
603	TECHNICAL REQUIREMENTS FOR SAMPLING.....	2
603.1	Sampling Process.....	2
604	ACCREDITATION CRITERIA.....	5
604.1	Sampling Provider/Rater Minimum Requirements.....	5
604.2	Certification Standards.....	6
605	ACCREDITATION PROCESS.....	6
605.1	Sampling Provider Accreditation.....	6
605.2	National Registry of Accredited Sampling Providers.....	7
605.3	Path to Sampling Provider Accreditation.....	7
606	RENEWAL.....	8
606.1	Sampling Provider Application for Renewal.....	8
606.2	Late Application.....	8
606.3	Successful Renewals.....	8
606.4	Renewal Applications Extending Beyond the Grace Period.....	8
606.5	Accreditation Not Renewed.....	8
606.6	Appeals.....	8
606.7	Program Element Changes.....	8
607	SUSPENSION AND REVOCATION OF ACCREDITATION.....	8
607.1	For Failure to Correct Deficiencies of the Accredited Sampling Provider’s Sampling Procedures....	9
607.2	For Cause.....	9

607.3 Suspension/Revocation Due Process	10
608 APPEALS PROCEDURES FOR APPLICATION NOT BEING APPROVED, SUSPENSION, OR REVOCATION.....	10
608.1 Notification	11
608.2 Appeal.....	11
609 REVISION OF ACCREDITATION PROCEDURES.....	12
609.1 Revision and Amending Sampling Accreditation Procedures.....	12
609.2 Periodic Review of Accreditation Procedures	12
609.3 Process for Submitting Proposals to Change Accreditation Procedures	12
609.4 Proposals to Change these Procedures Shall be Considered and Evaluated at Least Annually	13
609.5 Accreditation Procedure Revision Process	13
610 EFFECTIVE DATES.....	14
610.1 Application.....	14
610.2 Implementation	14
Appendix A.....	1

Chapter One

RESNET Standards

100 ACCREDITATION STANDARD FOR HOME ENERGY RATING PROVIDERS

101 GENERAL PROVISIONS

101.1 Purpose

The purpose of this standard is to ensure that accurate and consistent home energy ratings are performed by accredited home energy rating systems nationwide; to increase the credibility of the rating systems with the mortgage finance industry; and to promote voluntary participation in an objective, cost-effective, sustainable home energy rating process.

Leaders in both the mortgage industry and the states have identified the need for an accreditation process for home energy rating systems. This accreditation process will be used by the mortgage industry to accept home energy ratings and by the states to assure accurate, independent information upon which a state may recognize the home energy ratings as a compliance method for state building energy codes; as qualification for energy programs designed to reach specific energy saving goals; and as a way to provide its housing market the ability to differentiate residences based on their energy efficiency. This home energy rating system process has been developed to satisfy the above purposes.

101.1.1 Relationship to other Standards. This standard is a companion chapter to the “National Rater Training and Certifying Standard (Chapter Two of this document, and “National Energy Rating Technical Standard (Chapter Three).

101.1.2 Relationship to State Law. This standard specifically recognizes the authority of states that have laws requiring certification or licensing of home energy rating systems. To the extent that state laws differ from this standard, state laws shall govern.

101.2 Scope

This document sets out the procedures for the accreditation of home energy rating systems so their results will be acceptable to the mortgage industry. Accreditation involves the active participation of state energy offices; therefore, there may be instances in which state laws or regulations will have additional requirements to those specified in this document.

102 ACCREDITATION CRITERIA

102.1 Minimum Standards for Home Energy Rating

A Home Energy Rating System Must Specifically Meet the Following Minimum Standards.

102.1.1 Quality Assurance Designee.

102.1.1.1 A home energy rating system shall designate an officer, employee, or contractor to be responsible for quality assurance within the organization. This definition does not prohibit a rating provider's Quality Assurance Designee from having a qualified certified home energy rater perform the required quality assurance file review and field inspection functions. A Quality Assurance Designee Delegate shall meet the criteria contained in 102.1.2. The Quality Assurance Designee, however, remains responsible for the accuracy and compliance of the provider's quality assurance program, including reviews and inspections completed by a QA Delegate. The responsibilities of the designee shall include:

102.1.1.1.1 Maintenance of quality assurance files

102.1.1.1.2 Review of ratings by rater trainees and during the probationary period

102.1.1.1.3 Monitoring of ratings by certified raters

102.1.1.2 The designated officer, employee, or contractor responsible for quality assurance shall demonstrate sufficient experience with the home energy rating system knowledge base and skills given in Section 205.1 of Chapter Two of the Standard to review the work of trainees and certified raters. Sufficient experience shall be demonstrated by either of the following:

102.1.1.2.1 Certification as a Rater Trainer

102.1.1.2.2 Passing the RESNET Quality Assurance Designee Test

102.1.1.3 Proof of qualification shall be submitted with an application for accreditation.

102.1.1.4 If the designated officer, employee, or contractor leaves the home energy rating system, the provider shall have sixty (60) calendar days to notify RESNET of the new designated officer, employee, or contractor or be subject to suspension of the accreditation under the provisions of Section 109, "Suspension and Revocation of Accreditation".

102.1.2 Quality Assurance Designee Delegate

102.1.2.1 A Quality Assurance Designee Delegate must be a certified home energy rater and have completed the portion of the inspection or rating process for which the individual is performing Quality Assurance tasks on a minimum of 25 homes. In other words, if the Delegate is repeating on site testing and inspections as part of the Quality Assurance process, that individual must have at least performed these tasks on a minimum of 25 homes.

102.1.2.1.1 In addition, the Quality Assurance Designee shall determine accuracy of the delegated Rater(s) in qualifying to perform quality assurance tasks, and ongoing performance of those tasks, by reviewing the results of the quality assurance process for that Rater (i.e. 1% field verification/10% file verification) with a maximum allowable variance

of +/- 5% on annual loads (i.e. heating, cooling and water heater loads as impacted by insulation assessment, blower door tests, duct leakage to outside, sq. ft. of windows, weather station selection, etc.).

102.1.2.2 No step in the quality assurance process may be performed by the same individual that performed any part of the testing, inspection or rating of the home being subject to the quality assurance review. In other words, if an individual performed any part of the inspection or rating process on a home, that individual cannot be the Quality Assurance Designee or Delegate performing any part of the quality assurance process specific to that home.

102.1.2.3 The Quality Assurance Designee shall provide to RESNET a listing of the certified Rater(s) it has delegated to undertake quality assurance reviews on behalf of the Designee and must keep and provide documentation of their qualifications, including evidence of passing the Rater and/or quality assurance exam and ongoing quality assurance results. The potential penalty for non-compliance with these selection or documentation requirements is the individual losing Quality Assurance Designee status and the Provider losing accreditation.

102.1.3 Rater Certification Standards. Certification and recertification of energy raters shall be made by accredited rater providers, which shall include the following provisions:

102.1.3.1 A rating provider shall provide documentation that their raters meet the rater certification provisions contained in Chapter Two of these standards.

102.1.3.2 Performance evaluation of ability to perform accurate ratings. Each rater shall complete a probationary period where close supervision is provided. This period covers a minimum of three ratings above the two supervised ratings that are conducted in rater training, after which the supervisor shall determine if additional training is needed.

102.1.3.3 Continuing Education. Raters must have 12 hours of approved continuing education and training units approved by the rating provider every three years. Ten hours of the training must be approved by RESNET.

102.1.3.4 Rater Testing. All certified Raters must take the national home energy rater test administered by RESNET by January 1, 2008.

102.1.3.5 Recertification of raters no less than every three years.

102.1.3.6 Rater Agreements. As a condition of rater certification, each provider shall ensure that a certified rater who has met the requirements of Chapter 2, Rater Training Requirements, has entered into a written agreement with the provider to provide home energy rating, field verification, and diagnostic services in compliance with these standards. A copy of the rater written agreement shall be provided to RESNET with the provider's accreditation application and within 60 days of making changes to the agreement. The written agreement shall at a minimum require raters to:

102.1.3.6.1 Provide home energy rating and field verification services in compliance with these standards;

102.1.3.6.2 Provide accurate and fair ratings, field verification and diagnostic testing;

102.1.3.6.3 Comply with the RESNET Code of Ethics. The “RESNET Code of Ethics” is posted at <http://www.natresnet.org/ethics.htm>. The Code of Ethics shall be attached to the written agreement. An unexecuted copy of the written agreement shall be provided to RESNET with a provider’s accreditation application and within 60 days of making changes to the agreement.

102.1.4 Minimum Standards for Home Energy Rating System’s Operation Policies and Procedures must be written and provide for the following:

102.1.4.1 Ratings from plans. If the home energy rating system provides for ratings by from plans, the rating be labeled as from plans. Such ratings may be used to demonstrate energy code compliance or programmatic qualification but must be confirmed through a field inspection upon completion of construction.

102.1.4.2 Field inspection of all homes.

102.1.4.3 Blower Door Test completed on all homes claiming credit for reduced air infiltration.

102.1.4.4 Duct testing completed on all homes claiming credit for reduced air distribution system leakage.

102.1.4.5 When applicable, improvement analysis given to home owner.

102.1.4.5.1 Recommended improvements with the cost basis supplied for each recommendation by the home energy rating software program, home energy rating system or the rater receiving quotes.

102.1.4.5.2 Estimated energy and cost savings of improvements based upon assumptions contained in the home energy rating system program.

102.1.4.6 Written conflict of interest provisions that prohibits undisclosed conflicts of interest but allows waiver with advanced disclosure. The” Home Energy Rating Standard Disclosure” form adopted by the RESNET Board of Directors shall be completed for each home that receives a home energy rating and shall be provided to the rating client and made available to the home owner/buyer. Each form shall include, at a minimum, the name of the community/subdivision, city, and state where the home is located. Each form shall accurately reflect the proper disclosure for the home that it is rated (i.e. it should, reflect the Rater’s involvement with the home at the time the final rating is issued. For the purpose of completing this disclosure, “Rater’s employer” includes any affiliate entities. Recognizing that a number of different relationships may occur between the Rater or the Rater’s employer

and the rating client and/or homeowner and/or the marketplace in general, the rating provider shall ensure that all disclosures are adequately addressed by the provider's quality assurance plan, in accordance with the relevant quality assurance provisions of the standards.

102.1.4.7 Written rater discipline procedures that includes progressive discipline involving Probation - Suspension – Termination.

102.1.4.8 Written rater quality control process that includes at a minimum the following:

102.1.4.8.1 The provider's quality assurance designee shall be responsible for the internal review of ratings submitted by its raters, including:

102.1.4.8.1.1 Review of ratings conducted during the raters' probation period. Prior to certifying a Rater candidate, the provider shall review at least three probationary ratings performed by the Rater candidate within 12 months of training.

102.1.4.8.1.2 Review of rating data files. For each Rater, the provider's quality assurance designee shall annually evaluate a minimum of 10% of each Rater's rating data files. The provider shall resolve any problems detected during these reviews. Excessive problems will trigger field monitoring of the Rater.

102.1.4.8.1.3 Field monitored ratings. For each Rater, the provider's quality assurance designee shall be responsible for an annual evaluation of the greater of one home or one percent of the Rater's annual total of homes for which confirmed ratings and/or diagnostic testing services were provided. The provider's quality assurance designee shall ensure that a rating is independently repeated to determine whether the rating and/or diagnostic testing was accurately completed by the Rater, and determine whether information was completely collected and reported as required in 303.1 of Chapter 3 of these standards.

102.1.4.8.2 Rating/Tax Credit Verification Recordkeeping. Providers and/or their certified Raters shall maintain records for each rating/tax credit verification.

102.1.4.8.2.1 The quality assurance record for each home shall contain at a minimum the electronic copy of the building file.

102.1.4.8.2.2 The record for each rating/tax credit verification shall be maintained for a minimum of three years.

102.1.4.9 Rater Registry. The provider shall maintain a registry of all of its certified Raters. The provider will also keep on file the names and contact information for all, including company name, mailing address, voice phone number, fax number, and email address. Upon request, the provider shall provide to RESNET its registry of certified Raters.

102.1.4.10 Complaint Response System Each provider shall have a system for receiving complaints. The provider shall respond to and resolve complaints related to ratings and field

verification and diagnostic testing services and reports. Providers shall ensure that Raters inform purchasers and recipients of ratings and field verifications about the complaint system. Each provider shall retain records of complaints received and responses to complaints for a minimum of three years after the date of the complaint.

102.1.4.11 Data Submittal Upon RESNET's request, a provider shall submit to RESNET the number of homes for which ratings/tax credit verification were provided since the last data submittal. The ratings/tax credit verification shall be identified by type (to include projected and confirmed ratings for new and existing homes and the number of homes verified for tax credits). To the extent RESNET makes this information public, it will do so only in an aggregated form.

102.1.4.12 All HERS providers shall maintain an electronic database of information for each home rated or verified for the tax credit. The minimum content of the database is:

102.1.4.12.1 A unique file reference with ID number;

102.1.4.12.2 Date of on-site inspection;

102.1.4.12.3 Raters name;

102.1.4.12.4 Tool name and version;

102.1.4.12.5 Identification of climate data used for the rating;

102.1.4.12.6 Type of rating, either projected or confirmed;

102.1.4.12.7 Use of rating:

102.1.4.12.7.1 Time of sale rating;

102.1.4.12.7.2 Pre-home improvement rating;

102.1.4.12.7.3 Post home improvement rating; or

102.1.4.12.7.4 Information only rating;

102.1.4.12.8 Address of Rated Home;

102.1.4.12.9 Home type;

102.1.4.12.10 Floor area of conditioned space;

102.1.4.12.11 Fuel types used by building heating, cooling and water heating systems;

102.1.4.12.12 Minimum rated feature energy efficiency data used to determine the rating;

102.1.4.12.13 In the four categories of heating, cooling, water heating and all other uses, the:

102.1.4.12.13.1 Estimated annual purchased energy consumption in total;

102.1.4.12.13.2 Estimated annual purchased energy consumption by fuel;

102.1.4.12.13.3 Estimated annual energy costs in total; and

102.1.4.12.13.4 Estimated annual energy cost by fuel.

102.1.4.12.14 Estimated total annual energy cost for all uses;

102.1.4.12.15 Rating score of the Rated Home on 0-100 points scale and 1-5+ stars category;

102.1.4.12.16 To the extent allowed by state statute, all HERS providers shall for 10% or for 500 of the homes rated annually, whichever is less, maintain a database of the following:

102.1.4.12.16.1 Homeowners authorization for the release of consumption information by utility companies;

102.1.4.12.16.2 Climate data site used for energy estimation;

102.1.4.12.16.3 Any energy efficiency improvements made to the home and date of completion.

102.1.4.13 Site data collection manual. All HERS providers shall provide raters with a manual containing procedures for the on-site collection of data that are at a minimum shall include the on-site inspection procedures for minimum rated features for new and existing homes provided in appendix A.

102.2 Technical Requirements for Home Energy Rating Software Programs

102.2.1 A home energy rating provider shall provide documentation with its accreditation application that the energy rating software used to produce energy ratings are properly licensed and has successfully passed the “RESNET Rating Software Testing Specifications and Verification Procedures” to ensure that the software compiles with the national home energy rating technical standards that are contained in Chapter Three of these standards. The “RESNET Rating Software Testing Specifications and Verification Procedures” are posted on RESNET’s Web site at http://www.natresnet.org/programs/software/software_test.pdf.

102.2.2 Documentation that home energy rating software program used by the home energy rating system passed BESTEST developed by the National Renewable Energy Laboratory, “Home Energy Rating System Building Energy Simulation Test (HERS BESTEST),” Vols. 1 & 2 (NREL/TP-472-7332); using the criteria and example acceptability ranges as set forth in Appendix H of the above document.

103 ACCREDITATION PROCESS

103.1 Accreditation Process Requirements

103.1.1 National home energy rating system accreditation will be through the RESNET Quality Assurance and Ethics Committee appointed by the RESNET Board.

103.1.2 Home energy rating systems must meet the accreditation criteria listed above.

103.1.3 The Residential Energy Services Network (RESNET) will maintain the database of accredited home energy rating systems, “The National Registry of Accredited Rating Providers” which is posted at <http://www.resnet.us/programs/providers/directory.aspx>.

103.1.4 Application Process:

103.1.4.1 A home energy rating system seeking accreditation must file its application developed by RESNET. Upon receiving an application, RESNET staff will review the application using the accreditation standards set forth herein and forward to the RESNET Quality Assurance and Ethics Committee.

103.1.5 Confidentiality of Information. Any home energy rating system submitting the required application information and desiring to have certain information treated as confidential in order to limit disclosure shall, at the time of submission, attach a statement specifying the proprietary information and requesting confidentiality. The request for confidentiality will be limited in the state energy office review by state law.

103.1.6 Review and Notification.

103.1.6.1 Applications reviewed under 103.1.4.1, Within 30 days of receipt of a complete application, RESNET staff will review the submission for compliance to the accreditation standards set forth within and either: forward the application and review checklist to the RESNET Quality Assurance and Ethics Committee and notify the home energy rating system of this action, or forward to the applicant a request for additional information or clarification.

103.1.6.2 Within 30 days of receipt of the completed application and review checklist, the RESNET Quality Assurance and Ethics Committee will review the submissions, make a determination of whether the applicant meets the accreditation standard, and if it does issue a unique home energy rating system accreditation identification number. This initial accreditation is valid for a period of three years from the date of issuance. The accreditation will be incorporated into a national registry of accredited home energy rating systems and

listed on the RESNET web site on the Internet. In order to maintain currency and credibility for the registry, renewal of accreditation is required annually.

103.1.6.3 If the RESNET Quality Assurance and Ethics Committee determines that the applicant does not meet the accreditation standard, it shall inform the home energy rating system, identify where the applicant failed to meet the accreditation standard, and inform the applicant its right of remedy under 109.3.

104 ACCREDITED HOME ENERGY RATING SYSTEMS

104.1 Responsibilities of Accredited Home Energy Rating Systems

The accredited home energy rating system is responsible for insuring that all of the ratings issued by the system comply with all of the criteria by which the system was accredited.

105 QUALITY ASSURANCE

105.1 RESNET Quality Assurance Review of Accredited Providers

105.1.1 RESNET shall randomly select a limited number of accredited providers annually and conduct a review of their files. The RESNET Board of Directors shall determine the number of providers that shall be reviewed on an annual basis and who will provide the quality assurance review. An accredited rating provider may have the right to challenge the quality assurance reviewer for cause.

105.1.2 Records that may be reviewed include:

105.1.2.1 Rating electronic files

105.1.2.2 Rating quality assurance records

105.1.2.3 Complaint files

105.1.2.4 Rater agreements

105.1.2.5 Rater registry

105.1.2.6 Disclosure files

105.1.3 Significant inconsistencies or errors in the files reviewed may result in a field review.

106 RESNET ETHICS COMMITTEE

106.1 Purpose of Committee

The RESNET Ethics Committee shall have the responsibility of investigating ethics complaints and reporting findings and recommendations to the RESNET Board of Directors.

106.1.1 Composition of the Committee:

106.1.1.1 The ethics committee will be composed of five members.

106.1.1.2 The members of the ethics committee shall be appointed by the RESNET Board of Directors.

106.1.1.3 Ethics committee members shall have staggered two-year terms.

107 ETHICS COMPLAINTS

107.1 Filing of Ethics Complaints

107.1.1 Complaints may be filed against an accredited provider for violating the RESNET Code of Ethics, for failing to enforce the ethics code with their certified Raters, or for failure to adhere to the accreditation requirements.

107.1.2 A complaint shall document the alleged violation(s). The complaint shall also be specific about which section(s) of the Code of Ethics or the accreditation standards have been violated. To be considered, the full and complete complaint shall be sent by registered mail to the Executive Director of RESNET and contain the following information:

107.1.2.1 The name of the complainant and contact information

107.1.2.2 The accredited provider that is the subject of the complaint

107.1.2.3 A complete description of the alleged violation(s)

107.1.2.4 A recitation of all the facts documenting the complaint including contact information

107.1.2.5 Copies of any relevant documents

107.2 Investigation of Complaints

107.2.1 The RESNET Executive Director shall assign a case number and forward the complaint to the Ethics Committee. The committee shall consider the documentation contained in 107.1.2 in making a decision whether to proceed or dismiss the complaint.

107.2.2 In cases where the Ethics Committee finds the documentation submitted does not meet the minimum standards for a complaint, the complaint may be dismissed. Both parties shall be notified by registered mail of the Ethics Committee's finding.

107.2.3 Upon a decision by the Ethics Committee that the complaint should proceed to the next step, the RESNET Executive Director shall send a copy of the complaint by registered

mail to the subject of the complaint immediately. The respondent has 30 days to submit a full and complete response to the complaint. All relevant information and documentation shall be included in the response. The response shall be in writing and sent to RESNET by registered mail.

107.2.4 Upon receipt of the response, the RESNET Executive Director shall immediately forward the response to the RESNET Ethics Committee for consideration and action. Within thirty (30) days of receiving the complaint, the Ethics Committee shall take action on the complaint. The action may include, but is not limited to:

107.2.4.1 Dismissal of complaint

107.2.4.2 Requirement that the rating provider take steps to correct problem

107.2.4.3 Recommendation of sanctions to the RESNET Board under Section 109 of this chapter.

107.2.5 All parties to the complaint shall be informed by registered mail of the Ethics Committee's action.

107.2.6 All complaints, responses, and supporting documentation shall be handled in strict confidence by the RESNET staff, the Ethics Committee, and the Board of Directors.

108 RENEWAL

108.1 Home energy rating system application for renewal

108.1.1 Home energy rating systems must submit an "Application for Renewal" no later than 120 days prior to the expiration of the current accreditation period. Renewal shall be required annually after the issuance of the unique accreditation registration number by the Mortgage Industry Home Energy Rating System Accreditation Committee. Renewal applications will be processed in the same manner as an initial application.

108.1.2 Late Application. Applications received later than specified above will be processed, to the maximum extent feasible, so that the accreditation does not expire. Should the expiration date pass, the applicant will be granted an extension not to exceed 30 days.

108.1.3 Successful Renewals. Successful renewals will be noted on the national registry and communicated to the applicant by the Mortgage Industry Home Energy Rating System Accreditation Committee.

108.1.4 Renewal Applications Extending Beyond the Grace Period. Renewals extending beyond the grace period will be noted as "pending" on the national registry and the applicant will be advised to cease representing themselves as accredited until the application receives approval.

108.1.5 Accreditation Not Renewed. Home energy rating systems that elect not to renew or fail to meet renewal requirements will be removed from the national registry and so advised.

108.1.6 Appeals. Home energy rating systems whose accreditation has been revoked, and are exercising their right of appeal will be noted as pending and the home energy rating system will be advised to cease representing themselves as accredited until the appeal is resolved.

108.1.7 Program Element Changes. It is the home energy rating system's responsibility to provide the Mortgage Industry Home Energy Rating System Accreditation Committee with any proposed changes in the program's minimum home energy rater certification procedures, minimum rater training standards, minimum rater certification standards, operation policies and procedures, information contained in the rating report or other information that effects its meeting the minimum accreditation criteria. Proposed changes will be evaluated by the accrediting review body in the same manner as the original or renewal application.

108.1.8 Rating Tool Changes. Should changes that affect the calculated results of the home energy rating occur in the engineering algorithms of the home energy rating system's tool, the home energy rating system will be required to submit verification that the tool continues to meet the BESTEST criteria for accreditation purposes. Providers shall also be required to use one of the currently approved versions of their chosen software are contained in the "National Registry of Accredited Rating Software Programs posted at <http://www.natresnet.org/programs/software/directory.htm>, as follows:

108.1.8.1 Transition period. On announcement of a new software version release, providers have a maximum of 60 days to begin all new ratings with the new version.

108.1.8.2 This requirement only applies to changes mandated by the technical standard or otherwise affecting the calculations of the rating score or projected energy savings.

108.1.8.3 Persistence. Once a projected rating has been made on a property, the version of the rating software that was used initially may be used for the final rating on that property. Providers, at their option, may update the software version for in-process ratings.

109 SUSPENSION AND REVOCATION OF ACCREDITATION

109.1 For failure to correct deficiencies of home energy rating system

109.1.1 Probation. - If RESNET determines at any time that a home energy rating system has failed to adhere to the accreditation requirements, RESNET shall notify the home energy rating system of the specified deficiencies and shall require that specific corrective action, set forth in the notification, be taken within a specified time after the date set forth in such notification. The notice of probation may be appealed to the RESNET Quality Assurance and Ethics Subcommittee in accordance with procedures set forth in Section 110.2.

109.1.2 Suspension. - In the event that the deficiencies have not been remedied as specified or can not be otherwise redressed to RESNET's satisfaction, RESNET shall have the authority to immediately initiate suspension by issuance of a Notice of Suspension effective for a specified date set forth in such notification. Such Suspension shall follow the due process procedures contained in 109.3 below. The notice may be appealed to the RESNET Quality Assurance and Ethic's Appeals Subcommittee in accordance with procedures set forth in Section 110.2.

109.1.3 Revocation. In the event that the specified deficiencies are not corrected as specified in the Notice of Suspension, or the deficiencies are deemed to be of a sufficiently serious nature, a Notice of Revocation shall be issued by RESNET after review by the Quality Assurance and Ethics Committee's Appeals and Ethics Subcommittee. Such Revocation shall follow the due process procedures contained in 109.3 below. The Notice of Revocation may be appealed to the RESNET Quality Assurance and Ethics Committee in accordance with the procedures set forth in Section 110.2.

109.2 For Cause

109.2.1 Any home energy rating system accredited by the RESNET Board of Directors may have the accreditation revoked in any of the following circumstances:

109.2.1.1 Upon a determination by RESNET that a home energy rating system has acted in such a manner as to impair the objectivity or integrity of the accreditation program or harm the reputation of the accreditation committee including, but not limited to submission of false information to the accreditation review body, or failure to submit to the accreditation review body any material information required to be submitted by the home energy rating system, in connection with obtaining or maintaining accreditation; knowingly or negligently issuing ratings that fail to meet all of the accreditation criteria; or misrepresentation by the home energy rating system in advertising or promotional materials of its accreditation status in general or with respect to any service provided by the home energy rating system.

109.2.1.2 Pursuant to any of the express provisions of Section 109.3 or any of the express provisions of the accreditation application, including but not limited to the following:

109.2.1.2.1 Home energy rating system goes out of business;

109.2.1.2.2 Home energy rating system does not re-apply at the end of existing accreditation period;

109.2.1.2.3 Failure to satisfy accreditation requirements on renewal;

109.2.1.2.4 Investigated and validated consumer complaints;

109.2.1.2.5 Willful misconduct;

109.2.1.2.6 Failure to disclose a self-serving interest.

109.3 Suspension/Revocation Due Process

109.3.1 RESNET shall comply with the following due process procedures in considering any suspension or revocation actions against an accredited home energy rating system after exhausting the appeals process specified in 110.2.

109.3.1.1 Notice. RESNET may, at its discretion, initiate a proposed suspension or revocation action against an accredited home energy rating system by providing the rating system written notice of the action sent by certified mail, return receipt requested, to the last known address of the rating system. Such notice shall inform the subject rating program of the entire basis and justification for the proposed action.

109.3.1.2 Contest of Proposed Suspension/Revocation. After exhausting the appeals process a respondent may contest a suspension/revocation by requesting a hearing with RESNET within 30 days of receipt of the determination of the appeal process.

109.3.1.3 Hearing. If the respondent files a timely response contesting the proposed suspension/revocation and requests a hearing, RESNET will appoint an independent, unbiased, and qualified hearing officer and issue a decision on the suspension/revocation. The hearing officer will review the notice of suspension/revocation and the respondent's contest. If the hearing officer finds that the respondent's contest has raised substantiated and valid factual argument to the contrary of the proposed suspension/revocation, the respondent shall be afforded an opportunity to participate in an open and public telephonic hearing, and to submit additional documentary evidence, and rebuttal argument to any material contained in the original notice of suspension/revocation or developed during the course of the hearing officer's investigation. The notice shall be provided to the respondent by written notice by certified mail, return receipt requested, to the last known address of the rating system at a minimum of 120 days before the scheduled hearing.

109.3.1.4 Hearing Officer's Decision. The hearing officer shall issue a written decision on the proposed suspension/revocation that is based on all the information contained in the hearing record including statements of the factual and legal basis of the decision. If the hearing officer decides to impose suspension or revocation, the decision must include findings regarding all disputed materials, and justification for all findings. A suspension/revocation decision by the hearing officer shall take effect upon the issuance of the hearing officer's decision and the written notification of such decision to the respondent.

109.3.1.5 No ex parte Communication. No ex parte communication between the parties and the hearing officer shall be allowed.

109.3.1.6 Notification of state's determination. Where a state has statutory authority to regulate home energy rating system and the state has followed its due process in suspending or revoking a rating system, the state is encouraged to notify RESNET of the action and the reasons for such action.

110 APPLICATION APPEAL PROCESS

Appeals procedures for applications not approved, suspended or revoked.

110.1 Notification

110.1.1 RESNET shall notify the home energy rating system and the accreditation review body of any decisions. Additionally, RESNET shall clearly notify the home energy rating system of the procedures and right to remedy.

110.2 Appeal

110.2.1 In the event that an accreditation application has been denied or revoked, or if the home energy rating system has been placed on probation or suspended, the home energy rating system shall have the right, for a period of 30 calendar days after the date of notice, to appeal to the RESNET Quality Assurance and Ethics Committee's Appeals and Ethics Subcommittee. The response shall contain all pertinent and substantive information and argument that is in contradiction to the proposed suspension/revocation, including identification of all disputed materials and facts.

In the event that an accreditation application was not approved or the accreditation has been suspended, the home energy rating system shall have the right, for a period of 30 calendar days after the date of notice, to appeal to the RESNET Board of Directors.

110.2.1.1 An appeal shall be in writing and sent by certified mail or other method which provides evidence of delivery to the Chairman of the RESNET Quality Assurance and Ethics Committee and shall specify the basis for the appeal.

110.2.1.2 The appellant home energy rating system may, at the time of noticing its appeal, request in writing, a hearing by the RESNET Quality Assurance and Ethics Committee's Appeals and Ethics Subcommittee. In such an event, the subcommittee shall, not later than 7 calendar days after the filing of the notice of appeal, notify the appellant home energy rating system of the date of the hearing, which shall be held as expeditiously as possible, but not later than 30 calendar days after the receipt of the notice of appeal.

110.2.1.3 In the event that a home energy rating system's appeal of its probation or suspension is rejected by the RESNET Quality Assurance Committee and Ethics Committee's Appeals and Ethics Subcommittee, the home energy rating system shall have the right, for a period of 30 calendar days after the date of the notification of the denial of the appeal to appeal to the RESNET Quality Assurance and Ethics Committee.

110.2.1.4 In the event that a home energy rating system's appeal of its revocation is rejected by RESNET Quality Assurance and Ethics Committee, the home energy rating system shall have the right for a period of 30 calendar days after the notification of the denial of the appeal to appeal to the RESNET Board of Directors.

Chapter Two

RESNET Standards

200 NATIONAL RATER TRAINING AND CERTIFYING STANDARD

201 GENERAL PROVISIONS

201.1 Purpose

The provisions of this document are intended to establish national rater training and certification standards which an accredited home energy rating system shall follow in certifying home energy raters. This enhances the goal of producing nationally uniform energy efficiency ratings for residential buildings.

201.1.1 Relationship to other Standards. These standards are a companion document to the “National Accreditation Procedures for Home Energy Rating Systems” as promulgated and maintained by the National Association of State Energy Officials (NASEO) and the Residential Energy Services Network (RESNET) and the “National Home Energy Rating Technical Guidelines” as promulgated and maintained by NASEO. Both guidelines are recognized by the mortgage industry.

201.1.2 Relationship to State Law. These standards specifically recognize the authority of each state that has a state law which requires certification or licensing of home energy rating systems. To the extent that such state laws differ from these standards, state law shall govern.

201.2 Scope

These standards apply to the training and certification of energy raters who will be accepted by nationally accredited home energy rating systems. An energy rating identifies the energy features and estimates the energy performance of a home and does not identify structural or health and safety problems of a home.

202 DEFINITIONS AND ACRONYMS

Accreditation Procedures - The set of standards and procedures entitled “Mortgage Industry National Home Energy Rating System Accreditation Standard” as published and maintained by NASEO and RESNET.

Accredited Rating System Provider - A home energy rating system accredited through the Mortgage Industry National Home Energy Rating System Accreditation Standard.

Accredited Rater Training Provider or Training Provider - A home energy rater training organization accredited by RESNET.

Certified Home Energy Rater or Rater - The person trained by an Accredited Training Provider and certified by an accredited home energy rating provider to inspect a home to evaluate the minimum rated features and prepare an energy efficiency rating (see also Rating Field Inspector and Senior Certified Rater). A rater may employ or use a Rating Field Inspector to perform the physical inspection tasks allowed under that job designation. This definition does not restrict a Rater from conducting the inspections and necessary basic performance tests (blower door & duct blaster) to produce a home energy rating. The certified home energy Rater remains responsible for the accuracy of the information contained in the rating.

Confirmed Rating - An energy rating accomplished using data gathered from an on-site audit inspection and, if required, performance testing of the physical building and its installed systems and equipment.

Certified Rater Trainer - Class instructor who has demonstrated, by means of passing the RESNET National Rater Trainer Competency Test, mastery of the building science and rating system and competency necessary to effectively teach rater training courses.

Energy Efficiency Rating - An unbiased indication of a home's relative energy efficiency based on consistent inspection procedures, operating assumptions, climate data and calculation methods.

Energy Saving Measure or Feature - Any material, component, device, system, construction method, process, or combination thereof that will result in a reduction of energy use.

EPA Act - The U.S. Energy Policy Act of 1992.

Examination - Test administered by an accredited Rater Training Provider from questions developed by National Rater Training Provider Accreditation Committee.

HERS - Home Energy Rating System.

HERS Provider - A firm or organization that develops, manages, and operates a home energy rating system.

Home - A one or two family dwelling, or multi-family dwelling of three stories or less.

NASEO - National Association of Energy Officials

National Core Rater Test - Computer-based examination developed by the Residential Energy Services Network's (RESNET) Training and Education Committee and administered by RESNET.

National Home Energy Rating Technical Guidelines - Voluntary home energy rating system technical guidelines adopted by the National Association of State Energy Officials (NASEO).

National Rater Training Provider Accreditation Body - The Residential Energy Services Network (RESNET) is the National Rater Training Provider Accreditation Body.

Projected Energy Rating - A rating performed prior to the construction of a new building or prior to implementation of energy-efficiency improvements to an existing building.

Rated Home - The specific home being evaluated using the rating procedures contained in the National Home Energy Rating Technical Guidelines.

Rater Specialty Certification – Professional building performance certification recognized by RESNET as part of a Home Energy Rater’s advanced certification.

Rater Trainer - An individual designated by the Accredited Rater Training Provider to provide instruction and assistance to trainees.

Rating Field Inspector – A Field Inspector is the entry level of rater certification. A Field Inspector under the direct supervision of a certified home energy rater may conduct the inspections and necessary basic performance tests (blower door& duct blaster) to produce a home energy rating. This category requires the ability to identify and quantify building components and systems.

Rating Tool - A procedure for calculating a home’s energy efficiency rating, annual energy consumption, and annual energy costs.

Reference Home - A hypothetical home configured in accordance with the specifications set forth in the National Home Energy Rating Technical Guidelines for the purpose of calculating rating scores.

RESNET - Residential Energy Services Network

RESNET National Rater Trainer Competency Test – Certification test developed and administered by RESNET to ensure that accredited rater training providers’ trainers have the requisite knowledge and competence to serve as trainers for prospective certified Raters. The test is based on the national core competency exam developed and maintained by RESNET.

RESNET Training and Education Committee - The accreditation committee that reviews and approves applications from Rater Training Providers for national accreditation.

Senior Certified Rater – A senior rater is the first category of advanced rater certification. Senior Certified Raters have demonstrated that they have the increased experience and knowledge base to interpret the findings of a rating and make recommendations on how the home can be improved.

203 TRAINING AND EDUCATION COMMITTEE

203.1 RESNET Training and Education Committee

203.1.1 Composition. The RESNET Training and Education Committee shall be appointed by and serve at the pleasure of the RESNET Board of Directors.

203.1.2 Responsibilities. The RESNET Training and Education Committee shall review and approve the following:

203.1.2.1 Applications from prospective Rater Training Providers for accreditation in accordance with this Standard;

203.1.2.2 Accreditation Renewal Application. Annually review and modify, if necessary, the following:

203.1.2.2.1 Core competency examination questions;

203.1.2.2.2 Time limits for the core examination;

203.1.2.2.3 Passing scores for the core examination; and

203.1.2.2.4 Annual accreditation fee.

204 ACCREDITED TRAINING PROVIDERS

204.1 Requirements for Accredited Home Energy Training Providers

204.1.1 Duties and Responsibilities. In order to maintain their accreditation in good standing, all Training Providers shall fully discharge the following duties and responsibilities. Failure to properly discharge all of these duties and responsibilities shall constitute grounds for disciplinary action in accordance with Section 212 of this Standard.

204.1.1.1 Hold the national core competency questions of the national test administered by RESNET in the strictest confidence.

204.1.1.2 Maintain a record, for a period of three years, of all training materials and trainee data, including:

204.1.1.2.1 Historical records of all training schedules and curricula,

204.1.1.2.2 Historical records of all training attendance records,

204.1.1.2.3 Historical records of all examinations and individual examination results,

204.1.1.2.4 Historical records of all certifications issued to any individuals,

204.1.1.2.5 Copies of the most up-to-date instructor presentation materials, training manuals, user manuals, course handouts and any other training materials use for training purposes,

204.1.1.2.6 Copies of all current policies, standards, guidelines and procedures in use by the Training Provider.

204.1.1.3 Maintain acceptable accounting practices, suitable to satisfy the requirements of independent audit procedures.

204.1.1.4 Maintain up-to-date training materials and courseware and provide for adequate training facilities.

204.1.1.5 Maintain certified trainers, who have been certified by RESNET by passing the National Rater Trainer Competency Test, and who satisfy the minimum trainer competencies in accordance with Section 206.1 of this chapter.

204.1.2 Privileges and rights. All accredited Training Providers in good standing shall have certain privileges and rights, as follows:

204.1.2.1 The privilege to display the accreditation seal of the National Accreditation Body on any publications, displays, presentations or marketing materials published, authorized for publication or otherwise issued by the Training Provider.

204.1.2.2 The privilege to make and use any trademarked, copyrighted or otherwise restricted materials other than the national core test developed by RESNET for marketing Rater Training Courses or Training Providers or for recruiting Rater trainees, instructors or trainers.

204.1.2.3 Copies of all current policies, standards, guidelines and procedures in use by the Training Provider.

204.1.2.4 The right to present evidence, arguments and a vigorous defense in any action brought under these standards by any party against a Training Provider.

205 HOME ENERGY RATINGS

205.1 Home Energy Rating Knowledge Base and Skills Set

205.1.1 The following comprise a list of knowledge base and skills are necessary for home energy ratings. Training Providers shall use a certified trainer who has successfully passed the RESNET National Rater Training Competency Test and that their training curricula are sufficiently comprehensive to effectively teach these materials to prospective Home Energy Raters (See Section 6.1). Prospective Home Energy Raters, to become certified, shall demonstrate proficiency through passing the RESNET national core test and other training provider written examinations and observations.

205.1.1.1 Building Energy Performance.

205.1.1.1.1 Basic energy principles.

205.1.1.1.1.1 Energy terminology, units and conversions.

205.1.1.1.1.2 Heat transfer principles

205.1.1.1.1.2.1 Conduction

205.1.1.1.1.2.1.1 R-values & U-values

205.1.1.1.1.2.1.2 UA concepts

205.1.1.1.1.2.1.3 Parallel paths

205.1.1.1.1.2.2 Convection

205.1.1.1.1.2.2.1 Film coefficients

205.1.1.1.1.2.2.2 Buoyancy

205.1.1.1.1.2.2.3 Forced air flows

205.1.1.1.1.2.3 Radiation

205.1.1.1.1.2.3.1 Solar (absorptance + reflectance + transmittance = 1.0)

205.1.1.1.1.2.3.2 Far infrared (emittance = absorptance)

205.1.1.1.1.3 Moisture Principles

205.1.1.1.1.3.1 Properties

205.1.1.1.1.3.1.1 Dew point

205.1.1.1.1.3.1.2 Relative Humidity

205.1.1.1.1.3.1.3 Evaporation & condensation

205.1.1.1.1.3.2 Transport Mechanisms

205.1.1.1.1.3.2.1 Rain and ground water

205.1.1.1.1.3.2.2 Capillary action

205.1.1.1.1.3.2.3 Air transported

205.1.1.1.1.3.2.4 Vapor Diffusion

205.1.1.1.1.3.2.5 Evaporation and condensation

205.1.1.1.1.3.3 Impacts

- 205.1.1.1.2.3.1** Impacts on energy use
- 205.1.1.1.2.3.2** Impacts on humidity control
- 205.1.1.1.2.4** Controls
 - 205.1.1.1.2.4.1** Standard thermostats
 - 205.1.1.1.2.4.2** Programmable thermostats
 - 205.1.1.1.2.4.3** Multi-zone
- 205.1.1.1.2.5** Distribution systems
 - 205.1.1.1.2.5.1** Duct types
 - 205.1.1.1.2.5.2** Restricted returns
 - 205.1.1.1.2.5.2.1** Closed interior doors
 - 205.1.1.1.2.5.2.2** Return ducts and grills
 - 205.1.1.1.2.5.3** Leakage
- 205.1.1.1.2.6** Fresh air ventilation
 - 205.1.1.1.2.6.1** Supply, exhaust and balanced flow systems
 - 205.1.1.1.2.6.2** Heat exchange systems
 - 205.1.1.1.2.6.3** Energy/enthalpy exchange systems
 - 205.1.1.1.2.6.4** Exchanger efficiency, fan power and duty cycle characteristics
- 205.1.1.1.2.7** Renewable energy systems
 - 205.1.1.1.2.7.1** Active and passive space heating systems
 - 205.1.1.1.2.7.2** Solar hot water systems
 - 205.1.1.1.2.7.3** Photovoltaic systems
 - 205.1.1.1.2.7.4** Wind generation
- 205.1.1.1.3** Diagnostic testing procedures
 - 205.1.1.1.3.1** Building air tightness

205.1.1.1.3.1.1 Multipoint pressure testing

205.1.1.1.3.1.2 C, n, p and R2

205.1.1.1.3.2 Air distribution system air tightness

205.1.1.1.3.2.1 Pressure pan threshold tests

205.1.1.1.3.2.2 Duct air leakage measurements

205.1.1.1.3.2.2.1 cfm25_total

205.1.1.1.3.2.2.2 cfm25 out

205.1.1.1.3.2.3 Pressure measurements

205.1.1.1.3.2.3.1 Operational (by home and its equipment)

205.1.1.1.3.2.3.2 Imposed (by blower door, etc.)

205.1.1.1.3.2.4 Air heat and moisture measurements

205.1.1.1.3.2.4.1 Airflows

205.1.1.1.3.2.4.2 Temperatures

205.1.1.1.3.2.4.3 Relative humidity

205.1.2 Identifying minimum rated features as defined in the National Home Energy Rating Technical Guidelines:

205.1.2.1 Identify basic home construction types; ramifications of these for energy usage.

205.1.2.2 Produce a scaled and dimensioned sketch of a home.

205.1.2.3 Identification of insulation defects and ability to account for them in energy analysis tool inputs.

205.1.2.4 Identify and document the features of the rated home in accordance with the requirements of Section B.5. and Appendix A of the National Home Energy Rating Technical Guidelines.

205.1.2.5 Identifying potential building problems

205.1.2.5.1 Health and safety concerns

205.1.2.5.2 Building durability issues

205.1.2.5.3 Potential comfort problems

205.1.2.5.4 Possible elevated energy use

205.1.2.6 Rating Procedures

205.1.2.6.1 Understanding construction documents

205.1.2.6.1.1 Building drawings

205.1.2.6.1.2 Specifications

205.1.2.6.2 Field data collection (including photo documentation)

205.1.2.6.2.1 Physical measurements

205.1.2.6.2.1.1 Completing scaled sketches

205.1.2.6.2.1.2 Measuring building dimensions

205.1.2.6.2.1.3 Determining building orientations

205.1.2.6.2.1.4 Measuring window overhang lengths and heights

205.1.2.6.2.1.5 Determining roof slopes, gable heights, etc.

205.1.2.6.2.1.6 Calculating gross and net areas and volumes.

205.1.2.6.2.2 Energy feature documentation

205.1.2.6.2.2.1 Energy Analysis (Software) tool data requirements

205.1.2.6.2.2.2 Developing and using field inspection forms

205.1.2.6.2.2.3 Organizing data entry procedures

205.1.2.6.2.3 Characterizing envelope features

205.1.2.6.2.3.1 Determining wall types

205.1.2.6.2.3.2 Determining window and door types and characteristics

205.1.2.6.2.3.3 Determining envelope insulation types, thickness, thermal characteristics and weighted average thermal values

205.1.2.6.2.3.4 Determining duct system characteristics (duct types, insulation value, location with respect to the thermal and air barrier)

- 205.1.2.6.2.4** Equipment efficiencies determination
 - 205.1.2.6.2.4.1** Nameplate data
 - 205.1.2.6.2.4.2** ARI and GAMA guides
 - 205.1.2.6.2.4.3** Age-based defaults
 - 205.1.2.6.2.4.4** In situ measurements
 - 205.1.2.6.2.5** Performance testing
 - 205.1.2.6.2.5.1** Envelope leakage
 - 205.1.2.6.2.5.2** Air distribution system leakage
- 205.1.2.6.3** Local climate impacts
 - 205.1.2.6.3.1** Major US climate zones
 - 205.1.2.6.3.2** 97.5% and 2.5% design conditions
 - 205.1.2.6.3.3** Cooling and heating design trade-offs
- 205.1.2.6.4** Utility prices
 - 205.1.2.6.4.1** Revenue-based pricing
 - 205.1.2.6.4.2** Reliable sources
- 205.1.2.6.5** Reports
 - 205.1.2.6.5.1** Minimum reporting requirements
 - 205.1.2.6.5.2** Improvement analysis
 - 205.1.2.6.5.3** Projected and confirmed ratings
- 205.1.2.7** Operating Procedures and Office Administration
 - 205.1.2.7.1** National guidelines and standards
 - 205.1.2.7.1.1** Accreditation Procedures
 - 205.1.2.7.1.2** Technical Guidelines
 - 205.1.2.7.1.3** Training & Certification Standards

205.1.2.7.2 Understanding the Reference home and rating method

205.1.2.7.2.1 Reference Home as defined in B.2 of the National Home Energy Rating Technical Guidelines (“Twin” home concept): “The reference home is the geometric twin of the rated home, configured to a standard set of thermal performance characteristics, from which the energy budget, that is the basis for comparison, is derived.”

205.1.2.7.2.2 HERS Score computation using the Normalized Modified Loads Rating Method

205.1.2.7.3 Uses of a Rating

205.1.2.7.3.1 Builder assistance

205.1.2.7.3.1.1 Cost effective building design assistance

205.1.2.7.3.1.2 Quality assurance assistance

205.1.2.7.3.1.3 Marketing

205.1.2.7.3.2 Program qualifications

205.1.2.7.3.2.1 EPA Energy Star

205.1.2.7.3.2.2 Utility

205.1.2.7.3.2.3 Other

205.1.2.7.3.3 Financing advantages

205.1.2.7.3.3.1 Energy Efficient Mortgages (EEM)

205.1.2.7.3.3.2 Energy Improvement Mortgages (EIM)

205.1.2.7.3.4 Energy Code compliance

205.1.2.7.3.5 Added appraisal value

205.1.2.7.3.6 Consumer education

205.1.2.7.4 Understanding real estate, financing and economic terminology

205.1.2.7.5 Dealing with clients

205.1.2.7.5.1 Understanding the business aspects of being a energy rater

205.1.2.7.5.2 Cultivating builder, banker and real estate partners.

205.1.2.7.5.3 Knowing who the customer is.

205.1.2.7.5.4 Providing excellent service.

205.1.2.7.6 Ethics and disclosure

205.2 Rating Field Inspector Knowledge and Skills Set

205.2.1 The following comprise a list of knowledge base and skills necessary to be certified as a Rating Field Inspector:

205.2.1.1 Completion of Rating Field Inspector training by a RESNET accredited Rater Training Provider.

205.2.1.2 A rating Field Inspector candidate has the option of challenging the classroom training by passing the RESNET National Rating Field Inspector Test. A candidate who passes the challenge test must still comply with the training field testing requirement.

205.2.1.3 A Rating Field Inspector shall pass the National Field Inspector Test administered by RESNET. A candidate who passes the test must still comply with the training field testing requirement.

205.2.1.4 Upon successful completion of the training, the Rating Field Inspection candidate shall complete three additional probation tests under the direct supervision of a certified rater.

205.3 Senior Certified Knowledge and Skills Set

205.3.1 The following comprise a list of knowledge base and skills necessary to be certified as a Senior Certified Rater:

205.3.1.1 Experience as a certified energy rater for a period of at least one year.

205.3.1.2 Documentation having accurately completed ratings and performance tests of a minimum of 25 homes.

205.3.1.3 Certification in a minimum of two Rater Specialty Certifications.

205.3.1.4 Demonstrate the ability to complete a rating and all required performance testing, without the use of any reference material, in the presence of a rater trainer or quality assurance designee.

205.3.1.5 Passing the National Senior Rater Test administered by RESNET.

205.3.2 A National Senior Rater must also publicly demonstrate before a jury of 5, approved by the Technical Committee and composed of at least 3 of his/her peers and at least one Certified Trainer and at least one Quality Assurance Designee, that he or she is competent in

all areas by passing an oral exam, designed to determine if the National Senior Rater candidate can successfully diagnose and discuss in detail the building science phenomena that underlie a complex home energy rating case study, approved by the Training and Certification Committee.

205.4 Rater Specialty Certification

205.4.1 RESNET will formally recognize raters' optional specialty certification(s) by independent programs in closely related fields of building performance, above and beyond RESNET's rater certification. In order to be recognized by RESNET the program must submit an application developed by the RESNET Training and Education Committee. The RESNET Training and Education Committee will select programs based upon the following criteria:

205.4.1.1 The organization offering the certification shall have a credible reputation.

205.4.1.2 The training and certification is conducted by competent and qualified instructors in the prescribed field of instruction.

205.4.1.3 The organization offering the certification shall have a credible training and testing process as part of their certification.

205.4.1.4 The organization shall have clear, effective, and documented independent quality assurance procedures.

205.4.1.5 The organization shall have a clear, effective and documented discipline process.

206 MINIMUM COMPETENCIES

206.1 Minimum Rater Training Provider Competencies

206.1.1 A Rater Training Provider shall maintain certified trainers demonstrating the following skills:

206.1.1.1 Mastery of the Home Energy Rating System knowledge base and skills set given by Section 205.1 of this chapter. The certified trainers shall demonstrate these skills by passing the RESNET National Rater Training Competency Test.

206.1.1.2 Ability to communicate effectively the methods, procedures, knowledge and skills given in Section 5 of this Standard to produce accurate and fair Home Energy Ratings from building drawings and specifications and from field inspections and performance testing in accordance with the National Home Energy Rating Technical Guidelines.

206.1.1.3 Understanding of the purposes and benefits of home energy ratings and ability to communicate these to students.

206.1.1.4 Understanding the basics of energy efficient mortgages, energy improvements mortgages and related products and ability to communicate these to students.

206.1.2 Minimum Rater Competencies. A Certified Rater shall pass examinations comprising, at a minimum, the national core test administered by RESNET and complete a minimum of two ratings in the presence of a trainer. This examination may either follow training or it may be taken as a challenge examination. Specifically, a Certified Rater shall demonstrate the following skills:

206.1.2.1 Ability to accurately gather from building drawings and specification or from field inspections and product specification and nameplate information and/or determine through field performance testing all input data required by home energy rating system software to produce accurate and fair home energy ratings in accordance with the National Home Energy Rating Technical Guidelines.

206.1.2.2 Understanding of the purposes and benefits of home energy ratings and ability to communicate these to potential customers.

206.1.2.3 Understanding the basics of energy efficient mortgages, energy improvement mortgages and related products and ability to communicate these to potential customers.

207 CERTIFIED TRAINING

207.1 Minimum Certified Training Requirements

207.1.1 The curriculum shall be designed to ensure that the Rater trainee is proficient as a Home Energy Rater as defined by Section 206.1.2, Minimum Rater Competencies, as given above.

207.1.2 Successful completion of rater training requires that the Rater trainee pass a written examination comprising, at a minimum, the RESNET National Core Competency Test administered by RESNET and complete a minimum of two ratings in the presence of a trainer.

207.1.3 Rater certification by an Accredited Rating Provider shall be achieved within 1 year of successful completion of Rater training or training certification shall be null and void.

208 EXAMINATIONS

208.1 Certified Rater Trainer

208.1.1 Written examination. Examinations may be given at completion of classroom training or may be given in the form of a “challenge” exam to individuals who have not undergone classroom training.

208.1.1.1 National core competency test. RESNET shall directly administer the National Rater Training Competency Test to prospective rater trainers seeking certification. The rater training provider seeking accreditation shall submit the names of certified rater trainers it

intends to use; and RESNET will verify whether they have passed the RESNET National Rater Training Competency Test.

208.1.1.1.1 RESNET National Rater Training Competency Test.

208.1.1.1.2 Overseen by a proctor. A proctor is an individual designated by RESNET to oversee the written National Rater Training Competency examination.

208.1.1.1.3 Time limited

208.1.2 Rater Candidates.

208.1.2.1 Written examination. Examinations may be given at completion of classroom training or may be given in the form of a “challenge” exam to individuals who have not undergone classroom training.

208.1.2.1.1 RESNET National Rater Training Competency Test

208.1.2.1.2 Open book (& student notes)

208.1.2.1.3 Overseen by a proctor. A proctor is an individual designated by the Accredited Training Provider to oversee the written examination.

208.1.2.1.4 Time limited

209 CONTINUING EDUCATION

209.1 Continuing Education Requirements for Certified Raters

209.1.1 Continuing education units must be recognized by RESNET. Certified Rater trainer continuing education shall consist of a minimum of twelve hours annually.

209.1.2 Continuing education units shall be approved by the Accredited Rating System Provider and shall consist of the number of hours required by the Mortgage Industry National Home Energy Rating System Accreditation Procedures.

210 RATER TRAINING PROVIDERS

210.1 Accreditation of Rater Training Providers

210.1.1 Training Providers shall be accredited by the National Rater Training Provider Accreditation Committee (TPAC) through the auspices of the National Rater Training Provider Accreditation Body.

210.1.1.1 Application Procedure.

210.1.1.1.1 Applicants shall demonstrate that their training meets the criteria established through this Standard. Documentation shall include:

210.1.1.1.1.1 Training curriculum

210.1.1.1.1.2 Training materials and manuals

210.1.1.1.1.3 Examination materials

210.1.1.1.1.4 Facilities description

210.1.1.1.1.5 Organization description

210.1.1.1.1.6 Principals and staff qualifications (detailed resumes)

210.1.1.1.2 Applications shall be submitted to the National Rater Training Provider Accreditation Body and reviewed and approved by the National Rater Training Provider Accreditation Committee

210.1.1.1.3 Application Review Procedure. A National Training Provider Accreditation Committee (TPAC) comprised of individuals consisting of members of Rater Training Providers, Rating System Providers, and Certified Raters shall provide review and approval or rejection of the application documents.

210.1.1.1.4 Confidentiality of Information. Any Rater Training Provider submitting the required application information and desiring to have certain information treated as confidential in order to limit disclosure shall, at the time of submission, attach a statement specifying the proprietary information and requesting confidentiality.

210.1.1.2 Review and Notification. Within 120 days of a complete application, the accrediting body will review the submission for compliance to the accreditation standards set forth within and accredit the Rater Training Provider or forward a request for additional information or clarification.

210.1.1.3 If the TPAC determines that the application meets the Standard, it shall provide a copy of all documentation and written approval of the application to the National Rater Training Accreditation Body, who shall issue a unique Rater Training Provider accreditation identification number. The initial accreditation is valid for a period of three years from the date of issuance. The accreditation will be incorporated into a national registry of accredited home energy Rater Training Providers and listed on the RESNET web site on the Internet. In order to maintain accreditation in good standing, renewal of accreditation is required triennially.

210.1.1.4 If the TPAC determines that the applicant does not meet the accreditation Standard, it shall inform the applicant, identify where the applicant failed to meet the accreditation Standard, and inform the applicant of its right of remedy under Section 13 of this Standard. A rejected applicant has the right to call for an on-site review and evaluation of their training program by a designee of the TPAC.

210.1.1.4.1 A fee for the on-site review shall be established by the TPAC and paid by the organization seeking accreditation.

210.1.1.4.2 Evaluation criteria for the on-site review shall be established by the TPAC.

210.1.1.4.3 Full Accreditation shall be granted only upon the successful completion of on-site evaluation.

210.1.1.5 Responsibility of Accredited Training Provider. The Accredited Training Provider is responsible for ensuring that all of their training sessions comply with all of the criteria for which the Training Provider was accredited.

210.1.1.6 Accreditation Fee. An annual accreditation fee shall be established by TPAC.

210.1.1.7 Application Fee. An Accreditation application fee equal to the annual accreditation fee shall be paid by training organizations seeking accreditation. This application fee shall also constitute the accreditation fee for the first year of accreditation.

211 ACCREDITATION RENEWAL

211.1 Rater Training Providers Application for Renewal

211.1.1 Rater Training Providers Application for Renewal. Rater Training Providers shall submit an “Application for Renewal” no later than 120 days prior to the expiration of the current accreditation period. Renewal shall be required every three years after the issuance of the unique accreditation registration number by the national accreditation body. Renewal applications will be processed in the same manner as the initial application.

211.1.2 Late Application. Applications received later than specified above will be processed, to the maximum extent feasible, so that the accreditation does not expire. Should the expiration date pass, the applicant may be granted an extension not to exceed 30 days.

211.1.3 Successful Renewals. Successful renewals will be noted on the national registry.

211.1.4 Renewal Applications Extending Beyond the Grace Period. Renewals extending beyond the grace period will be noted as “pending” on the national registry and the applicant will be advised to cease representing themselves as accredited until the application receives approval.

211.1.5 Accreditation Not Renewed. Rater Training Providers that elect not to renew or fail to meet renewal requirements will be removed from the national registry and so advised.

211.1.6 Appeals. Rater Training Providers whose accreditation has been revoked, and are exercising their right of appeal will be notified as pending and the Training Provider will be advised to cease representing themselves as accredited until the appeal is resolved.

211.1.7 Program Element Changes. It is the accredited rater Training Provider’s responsibility to provide the national accrediting body with any proposed changes in the

organization's minimum training procedures, examinations and principals or other information that effects the minimum accreditation criteria. Proposed changes will be evaluated by the accrediting review body in the same manner as the original or renewal application.

212 SUSPENSION OR REVOCATION OF ACCREDITATION

212.1 Suspension or Revocation of Accreditation of Rater Training Providers

212.1.1 For Failure to Correct Deficiencies. If the national accrediting body determines at any time that a Rater Training Provider has failed to adhere to the accreditation requirements, the accreditation body shall notify the Training Provider of the specified deficiencies and shall require that specific corrective action, set forth in the notification, be taken not later than 30 calendar days after the date set forth in such notification.

212.1.1.1 In the event that the deficiencies have not been remedied, the national accrediting body shall have the authority to immediately begin the process of suspension by issuance of a Notice of Suspension Proceedings. Such Suspension Proceedings shall follow the due process procedures contained in Section 212.1.3 below. The notice may be appealed in accordance with procedures set forth in Section 213.

212.1.1.2 In the event that the specified deficiencies are not corrected within the application period set forth in the Notice of Suspension, a Notice of Revocation Proceeding shall be issued by the accreditation body. Such Revocation Proceeding shall follow the due process procedures contained in Section 212.1.2 below. The Notice of Revocation may be appealed in accordance with the procedures set forth in Section 212.1.3.

212.1.2 For Cause. Any Rater Training Provider accredited by the accrediting body may have their accreditation revoked in any of the following circumstances:

212.1.2.1 Upon determination by the accrediting body that a Rater Training Provider has acted in such a manner as to impair the objectivity or integrity of the accrediting program or harm the reputation of the accrediting body including, but not limited to submission of false information to the accreditation review body, or failure to submit to the accreditation review body any material information required to be submitted by the Training Provider, in connection with obtaining or maintaining accreditation; knowingly or negligently issuing training certifications that fail to meet all of the accreditation criteria; or misrepresentation by the Training Provider in advertising or promotional materials of its accreditation status in general or with respect to any service provided by the Training Provider.

212.1.2.2 Pursuant to any of the express provisions of Section 210.1 or any of the express provisions of the accreditation application including but not limited to the following:

212.1.2.2.1 Rater Training Provider goes out of business;

212.1.2.2.2 Rater Training Provider does not re-apply at the end of existing accreditation period;

212.1.2.2.3 Failure to satisfy accreditation requirements on renewal;

212.1.2.2.4 Investigated and validated consumer complaints;

212.1.2.2.5 Willful misconduct;

212.1.2.2.6 Failure to disclose a conflict of interest.

212.1.2.3 Upon expiration of a Training Provider's right to appeal, a suspension of accreditation pursuant to Section 212.1.2.

212.1.3 Suspension/Revocation Due Process. The national accreditation body shall comply with the following due process procedures in considering any suspension or revocation actions against an accredited rater Training Provider.

212.1.3.1 Notice. The accrediting body may, at its discretion, initiate a proposed suspension or revocation action against an accredited Training Provider by providing the Training Provider and the accrediting review body written notice of the proposed action sent by certified mail, return receipt requested, to the last known address of the Training Provider. Such notice shall inform the Training Provider of the entire basis and justification for the proposed action.

212.1.3.2 Contest of Proposed Suspension/Revocation. A respondent may contest a proposed suspension/revocation by filing a response with the accrediting body within 30 days of receipt of the notice. The response shall contain all pertinent and substantive information and argument that is in contradiction to the proposed suspension/revocation, including identification of all disputed materials and facts. If the respondent fails to file said response within the allotted time, the accrediting body may, at its discretion, suspend/revoke the accreditation of the respondent effective immediately upon written notification to the respondent.

212.1.3.3 Hearing. If the respondent files a timely response contesting the proposed suspension/revocation and requests a hearing, the national accrediting body will appoint an independent, unbiased, and qualified hearing officer and issue a decision on the proposed suspension/revocation. The hearing officer will review the notice of suspension/revocation and the respondent's contest. If the hearing officer finds that the respondent's contest has raised substantiated and valid factual argument to the contrary of the proposed suspension/revocation, the respondent shall be afforded an opportunity to participate in an open and public hearing, and to submit additional documentary evidence, and rebuttal argument to any material contained in the original notice of suspension/revocation or developed during the course of the hearing officer's investigation. The notice shall be provided to the respondent by written notice by certified mail, return receipt requested, to the last known address of the rating system at a minimum of 120 days before the scheduled hearing.

212.1.3.4 Hearing Officer's Decision. The hearing officer shall issue a written decision on the proposed suspension/revocation that is based on all the information contained in the hearing record including statements of the factual and legal basis of the decision. If the

hearing officer decides to impose suspension or revocation, the decision must include findings regarding all disputed materials, and justification for all findings. A suspension/revocation decision by the hearing officer shall take effect upon the issuance of the hearing officer's decision and the written notification of such decision to the respondent.

212.1.3.5 No Ex Parte Communication. No ex parte communication between the parties and the hearing officer shall be allowed.

212.1.3.6 Notification of state's determination. Where a state has statutory authority to regulate Rater training and the state has followed its due process in suspending or revoking a Rater Training Provider's rights, the state is encouraged to notify RESNET of the action and the reasons for such action.

213 APPEALS PROCEDURES

213.1 Appeals Procedures for Non-Approved, Suspended, or Revoked Applications

213.1.1 Notification. The national accrediting body shall notify the rater Training Provider and the RESNET Training and Education Committee of any and all disciplinary actions. Additionally, the Committee shall clearly notify the Training Provider of all procedures and rights to remedy.

213.1.2 Appeal.

213.1.2.1 In the event that an accreditation application was not approved or the accreditation has been suspended, the rater Training Provider shall have the right, for a period of 30 calendar days after the date of notice, to appeal to the national accrediting body.

213.1.2.2 In the event that a Training Provider's accreditation is suspended following the expiration of the period to appeal a suspension, in the absence of an appeal having been taken, the Training Provider shall have the right, at its election, for a period of 30 calendar days after the date of issue of a Notice of Suspension, to appeal to the national accrediting body.

213.1.2.3 An appeal shall be in writing and sent by certified mail or other method which provides evidence of delivery to the RESNET Executive Director and shall specify the basis for the appeal.

213.1.2.4 The appellant Training Provider may, at the time of noticing its appeal, request in writing, a hearing. In such an event, the national accrediting body shall, not later than 7 calendar days after the filing of the notice of appeal, appoint a hearing officer and notify the appellant Training Provider of the date of the hearing, which shall be held as expeditiously as possible, but not later than 30 calendar days after the receipt of the notice of appeal.

214 RECIPROCITY

214.1 Reciprocity among Jurisdictions

214.1.1 Nationally accredited Home Energy Rating Systems shall accept certified training provided by an accredited Training Provider as meeting the core competencies for a Home Energy Rater. Accredited Home Energy Rating System Providers may add additional training requirements needed to address their specific program, climate, software or administrative requirements.

Chapter Three

RESNET Standards

300 NATIONAL ENERGY RATING TECHNICAL STANDARDS

301 GENERAL PROVISIONS

301.1 Purpose

The provisions of this document are intended to establish national residential energy rating Standards, consistent with the provisions of the Energy Policy Act of 1992, which any provider of home energy ratings may follow to produce uniform energy ratings for residential buildings.

301.1.1 Relationship to Other Standards. This Chapter is a companion Chapter to the “National Accreditation Procedures for Home Energy Rating Systems”(Chapter 1 of this Standard) and “National Rater Training and Certifying Standard (Chapter 2 of this Standard), as promulgated and maintained by the Residential Energy Services Network (RESNET) and recognized by the mortgage industry.

301.1.2 Relationship to State Law. These Standards specifically recognize the authority of each state that has a state law or regulation requiring certification, or licensing of home energy rating systems. To the extent that such state laws or regulations differ from these Standards, state law or regulation shall govern.

301.2 Scope

301.2.1 Application of Standards

These Standards apply to existing or proposed, site-constructed or manufactured, single- and multi-family residential buildings three stories or less in height excepting hotels and motels.

302 DEFINITIONS AND ACRONYMS

Accreditation Procedures – The set of standards and procedures entitled “Mortgage Industry National Accreditation Procedures for Home Energy Rating Systems” as published and maintained by RESNET.

Annual Fuel Utilization Efficiency or AFUE – A standardized measure of heating system efficiency, based on the ratio of annual output energy to annual input energy that includes any non-heating season pilot input loss.

Auxiliary Electric Consumption – The annual auxiliary electrical energy consumption for a fossil fuel fired furnace or boiler in kilowatt-hours per year, derived from the Eae as follows:

Auxiliary Electric Consumption (kWh/yr) = Eae * (HLH) / 2080)

where: HLH = annual heating load hours seen by the furnace/boiler Note: If fan power is needed (kW), it is determined by Eae / 2080.

Bedroom – A room or space 70 square feet or greater, with egress window and closet, used or intended to be used for sleeping. A "den," "library," "home office" with a closet, egress window, and 70 square feet or greater or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.

Biomass Fuel – Non-liquid and non-gaseous combustible substance burned to create energy, such as chunk wood, wood chips, corn husks, etc.

Biomass System – A biomass fuel combustion device and all associated mechanisms, controls, venting, and heat delivery components designed to provide space heating.

Climate zone – A geographical area defined as having similar long-term climate conditions.

COP – Coefficient of Performance, which is the ratio of the rate of heat delivered to the rate of energy input, in consistent units, for a complete heat pump system under designated operating conditions.

Conditioned Floor Area (CFA) – The finished floor area in square feet of a home that is conditioned by heating or cooling systems, measured in accordance with ANSI Standard Z765-2003 with exceptions as specified in Appendix A of this Standard.

Conditioned space boundary – The continuous planes of the building envelope that comprise the primary thermal and air flow barrier between the directly or indirectly conditioned space and either the outdoors or an adjacent unconditioned space.

Confirmed Rating – An energy rating accomplished using data gathered from an on-site audit inspection and, if required, performance testing of the physical building and its installed systems and equipment.

Detached One- and Two-Family Dwelling – A building with one or two independent dwelling units with an individual or central HVAC system.

Directly Conditioned Space – An enclosed space having heating equipment with a capacity exceeding 10 Btu/hr-ft², or cooling equipment with a capacity exceeding to 10 Btu/hr-ft². An exception is if the heating and cooling equipment is designed and thermostatically controlled to maintain a process environment temperature less than 65 degrees Fahrenheit or greater than 85 degrees Fahrenheit for the whole space the equipment serves.

Distribution System Efficiency – A system efficiency factor, not included in manufacturer's performance ratings for heating and cooling equipment, that adjusts for the energy losses associated with the delivery of energy from the equipment to the source of the load, such

energy losses associated with heat transfer across duct or piping walls and air leakage to or from forced air distribution systems.

EAE – The average annual auxiliary electrical energy consumption for a gas furnace or boiler in kilowatt-hours per year as published in the GAMA Consumer's Directory of Certified Efficiency Ratings.

Energy Analysis Tool – A computerized calculation procedure for determining a home's energy efficiency rating and estimating annual purchased energy consumption and cost.

Energy Efficiency Ratio or EER – the ratio of net equipment cooling capacity in Btu/h to total rate of electric input in watts under designated operating conditions.

Energy Efficiency Rating or Energy Rating – An unbiased indication of a home's relative energy performance based on consistent inspection procedures, operating assumptions, climate data and calculation methods.

Energy Factor or EF – A standardized measure of water heater energy efficiency as determined under Department of Energy Regulations, 10 CFR 430.23(e)(2)(ii).

Energy Saving Measure or Feature – Any material, component, device, system, construction method, process or combination thereof that will result in a reduction of energy use.

EPAct – The U.S. Energy Policy Act of 1992

Equivalent Electric Power – The amount of electricity that would be produced from site fossil fuel uses when converted to electrical power using the Reference Electricity Production Efficiency.

Estimated Annual Energy Cost Savings – Positive dollar difference between estimated annual energy costs for an improved existing home as compared with the same home in its original condition or for a new home, as compared with the HERS Reference Home, local code or, for the purposes of Fannie Mae mortgages, the RESNET representation of the 1993 Model Energy Code, whichever is applicable.

Exposed Wall – Walls subjected to heat loss or gain.

Fenestration – A glazed opening and its associated sash and framing that is installed into a building.

Standards (HERS Standards) – Minimum criteria that a HERS Provider must meet in order to receive accreditation

HERS – Home Energy Rating System

HERS-BESTEST – The Home Energy Ratings System Building Energy Simulation Test published as NREL Report No. NREL/TP-472-7332

HERS Index – A numerical integer value that represents the relative energy use of a Rated Home as compared with the energy use of the HERS Reference Home and where an Index value of 100 represents the energy use of the HERS Reference Home and an Index value of 0 (zero) represents a home that uses zero net purchased energy.

HERS Provider – A person or organization that develops, manages, and operates a home energy rating system.

Home – A building with one or more dwelling units that has three or fewer stories above grade, or a single dwelling unit within a building of three or fewer stories above grade.

Home Energy Rater or Rater – The person trained and certified by a Rating Provider to perform the functions of inspecting and analyzing a home to evaluate the minimum rated features and prepare an energy efficiency rating.

Home Energy Rating System or HERS – The materials and procedures needed to operate a home energy rating program including but not limited to: marketing materials, training materials, publications, rating tool, quality control, data collection and maintenance, agreements, data collection sheets, home owner reports, and other related materials and services.

Heating Seasonal Performance Factor or HSPF-- A standardized measure of heat pump efficiency, based on the total heating output of a heat pump, in Btu, divided by the total electric energy input, in watt-hours, under test conditions specified by the Air Conditioning and Refrigeration Institute Standard 210/240.

HVAC – Heating, Ventilating and Air Conditioning.

Indirectly Conditioned Space – Enclosed space that is not directly conditioned:
(a) With area weighted heat transfer coefficient (U-value) to directly conditioned space exceeding that to the outdoors or to unconditioned spaces; or
(b) Through which air to or from directly conditioned spaces is transferred at a rate exceeding three air changes per hour.

Internal Gains – The heat gains within a home attributable to lights, people, and miscellaneous equipment.

International Energy Conservation Code (IECC) – The model code for building energy conservation as promulgated by the International Code Council.

Labeled Ceiling Fan – A ceiling fan that has been labeled for efficiency in accordance with EPA guidelines such that the label shows the cfm, cfm/watt and watts of the fan at low, medium and high speeds

Labeled Ceiling Fan Standardized Watts (LCFSW) – The power consumption in watts of a Labeled Ceiling Fan “standardized” to a medium speed air delivery of 3000 cfm.

Light Fixture – A complete lighting unit consisting of a lamp or lamps, and ballasting (when applicable) together with the parts designed to distribute the light, position and protect the lamps, and connect the lamps to the power supply. For built-in valence lighting, strings of low-voltage halogens, and track lights, each individual bulb shall count as a fixture.

Model Energy Code: 1993 (MEC '93) – The building energy code as promulgated by the Council of American Building Officials (CABO) in 1992 as amended in 1993. The RESNET representation of MEC '93 is the HERS Reference home as defined in the “Mortgage Industry National Home Energy Rating Standards” dated 1999.

Mechanical Ventilation System – A fan designed to exchange the air in the house with outside air, sized to provide whole-house service per ASHRAE 62.2, and controlled automatically (i.e. not requiring human intervention to turn on and off). The presence of a remote-mounted on-off switch or dedicated circuit breaker labeled "whole house ventilation" (or equivalent) shall not disqualify a system from meeting the requirement of automatic control.

NREL – National Renewable Energy Laboratory.

On-site Power Production (OPP) – Electric power produced at the site of a Rated Home. OPP shall be the net electrical power production, such that it equals the gross electrical power production minus any purchased fossil fuel energy, converted to its Equivalent Electric Power, used to produce the on-site power.

Projected Rating – A rating performed prior to the construction of a new building or prior to implementation of energy-efficiency improvements to an existing building.

Purchased Energy – The portion of the total energy requirement of a home purchased from a utility or other energy supplier.

Purchased Energy Fraction (PEfrac) – The fraction of the total energy consumption of the Rated Home that is purchased energy, wherein all site fossil energy uses are converted to their Equivalent Electric Power using the Reference Electricity Production Efficiency of 40%.

Qualifying Light Fixture – A light fixture comprised of any of the following components: a) fluorescent hard-wired (i.e. pin-based) lamps with ballast; b) screw-in compact fluorescent bulb(s); or c) light fixture controlled by a photocell and motion sensor.

Qualifying Light Fixture Locations – For the purposes of rating, those qualifying light fixtures located in kitchens, dining rooms, living rooms, family rooms/dens, bathrooms, hallways, stairways, entrances, bedrooms, garage, utility rooms, home offices, and all outdoor fixtures mounted on a building or pole. This excludes plug-in lamps, closets, unfinished basements, and landscape lighting.

Rated Home – The specific home being evaluated using the rating procedures and Standards contained in this document.

Rating Index – See HERS Index.

Rating Tool – A computerized procedure for calculating a home’s energy efficiency rating, annual energy consumption, and annual energy costs.

Reference Electricity Production Efficiency – Electric power production efficiency, including all production and distribution losses, of 40%, approximating the efficiency of a modern, high-efficiency, central power plant. The Reference Electricity Production Efficiency is to be used only to convert site fossil fuel energy uses to an Equivalent Electric Power for the sole purposes of providing home energy rating system credit for On-site Power Production.

Reference Home – A hypothetical home configured in accordance with the specifications set forth in Section 303.4 of these Standards.

RESNET – Residential Energy Services Network

R-Value – thermal resistance value measured in $\text{h}\cdot\text{ft}^2\cdot\text{F}/\text{Btu}$.

Seasonal Energy Efficiency Ratio or SEER-- A standardized measure of air conditioner efficiency based on the total cooling output of an air conditioner in Btu/h, divided by the total electric energy input, in watt-hours, under test conditions specified by the Air Conditioning and Refrigeration Institute Standard 210/240.

Standard Ceiling Fan – The ceiling fan against which Labeled Ceiling Fans are measured for efficiency. At medium fan speed, the Standard Ceiling Fan produces 3000 cfm of air flow and consumes uses 42.6 watts of power.

Thermal Boundary Wall - Any wall that separates directly or indirectly conditioned space from unconditioned space or ambient conditions.

Above-Grade Thermal Boundary Wall is any thermal boundary wall, or portion of such wall, not in contact with soil.

Thermal Storage Mass – Materials or equipment incorporated into a home that will store heat, produced by renewable or non-renewable energy, for release at a later time.

Typical Meteorological Year or TMY Data – Hourly climate data published by the National Climatic Center, Asheville, NC, based on historical climate data in 216 locations.

U-Value – Thermal transmittance value measured in $\text{Btu}/\text{h}\cdot\text{ft}^2\cdot\text{F}$.

303 TECHNICAL REQUIREMENTS

303.1 Rating Procedures

303.1.1 To determine the energy rating of a home, all HERS providers shall–

303.1.1.1 If rating an existing home, visit the home to collect the data needed to calculate the rating;

303.1.1.2 If rating a new, to-be-built home, follow the procedures set forth in Section 303.6 and 303.7 of these Standards to collect the data needed to calculate the rating;

303.1.1.3 Use the collected data to estimate the annual purchased energy consumption for heating, cooling and water heating, lighting and appliances for both the Rated Home and the Reference Home as defined in Section 303.4 of these Standards.

303.1.1.4 If the energy efficiency rating is conducted to evaluate proposed energy conserving improvements to the home, calculate additional estimates of annual purchased energy consumption with the home reconfigured to include those improvements sufficient to consider interactions among improvement options.

303.1.1.5 If the Rated Home includes On-site Power Production (OPP), then OPP shall be calculated as the gross electric power produced minus the Equivalent Electric Power of any purchased fuels used to produce the electric power. The HERS Reference Home shall not include On-site Power Production.

For example, assume 1000 kWh (3413 kBtu or 3.413 MBtu) of gross electrical power is produced using 60 therms (6 MBtu) of natural gas to operate a high-efficiency fuel cell system. Using these assumptions, $OPP = 3.413 \text{ MBtu} - (6 \text{ MBtu} * 0.4) = 1.0 \text{ MBtu}$.

303.1.2 Estimates completed by all HERS providers under Sections 303.1.1.3, 303.1.1.4 and 303.1.1.5 of this Standard must be—

303.1.2.1 Based on the minimum rated features set forth in Section 303.7 of these Standards.

303.1.2.2 Conducted using the standard operating assumptions established in Section 303.5 of these Standards.

303.1.2.3 Conducted using rating tool that has been certified for accuracy under Chapter 1, Section 102.2 of these Standards (“National Accreditation Procedures for Home Energy Rating Systems”).

303.1.3 All HERS providers shall compare the estimates provided under Section 303.1.1 of this Standard to determine the energy rating of the home and, if applicable, the energy rating of the home with proposed conservation measures and On-site Power Production installed.

303.2 Rating Determination

303.2.1 HERS Index. The rating Index shall be a numerical integer value that is based on a linear scale constructed such that the HERS Reference Home has an Index value of 100 and a home that uses no net purchased energy has an Index value of 0 (zero). Each integer value on the scale shall represent a 1% change in the total energy use of the Rated home relative to the total energy use of the Reference home. Except in states or territories whose laws or

regulations require a specific alternative method, which shall control, equations 1 and 2 shall be used in a 2 step process to calculate the HERS Index for the Rated Home, as follows:

Step (1) Calculate the individual normalized Modified End Use Loads (nMEUL) for heating, cooling, and hot water using equation 1:

$$\text{nMEUL} = \text{REUL} * (\text{nEC}_x / \text{EC}_r) \quad (\text{Eq. 1})$$

where:

nMEUL = normalized Modified End Use Loads (for heating, cooling, or hot water) as computed using accredited simulation tools.

REUL = Reference Home End Use Loads (for heating, cooling or hot water) as computed using accredited simulation tools.

nEC_x = normalized Energy Consumption for Rated Home's end uses (for heating, including auxiliary electric consumption, cooling or hot water) as computed using accredited simulation tools.

EC_r = estimated Energy Consumption for Reference Home's end uses (for heating, including auxiliary electric consumption, cooling or hot water) as computed using accredited simulation tools.

and where:

$$\text{nEC}_x = (a * \text{EEC}_x - b) * (\text{EC}_x * \text{EC}_r * \text{DSE}_r) / (\text{EEC}_x * \text{REUL})$$

where:

EC_x = estimated Energy Consumption for the Rated Home's end uses (for heating, cooling or hot water) as computed using accredited simulation tools.

EEC_x = Equipment Efficiency Coefficient for the Rated Home's equipment, such that EEC_x equals the energy consumption per unit load in like units as the load, and as derived from the Manufacturer's Equipment Performance Rating (MEPR) such that EEC_x equals 1.0 / MEPR for AFUE, COP or EF ratings, or such that EEC_x equals 3.413 / MEPR for HSPF, EER or SEER ratings.

$$\text{DSE}_r = \text{REUL} / \text{EC}_r * \text{EEC}_r$$

For simplified system performance methods, DSE_r equals 0.80 for heating and cooling systems and 1.00 for hot water systems. [see Table 303.4.1(1)]. However, for detailed modeling of heating and cooling systems, DSE_r may be less than 0.80 as a result of part load performance degradation, coil air flow degradation, improper system charge and auxiliary resistance heating for heat pumps. Except as otherwise provided by these Standards, where detailed systems modeling is employed, it must be applied equally to both the Reference and the Rated Homes.

EEC_r = Equipment Efficiency Coefficient for the Reference Home's equipment, such that EEC_r equals the energy consumption per unit load in like units as the load, and as derived from the Manufacturer's Equipment Performance Rating (MEPR) such that EEC_r equals 1.0 / MEPR for AFUE, COP or EF ratings, or such that EEC_r equals 3.413 / MEPR for HSPF, EER or SEER ratings and where the coefficients 'a' and 'b' are as defined by Table 303.2.2 below:

Table 303.2.2. Coefficients 'a' and 'b'

Fuel type and End Use	a	b
Electric space heating	2.2561	0
Fossil fuel* space heating	1.0943	0.4030
Biomass space heating	0.8850	0.4047
Electric air conditioning	3.8090	0
Electric water heating	0.9200	0
Fossil fuel* water heating	1.1877	1.0130

*Such as natural gas, LP, fuel oil

Step (2) Determine the HERS Index using equation 2:

$$\text{HERS Index} = \text{PEfrac} * (\text{TnML} / \text{TRL}) * 100 \text{ (Eq. 2)}$$

where:

TnML = nMEULHEAT + nMEULCOOL + nMEULHW + EULLA (Total of all normalized modified end use loads for heating, cooling and hot water as calculated using equation 1 plus EULLA = [(18,842 + 25.1*CFA) * 365] / (1*10⁶) MBtu/year, modified by allowable reductions for qualifying lighting and appliances as specified by Section 303.4.1.7 of this Standard).

TRL = REULHEAT + REULCOOL + REULHW + REULLA (Total of all Reference Home end use loads for heating, cooling and hot water plus REULLA = [(18,842 + 25.1*CFA) * 365] / (1*10⁶) MBtu/year).

and where:

$$\text{PEfrac} = (\text{TEU} - \text{OPP}) / \text{TEU}$$

TEU = Total energy use of the Rated Home including all rated and non-rated energy features where all fossil fuel site energy uses are converted to Equivalent Electric Power by multiplying them by the Reference Electricity Production Efficiency of 40%

OPP = On-site Power Production as defined by Section 303.1.1.5

303.3 Rating Report

303.3.1 The Rated Home will be given a star rating between one and five-plus stars, determined by the numerical HERS Index and the corresponding number of stars depicted in Table 303.3.1:

TABLE 303.3.1. HERS Index, Star and Efficiency Scales for Rated Homes

HERS Index Range	Stars	Relative Energy Use (with respect to Reference Home)
=<500 and >401	★	=<500% and >401%
=<400 and >301	★+	=<400% and >301%
=<300 and >251	★★	=<300% and >251%
=<250 and >201	★★+	=<250% and >201%
=<200 and >151	★★★	=<200% and >151%
=<150 and >101	★★★+	=<150% and >1%
=<100 and >91	★★★★	=<0% and >-9%
=<90 and >86	★★★★+	=<-10% and >-14%
=<85 and >71	★★★★★	=<-15% and >-29%
=<70 and >=0	★★★★★+	=<-30% and >=-100%

303.3.2 For each rating conducted under this part, a report shall be prepared containing, at a minimum, the following information:

303.3.2.1 The numerical rating Index determined in accordance with Section 303.2.1 of these Standards;

303.3.2.2 The star rating determined in accordance with Section 303.3.1 of these Standards, except that all plus (+) ratings other than 5+ are optional;

303.3.2.3 The estimated annual purchased energy consumption for space heating, space cooling, domestic hot water, and all other energy use, and the total of these four estimates;

303.3.2.4 The estimated annual energy cost for space heating, space cooling, domestic hot water, and all other energy use, and the total of these four estimates;

303.3.2.5 The unique physical location (full street address or recorded real property identifier) of the Rated home;

303.3.2.6 The name of the individual conducting the rating;

303.3.2.7 The date the rating was conducted;

303.3.2.8 The rating tool (including version number) used to calculate the rating; and

303.3.2.9 The following statement in no less than 8 point font, “The Home Energy Rating Standard Disclosure for this home is available from the rating provider.” At a minimum, this will include the Rating Provider’s mailing address and phone number.

303.3.3 If ratings are conducted to evaluate energy saving improvements to the home, in addition to the information set forth under Section 303.3.2 of this Standard, each rating report shall include—

303.3.3.1 The estimated annual energy cost savings for the home reconfigured to include those improvements;

303.3.3.2 The Energy Value of improved homes (present value of the energy cost savings) shall be calculated as follows:

303.3.3.2.1 For Fannie Mae energy efficient mortgages the present value factor shall be calculated as:

$$pvf = [1 - (1 + r)^{-n}] / r$$

where:

pvf = present value factor

r = prevailing mortgage rate (Assumed Rate)

n = weighted life of the measures (23 years)

To determine the Energy Value of the improved home, the present value factor (pvf) shall be multiplied by the annual energy savings.

303.3.3.2.2 For Fannie Mae energy efficient mortgage products, the financing interest rate (Assumed Rate) shall be provided by RESNET annually from the information provided by Fannie Mae.

303.3.3.2.3 A weighted lifetime of 23 years shall be used in determining the present value factor for the energy cost savings.

303.3.3.3 The annual energy savings for a home shall be calculated by comparing the projected annual energy use cost of the Rated Home with the projected annual energy use cost of either the RESNET representation of the 1993 Model Energy Code's Standard Design Home for new homes or with the original home for existing homes. The monthly energy savings for the improved home shall be equal to the annual energy savings for the home divided by 12.

303.3.3.4 For FHA and Freddie Mac energy mortgages, the present worth of energy savings shall be calculated by taking the net annual energy savings (the annual energy savings minus the annual maintenance costs) times the present value factor developed by the U.S. Department of Housing and Urban Development. The present value factor is contained in the "HUD Mortgage Letter 93-13", as posted on RESNET's web site at http://www.natresnet.org/resources/lender/lhandbook/hud_93-13.htm.

303.3.4 If a Projected Rating conducted under Section 303.6.1 of these Standards, the Rating shall be prominently identified as a "Projected Rating."

303.3.5 For each rating conducted under these Standards, the following items are to be prominently displayed on all reports and labels:

303.3.5.1 Date of the rating;

303.3.5.2 Annual estimated energy costs for heating, cooling, water heating and all other uses;

303.3.5.3 Rating Index and;

303.3.5.4 Star rating;

303.3.5.5 At the request of the person for whom the rating is being conducted, as an alternative to reporting the rating Index and star rating, any home achieving a rating Index as defined by EPA Energy Star Homes guidelines, be labeled an ENERGY STAR® Home.

303.4 HERS Reference Home and Rated Home Configuration

303.4.1 Calculation Procedure

303.4.1.1 General. Except as specified by this Section, the HERS Reference Home and Rated Home shall be configured and analyzed using identical methods and techniques.

303.4.1.2 Residence Specifications. The HERS Reference Home and Rated Home shall be configured and analyzed as specified by Table 303.4.1(1).

Table 303.4.1(1) Specifications for the HERS Reference and Rated Homes

Building Component	HERS Reference Home	Rated Home
Above-grade walls:	Type: wood frame Gross area: same as Rated Home U-Factor: from Table 303.4.1(2) Solar absorptance = 0.75 Emittance = 0.90	Same as Rated Home Same as Rated Home Same as Rated Home Same as Rated Home Same as Rated Home
Conditioned Basement walls:	Type: same as Rated Home Gross area: same as Rated Home U-Factor: from Table 303.4.1(2) with the insulation layer on the interior side of walls	Same as Rated Home Same as Rated Home Same as Rated Home
Floors over unconditioned spaces:	Type: wood frame Gross area: same as Rated Home U-Factor: from Table 303.4.1(2)	Same as Rated Home Same as Rated Home Same as Rated Home
Ceilings:	Type: wood frame Gross area: same as Rated Home U-Factor: from Table 303.4.1(2)	Same as Rated Home Same as Rated Home Same as Rated Home
Roofs:	Type: composition shingle on wood sheathing Gross area: same as Rated Home Solar absorptance = 0.75 Emittance = 0.90	Same as Rated Home Same as Rated Home Same as Rated Home Same as Rated Home
Attics:	Type: vented with aperture = 1ft ² per 300 ft ² ceiling area	Same as Rated Home
Foundations:	Type: same as Rated Home	Same as Rated Home

Table 303.4.1(1) Specifications for the HERS Reference and Rated Homes

Building Component	HERS Reference Home	Rated Home
	Gross Area: same as Rated Home U-Factor / R-value: from Table 303.4.1(2)	Same as Rated Home Same as Rated Home
Crawlspaces:	Type: vented with net free vent aperture = 1ft ² per 150 ft ² of crawlspace floor area. U-factor: from Table 303.4.1(2) for floors over unconditioned spaces.	Same as the Rated Home, but not less net free ventilation area than the Reference Home unless an approved ground cover in accordance with IRC 408.1 is used, in which case, the same net free ventilation area as the Rated Home down to a minimum net free vent area of 1ft ² per 1,500 ft ² of crawlspace floor area. Same as Rated Home
Doors:	Area: 40 ft ² Orientation: North U-factor: same as fenestration from Table 303.4.1(2)	Same as Rated Home Same as Rated Home Same as Rated Home
Glazing: ^(a)	Total area ^(b) =18% of conditioned floor area Orientation: equally distributed to four (4) cardinal compass orientations (N,E,S,&W) U-factor: from Table 303.4.1(2) SHGC: from Table 303.4.1(2) Interior shade coefficient: Summer = 0.70 Winter = 0.85 External shading: none	Same as Rated Home Same as Rated Home Same as Rated Home Same as Rated Home Same as HERS Reference Home ^(c) Same as Rated Home
Skylights	None	Same as Rated Home
Thermally isolated sunrooms	None	Same as Rated Home
Air exchange rate	Specific Leakage Area (SLA) ^(d) = 0.00048 (assuming no energy recovery)	For residences that are not tested, the same as the HERS Reference Home For residences without mechanical ventilation systems that are tested in accordance with ASHRAE Standard 119, Section 5.1, the measured air exchange rate ^(e) but not less than 0.35 ach

Table 303.4.1(1) Specifications for the HERS Reference and Rated Homes

Building Component	HERS Reference Home	Rated Home
		For residences with mechanical ventilation systems that are tested in accordance with ASHRAE Standard 119, Section 5.1, the measured air exchange rate ^(e) combined with the mechanical ventilation rate, ^(f) which shall not be less than $0.01 \times \text{CFA} + 7.5 \times (\text{Nbr}+1)$ cfm
Mechanical ventilation:	None, except where a mechanical ventilation system is specified by the Rated Home, in which case: Annual vent fan energy use: $\text{kWh/yr} = 0.03942 \times \text{CFA} + 29.565 \times (\text{Nbr}+1)$ (per dwelling unit) where: CFA = conditioned floor area N _{br} = number of bedrooms	Same as Rated Home Same as Rated Home
Internal gains:	$\text{IGain} = 17,900 + 23.8 \times \text{CFA} + 4104 \times \text{Nbr}$ (Btu/day per dwelling unit)	Same as HERS Reference Home, except as provided by Section 303.4.1.7.
Internal mass:	An internal mass for furniture and contents of 8 pounds per square foot of floor area	Same as HERS Reference Home, plus any additional mass specifically designed as a Thermal Storage Element ^(g) but not integral to the building envelope or structure
Structural mass:	For masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air For masonry basement walls, same as Rated Home, but with insulation required by Table 303.4.1(2) located on the interior side of the walls For other walls, for ceilings, floors, and interior walls, wood frame construction	Same as Rated Home Same as Rated Home Same as Rated Home
Heating systems ^{(h),(i)}	Fuel type: same as Rated Home	Same as Rated Home ⁽ⁱ⁾

Table 303.4.1(1) Specifications for the HERS Reference and Rated Homes

Building Component	HERS Reference Home	Rated Home
	Efficiencies: Electric: air source heat pump with prevailing federal minimum efficiency Non-electric furnaces: natural gas furnace with prevailing federal minimum efficiency Non-electric boilers: natural gas boiler with prevailing federal minimum efficiency Capacity: sized in accordance with Section 303.5.1.4 of this Standard.	Same as Rated Home Same as Rated Home Same as Rated Home Same as Rated Home
Cooling systems ^{(h),(k)}	Fuel type: Electric Efficiency: in accordance with prevailing federal minimum standards Capacity: sized in accordance with Section 303.5.1.4 of this Standard.	Same as Rated Home ^(k) Same as Rated Home Same as Rated Home
Service water heating systems ^{(h) (m)}	Fuel type: same as Rated Home Efficiency: in accordance with prevailing federal minimum standards Use (gal/day): $30 * N_{du} + 10 * N_{br}$ where N_{du} = number of dwelling units Tank temperature: 120 F	Same as Rated Home ^(m) Same as Rated Home Same as HERS Reference Home Same as HERS Reference Home
Thermal distribution systems:	A thermal distribution system efficiency (DSE) of 0.80 shall be applied to both the heating and cooling system efficiencies.	As specified by Table 303.4.1(3), except when tested in accordance with ASHRAE Standard 152-2004 ⁽ⁿ⁾ , and then either calculated through hourly simulation or calculated in accordance with ASHRAE Standard 152-2004
Thermostat	Type: manual Temperature setpoints: cooling temperature set point = 78 F; heating temperature set point = 68 F	Type: Same as Rated Home Temperature setpoints: same as the HERS Reference Home, except as required by Section 303.5.1.2

Table 303.4.1(1) Notes:

(a) Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50% of the door area, the glazing area is the sunlight transmitting opening area shall be used. For all other doors, the glazing area is the rough frame opening area for the door, including the door and the frame.

(b) For homes with conditioned basements and for multi-family attached homes the following formula shall be used to determine total window area:

$$AF = 0.18 \times AFL \times FA \times F$$

where:

AF = Total fenestration area

AFL = Total floor area of directly conditioned space

FA = (Above-grade thermal boundary gross wall area) / (above-grade boundary wall area + 0.5 x below-grade boundary wall area)

F = (Above-grade thermal boundary wall area) / (above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater

and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions

Above-grade thermal boundary wall is any portion of a thermal boundary wall not in contact with soil.

Below-grade boundary wall is any portion of a thermal boundary wall in soil contact

Common wall is the total wall area of walls adjacent to another conditioned living unit, not including foundation walls.

(c) For fenestrations facing within 15 degrees of due south that are directly coupled to thermal storage mass, the winter interior shade coefficient shall be permitted to increase to 0.95 in the Rated Home.

(d) Where Leakage Area (L) is defined in accordance with Section 5.1 of ASHRAE Standard 119 and where $SLA = L / CFA$ (where L and CFA are in the same units).

Either hourly calculations using the procedures given in the 2001 ASHRAE Handbook of Fundamentals, Chapter 26, page 26.21, equation 40 (Sherman-Grimsrud model) or calculations yielding equivalent results shall be used to determine the energy loads resulting from air exchange.

(e) Tested envelope leakage shall be determined and documented by a Certified Rater using the on-site inspection protocol as specified in Appendix A under "Blower Door Test." Either hourly calculations using the procedures given in the 2001 ASHRAE Handbook of Fundamentals, Chapter 26, page 26.21, equation 40 (Sherman-Grimsrud model) or

calculations yielding equivalent results shall be used to determine the energy loads resulting from air exchange.

(f) The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with equation 43 of 2001 ASHRAE Handbook of Fundamentals page 26.24 in combination with the "Whole-house Ventilation" provisions of 2001 ASHRAE Handbook of Fundamentals, page 26.19 for intermittent mechanical ventilation.

(g) Thermal storage element shall mean a component not normally part of the floors, walls, or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase change containers. A thermal storage element must be in the same room as fenestration that faces within 15 degrees of due south, or must be connected to such a room with pipes or ducts that allow the element to be actively charged.

(h) For a Rated Home with multiple heating, cooling, or water heating systems using different fuel types, the applicable system capacities and fuel types shall be weighted in accordance with the loads distribution (as calculated by accepted engineering practice for that equipment and fuel type) of the subject multiple systems. For the HERS Reference Home, the prevailing federal minimum efficiency shall be assumed except that the efficiencies given in Table 303.4.1(1)(a) below will be assumed when:

- 1) A type of device not covered by NAECA is found in the Rated Home;
- 2) The Rated Home is heated by electricity using a device other than an air source heat pump; or
- 3) The Rated Home does not contain one or more of the required HVAC equipment systems.

Table 303.4.1(1)(a). Default HERS Reference Home Heating and Cooling Equipment Efficiencies ^{(i) (k) (m) (n)}

Rated Home Fuel	Function	Reference Home Device
Electric	Heating	7.7 HSPF air source heat pump
Non-electric warm air furnace or space heater	Heating	78% AFUE gas furnace
Non-electric boiler	Heating	80% AFUE gas boiler
Any type	Cooling	13 SEER electric air conditioner
Biomass System ⁽¹⁾	Heating	63% Efficiency

Table 303.4.1(1)(a) Notes:

(1) Biomass fuel systems should not be included in ratings when they are considered "supplemental systems", i.e. where an automatic system, sized to meet the load of the house exists. Biomass systems should only be included in the rating in those situations where the automatic heating system is not large enough to meet the load of the house, and a biomass fuel system is in place to meet the balance of the load, or where there is only a biomass fuel

system in place. In the situation where there are two systems that together meet the load, the biomass system shall be assigned only that part of the load that cannot be met by the automatic system.

(i) For a Rated Home without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the HERS Reference Home and Rated Home. For electric heating systems, the prevailing federal minimum efficiency air-source heat pump shall be selected.

(k) For a Rated Home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the HERS Reference Home and the Rated Home.

(m) For a Rated Home with a non-storage type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency and with the same fuel as the proposed water heater shall be assumed for the HERS Reference Home. For a Rated Home without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency with the same fuel as the predominant heating fuel type shall be assumed for both the Rated and HERS Reference Homes.

(n) Tested duct leakage shall be determined and documented by a Certified Rater using the on-site inspection protocol as specified in Appendix A under “Air leakage (ducts)”.

Table 303.4.1(2). Component Heat Transfer Characteristics for HERS Reference Home ^(a)

Climate Zone ^(b)	Fenestration and Opaque Door U-Factor	Glazed Fenestration Assembly SHGC	Ceiling U-Factor	Frame Wall U-Factor	Floor Over Unconditioned Space U-Factor	Basement Wall U-Factor ^(c)	Slab-on-Grade ^(d,e) R-Value & Depth
1	1.20	0.40	0.035	0.082	0.064	0.360	0
2	0.75	0.40	0.035	0.082	0.064	0.360	0
3	0.65	0.40	0.035	0.082	0.047	0.360	0
4 except Marine	0.40	0.55	0.030	0.082	0.047	0.059	10, 2 ft.
5 and Marine 4	0.35	0.55	0.030	0.060	0.033	0.059	10, 2 ft.
6	0.35	0.55	0.026	0.060	0.033	0.059	10, 4 ft.
7 and 8	0.35	0.55	0.026	0.057	0.033	0.059	10, 4 ft.

Table 303.4.1(2). Component Heat Transfer Characteristics for HERS Reference Home ^(a)

Climate Zone ^(b)	Fenestration and Opaque Door U-Factor	Glazed Fenestration Assembly SHGC	Ceiling U-Factor	Frame Wall U-Factor	Floor Over Unconditioned Space U-Factor	Basement Wall U-Factor ^(c)	Slab-on-Grade ^(d,e) R-Value & Depth
Notes:							
a. Non-fenestration U-Factors shall be obtained from measurement, calculation, or an approved source.							
b. Climate zones shall be as specified by the 2004 Supplement to the International Energy Conservation Code.							
c. For basements where the conditioned space boundary comprises the basement walls.							
d. R-5 shall be added to the required R-value for slabs with embedded heating.							
e. Insulation shall extend downward from the top of the slab vertically to the depth indicated.							

Table 303.4.1(3). Default Distribution System Efficiencies for Inspected Systems ^(a)

Distribution System Configuration and Condition:	Forced Air Systems	Hydronic Systems ^(b)
Distribution system components located in unconditioned space	0.80	0.95
Distribution systems entirely located in conditioned space ^(c)	0.88	1.00
Proposed “reduced leakage” with entire air distribution system located in the conditioned space ^(d)	0.96	
Proposed “reduced leakage” air distribution system with components located in the unconditioned space ^(d)	0.88	
“Ductless” systems ^(e)	1.00	

Table 303.4.1(3) Notes:

(a) Default values given by this table are for distribution systems as rated, which meet minimum IECC 2000 requirements for duct system insulation.

(b) Hydronic Systems shall mean those systems that distribute heating and cooling energy directly to individual spaces using liquids pumped through closed loop piping and that do not depend on ducted, forced air flows to maintain space temperatures.

(c) Entire system in conditioned space shall mean that no component of the distribution system, including the air handler unit or boiler, is located outside of the conditioned space boundary.

(d) Proposed “reduced leakage” shall mean substantially leak free to be leakage of not greater than 3 cfm to outdoors per 100 square feet of conditioned floor area and not greater than 9 cfm total air leakage per 100 square feet of conditioned floor area at a pressure differential of 25 Pascal across the entire system, including the manufacturer’s air handler enclosure. Total air leakage of not greater than 3 cfm per 100 square feet of conditioned floor area at a pressure difference of 25 Pascal across the entire system, including the manufacturer’s air handler enclosure, shall be deemed to meet this requirement without measurement of air leakage to outdoors. This rated condition shall be specified as the required performance in the construction documents and requires confirmation through field-testing of installed systems as documented by a Certified Rater.

(e) Ductless systems may have forced airflow across a coil but shall not have any ducted airflows external to the manufacturer’s air handler enclosure.

303.4.1.3 All enclosure elements shall use framing fractions that are consistent with and representative of reality. Default enclosure framing fractions are provided by Table 303.4.1.3.

Table 303.4.1.3. Default Framing Fractions for Enclosure Elements

Enclosure Element	Frame Spacing (in o.c.)	Default Frame Fraction (% area)
Walls (standard):		
@16" o.c.	16	23%
@24" o.c.	24	20%
Walls (advanced):		
@16" o.c.	16	19%
@24" o.c.	24	16%
Structural. Insulated. Panels	48	10%
Floors (standard):		
@16" o.c.	16	13%
@24" o.c.	24	10%
Floors (advanced):		
@16" o.c.	16	11%
@24" o.c.	24	8%
Ceilings (standard trusses):		
@16" o.c.	16	14%
@24" o.c.	24	11%
Ceilings (advanced trusses – "raised heel"):		
@16" o.c.	16	10%
@24" o.c.	24	7%
Ceilings (conventional framing):		
@16" o.c.	16	13%
@24" o.c.	24	9%

303.4.1.4 Insulation Inspections: All enclosure elements for the Rated Home shall have their insulation assessed in accordance with this Standard. Installed cavity insulation shall be rated as Grade I, II, or III in accordance with the on-site inspection procedures of Appendix A.

303.4.1.4.1 The HERS Reference Home enclosure elements shall be modeled assuming Grade I insulation. Default values for Rated Home insulation that is not inspected according to the procedures of Appendix A shall be in accordance with the requirements of Grade III as given in Section 303.4.1.4.2 and shall be recorded as “not inspected” in the rating information.

Exceptions:

(a) Modular and manufactured housing using IPIA (In-Plant Inspection Agent) inspections may be substituted for the HERS inspection. However, housing manufacturer shall include RESNET insulation inspection details and requirements in their “DAPIA” (Design Approval Primary Inspection Agency) packages submitted to HUD which are used by IPIA’s for their factory inspections.

(b) Structural Insulated Panels (SIP’s), Insulated Concrete Forms (ICF’s), and other similar insulated manufactured assemblies. Note that manufacturer’s claims of “equivalent” R-values based on reduced air leakage or other secondary effects may not be used; only the thermal resistance values for the actual materials as found in ASHRAE Fundamentals may be used.

(c) A RESNET-approved, third-party audited installer certification program may be substituted under the conditions specified in the RESNET approval process.

303.4.1.4.2 Insulation Assessment: Insulated surfaces categorized as “Grade I” shall be modeled such that the insulation R-value within the cavity is considered at its measured (for loose fill) or labeled value, including other adjustments such as compression, and cavity fill versus continuous, for the insulated surface area (not including framing or other structural materials which shall be accounted for separately). Insulated surfaces categorized as “Grade II” shall be modeled such that there is no insulation R-value for 2% of the insulated surface area and its measured or labeled value, including other adjustments such as compression and cavity fill versus continuous, for the remainder of the insulated surface area (not including framing or other structural materials). Insulated surfaces categorized as “Grade III” shall be modeled such that there is no insulation R-value for 5% of the insulated surface area and its measured or labeled value, including other adjustments such as compression and cavity fill versus continuous, for the remainder of the insulated surface area (not including framing or other structural materials). Other building materials, including framing, sheathing, and air films shall be assigned aged or settled -values according to ASHRAE Fundamentals. In addition, the following accepted conventions shall be used in modeling Rated Home insulation enclosures:

303.4.1.4.2.1 Insulation that does not cover framing members shall not be modeled as if it covers the framing. Insulated surfaces that have continuous insulation (i.e. rigid foam, fibrous batts, loose fill, or sprayed insulation) covering the framing members shall be

assessed and modeled according to Section 303.4.1.4 and combined with the cavity insulation, framing and other materials to determine the overall assembly R-value.

303.4.1.4.2.2 Compression: for modeling purposes, the base R-value of fibrous insulation that is compressed to less than its full rated thickness in a completely enclosed cavity shall be assessed according to the manufacturer's documentation; in the absence of such documentation, use R-value correction factor (CF) for Compressed Batt or Blanket from Manual J, 8th edition Table A5-1, Section 7-d.

303.4.1.4.2.3 Where large areas of insulation that is missing, or has a different R-value from the rest of an assembly exist, these areas shall be modeled with the appropriate R-value and assembly description separately from the rest of the assembly. Insulation R-values may not be averaged according to coverage area. For example, if 50 square feet of a wall area has no cavity fill insulation at all, that 50 square feet shall be recorded as a separate building component with no cavity insulation, but with the existing structural components.

303.4.1.4.2.4 Steel framing in insulated assemblies: calculations for the overall thermal properties of steel-framed walls, ceilings and floors shall be based on the “Thermal Design Guide for Exterior Walls, Publication RG-9405, American Iron and Steel Institute; the “Zone Method” from 2001 ASHRAE Handbook of Fundamentals (P 25.10-11); or equivalent.

303.4.1.5 Renewable energy systems, using solar, wind or other renewable energy sources, which offset the energy consumption requirements of the Rated Home, shall not be included in the Reference Home.

303.4.1.6 For non-electric warm furnaces and non-electric boilers, the values in Table 303.4.1.5 shall be used for auxiliary electric (Eae) in the Reference Home.

Table 303.4.1.5

System Type	EAE
Oil boiler	330
Gas boiler	170
Oil furnace	$439 + 5.5 * \text{Capacity (kBtu/h)}$
Gas furnace	$149 + 10.3 * \text{Capacity (kBtu/h)}$

303.4.1.7 Lighting and Appliances

303.4.1.7.1 Lighting. Reference home annual lighting use in kWh/yr/(dwelling unit) shall be calculated as $(455 + 0.80 * \text{CFA})$ with an internal gain factor equal to 90% of lighting energy use (10% of lighting energy use is assumed to occur outside of the conditioned floor area of the home).

For the purpose of adjusting the annual light fixture energy consumption for calculating the rating, EULLA shall be adjusted by adding lighting $\Delta\text{EUL}_{\text{LA}}$, where $\Delta\text{EUL}_{\text{LA}}$ (MBtu/yr/(dwelling unit)) = $[29.5 - 0.5189 * \text{CFA} * \text{FL}\% - 295.12 * \text{FL}\% + 0.0519 * \text{CFA}] *$

0.003413, and where FL% is the ratio of Qualifying Light Fixtures to all light fixtures in Qualifying Light Fixture Locations, and CFA is the Conditioned Floor Area. For calculation purposes, the rated home shall never have FL% less than 10%.

For lighting, internal gains in the Rated home shall be reduced by 90% of the lighting ΔEUL_{LA} calculated in Btu/day using the following equation: $I_{gain} = 0.90 * \Delta EUL_{LA} * 10^6 / 365$.

303.4.1.7.2 Refrigerators. Reference home annual refrigerator energy use shall be 775 kWh/yr per dwelling unit.

For the purposes of adjusting the annual refrigerator energy consumption for calculating the rating, the EUL_{LA} shall be adjusted by adding ΔEUL_{LA} , where refrigerator $\Delta EUL_{LA}(\text{kWh/yr}/(\text{dwelling unit})) = \text{Total Annual Energy Consumption of Refrigerators in Rated Home} - 775$.

For refrigerators, internal gains in the Rated home shall be reduced by 100% of the refrigerator ΔEUL_{LA} calculated in Btu/day using the following equation: $\Delta I_{gain} = \Delta EUL_{LA} * 10^6 / 365$.

303.4.1.7.3 Mechanical Ventilation System Fans. If ventilation fans are present, the EUL_{LA} shall be adjusted by adding ΔEUL_{LA} , where $\Delta EUL_{LA}(\text{kWh/year}/(\text{dwelling unit})) = \text{Total Annual Energy Consumption of the Ventilation System in the Rated Home} - [0.03942 * \text{CFA} + 29.565 * (\text{Nbr} + 1)]$

303.4.1.7.4 Dishwashers. A dishwasher, with annual energy use as specified by Table 303.4.1.8 with an internal gain factor equal to 60% of dishwasher energy use, shall be assumed in the Reference home. If no labeled dishwasher energy factor is specified for the Rated home, the Rated home shall have the same dishwasher annual energy use and internal gain factor as the Reference home.

Table 303.4.1.8

Bedrooms per Dwelling Unit	Reference Dishwasher kWh
1	90
2	126
3	145
4	174
5+	203

For the purposes of calculating dishwasher energy savings and hot water energy savings for calculating the rating, the energy savings shall be calculated based on the following formula using Cycles/Year by number of Bedroom (Nbr) as specified in Table 303.4.1.9

Dishwasher annual energy use for each dwelling unit in the rated home (kWh/yr) = (0.27) * (cycles/yr/(dwelling unit)) / (dishwasher rated Energy Factor)

Table 303.4.1.9

N _{br} per Dwelling Unit	Cycles/Yr per Dwelling Unit
1	154
2	214
3	247
4	296
5+	345

EUL_{LA} shall be adjusted by adding dishwasher ΔEUL_{LA} , where ΔEUL_{LA} (MBtu/yr/(dwelling unit)) = (cycles/yr)*[0.27/(dishwasher rated Energy Factor) – 0.587]*0.003413.

Internal gains in the Rated Home shall be reduced by 60% of the dishwasher ΔEUL_{LA} calculated in Btu/day using the following equation: $\Delta I_{gain} = 0.60 * \Delta EUL_{LA} * 10^6 / 365$.

The reduction in hot water use (gallons/day) shall be based on the following formula, to be used in adjusting the hot water Use Equation given by Table 303.4.1(1):

Reduction in hot water use (gallons/day/(dwelling unit)) = [(7.4 gal/cycle) – (0.73)/(dishwasher rated Energy Factor in cycles/kWh)/(90 °F)/(0.0024 kWh/gal/F)] * [(cycles/yr/(dwelling unit))/(365 days/year)]

303.4.1.7.5 Ceiling Fans. If ceiling fans are included in the Rated home, they shall also be included in the Reference home. Three (3) ceiling fans shall be assumed in both the Reference Home and the Rated Home. A daily ceiling fan operating schedule equal to 14 full-load hours shall be assumed in both the Reference Home and the Rated Home during periods when ceiling fans are operational. Ceiling fans shall be assumed to operate only during the cooling season, which may be estimated to be all months with an average temperature greater than 63 oF. The cooling thermostat (but not the heating thermostat) shall be set up by 0.5 oF in both the Reference and Rated Home during periods when ceiling fans are assumed to operate.

The Reference Home shall use three (3) Standard Ceiling Fans of 42.6 watts each for total full-load fan wattage of 128 watts (42.6 * 3 = 128). The Rated Home shall use the Labeled Ceiling Fan Standardized Watts (LCFSW), also multiplied by three (3) fans to obtain total ceiling fan wattage for the Rated Home. The Rated Home LCFSW shall be calculated as follows:

$LCFSW = (3000cfm) / (cfm/watt \text{ as labeled at medium speed})$

During periods of fan operation, the fan wattage, at 100% internal gain fraction, shall be added to internal gains for both the Reference and Rated Homes. In addition, annual ceiling fan energy use, in MBtu/year (kWh/year * 3.413x10⁻³), for both the Rated and

Reference homes shall be added to the lighting and appliance end use loads (EULLA and REULLA) given in Equation 2, Section 303.2.1 of this Chapter.

303.4.1.8 If the Rated Home includes On-site Power Production, the Purchased Energy Fraction for the Rated Home (see Section 303.2.2) shall be used to determine the impact of the On-site Power Production on the HERS Index.

303.5 Operating Condition Assumptions

303.5.1 All HERS providers shall estimate the annual purchased energy consumption for heating, cooling and hot water for both the Rated Home and the Reference Home using the following assumptions–

303.5.1.1 Internal heat gains (“IGain” in Btu/day per dwelling unit) from lights, people and equipment of

$$\text{IGain} = 17,900 + 23.8 * \text{CFA} + 4,104 * \text{Nbr}$$

where

CFA = conditioned floor area per dwelling unit

Nbr = number of bedrooms per dwelling unit

As adjusted for internal gains from high-efficiency lighting and appliances in the Rated home as provided by Section 303.4.1.7.

303.5.1.2 Where programmable offsets are available in the Rated Home, 2 °F temperature control point offsets with an 11 p.m. to 5:59 a.m. schedule for heating and a 9 a.m. to 2:59 p.m. schedule for cooling, and with no offsets assumed for the Reference Home;

303.5.1.3 When calculating annual purchased energy for cooling, internal latent gains assumed as 0.20 times sensible internal heat gains;

303.5.1.4 The climatologically most representative TMY or equivalent climate data, which may be interpolated between climate sites if interpolation is established or approved by the accrediting body and consistent for all HERS providers operating within a state.

303.5.1.5 Manufacturer’s Equipment Performance Ratings (e.g., HSPF, SEER, AFUE) shall be corrected for local climate conditions and mis-sizing of equipment. To determine equipment mis-sizing, the capacity of heating and cooling vapor compression equipment shall be calculated in accordance with ACCA Manual J, Eighth Edition, ASHRAE 2001 Handbook of Fundamentals, or an equivalent computation procedure, using the following assumptions:

303.5.1.5.1 HERS Reference Home:

303.5.1.5.1.1 Indoor temperatures shall be 75 F for cooling and 70 F for heating.

303.5.1.5.1.2 Outdoor temperatures shall be the 99.0% and 1.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the city where the home is located or the most representative city for which design temperature data are available.

303.5.1.5.1.3 Infiltration rate in air changes per hour (ach) shall be:

- (a) For summer: $1.2 * nL * W$
- (b) For winter: $1.6 * nL * W$
- (c) Where: $nL = 0.48$
- (d) W = Weather factor from W Tables in ASHRAE Standard 136

303.5.1.5.1.4 Mechanical ventilation shall be zero.

303.5.1.5.1.5 All windows shall have blinds/draperies that are positioned in a manner that gives an Internal Shade Coefficient (ISC) of 0.70 in the summer and an ISC of 0.85 in the winter. These values are represented in ACCA Manual J Eighth Edition as “dark closed blinds” in the summer and “dark, fully drawn roller shades” in the winter.

303.5.1.5.1.6 Internal heat gains shall be 1,600 Btu/hr sensible for appliances plus 230 Btu/hr sensible and 200 Btu/hr latent per occupant, with the number of occupants equal to the number of bedrooms plus one.

303.5.1.5.1.7 Heat pump equipment shall be sized to equal the larger of the heating and cooling season calculations in accordance with these procedures.

303.5.1.5.1.8 Systems shall be smaller than the size calculated using this procedure plus 100 Btu/hr.

303.5.1.5.2 The Rated Home:

303.5.1.5.2.1 Indoor temperatures shall be 75 F for cooling and 70 F for heating.

303.5.1.5.2.2 Outdoor temperatures shall be the 99.0% and 1.0% design temperatures as published in the ASHRAE Handbook of Fundamentals for the city where the home is located or the most representative city for which design temperature data are available.

303.5.1.5.2.3 Infiltration rate shall be either the measured envelope leakage area converted to equivalent natural air changes per hour (ach,nat) or the default value derived above for the Reference Home modified as follows:

- (a) For summer: either $1.2 * ach,nat$ or $1.2 * nL * W$
- (b) For winter: either $1.6 * ach,nat$ or $1.6 * nL * W$
- (c) Where: $nL = 0.48$
- (d) W = Weather factor from W Tables in ASHRAE Standard 136

303.5.1.5.2.4 Mechanical ventilation shall only be included for systems that are controlled to run every hour or every time the HVAC system operates. Standard

bathroom and kitchen ventilation may not be considered as ventilation for sizing purposes.

303.5.1.5.2.5 Combined infiltration and ventilation may not be less than the ventilation rates required by ASHRAE Standard 62.2-2004, nor greater than $nL * W * 1.2$ in summer and $nL * W * 1.6$ in winter.

303.5.1.5.2.6 Windows shall include observed blinds/draperies. For new homes, all windows shall assume blinds/draperies that are positioned in a manner that gives an Internal Shade Coefficient (ISC) of 0.70 in the summer and an ISC of 0.85 in the winter. (These values are represented in ACCA Manual J Eighth Edition as “dark closed blinds” in the summer and “dark fully drawn roller shades” in the winter.)

303.5.1.5.2.7 Internal heat gains shall be 1,600 Btu/hr sensible plus 230 Btu/hr sensible and 200 Btu/hr latent per occupant, with the number of occupants equal to the number of bedrooms plus one.

303.5.1.5.2.8 Heat pump equipment shall be sized to equal the larger of the heating and cooling season calculations in accordance with these procedures.

303.5.1.5.2.9 To the degree that the installed equipment for the Rated Home exceeds properly sized equipment in accordance with the above procedures, the manufacturer’s equipment performance rating shall be reduced accordingly.

303.5.1.6 For heat pumps and air conditioners where a detailed, hourly HVAC simulation is used to separately model the compressor and evaporator energy (including part-load performance), the back-up heating energy, the distribution fan or blower energy and crank case heating energy, the Manufacturer’s Equipment Performance Rating (HSPF and SEER) shall be modified as follows to represent the performance of the compressor and evaporator components alone: HSPF, corr = HSPF, mfg / 0.582 and SEER, corr = SEER, mfg / 0.941. The energy uses of all components (i.e. compressor and distribution fan/blower; and crank case heater) shall then be added together to obtain the total energy uses for heating and cooling.

303.5.1.7 Natural ventilation shall be assumed in both the Reference and Rated Homes during hours when natural ventilation will reduce annual cooling energy use.

303.5.1.8 When a whole-house fan is present in the Rated Home, it shall operate during hours of favorable outdoor conditions, and no whole-house fan shall be assumed in the Reference Home. The fan energy associated with the whole-house fan shall be included in the normalized Energy Consumption for the Rated Home’s cooling end-use (nEC_x).

303.5.1.9 Local residential energy or utility rates that—
(a) Are revenue-based and include customer service and fuel charges;
(b) Are updated at least annually; and
(c) Are confirmed by the accrediting body.

303.6 Projected and Confirmed Ratings

303.6.1 A HERS provider may calculate the Projected Rating of a to-be-built or to-be-improved home based on architectural drawings with material, mechanical and electrical specifications for a to-be-built home, or based on a site audit for a to-be-improved home; and by:

303.6.1.1 Using either the envelope leakage rate specified as the required performance by the construction documents, the site-measured envelope leakage rate, or a default value as specified for the Reference home in Table 303.4.1(1).

303.6.1.2 Using either the distribution system efficiency specified as the required performance by the construction documents, the site-measured distribution system efficiency, or a default distribution system efficiency value from Table 303.4.1(1); and

303.6.1.3 Using the planned location and orientation of the proposed home, or if the proposed orientation is unknown, calculating ratings for the home facing each of the four cardinal directions, north, south, east and west, and using the largest HERS Index as the "worst case" Projected Rating.

303.6.2 Upon completion of construction and verification of the proposed specifications, all rated features of the home shall be confirmed using site inspections and envelope air leakage rates and distribution system efficiencies derived from on-site diagnostic tests conducted in accordance with Section 303.7.1 of this Standard, and the actual orientation of the home.

303.6.3 Rating tools accredited under Section 303.8 of this Standard must be retested and re-certified if a new version of the tool is released that includes changes to the engineering algorithms.

303.7 Minimum Rated Features

303.7.1 All HERS providers shall calculate the estimated annual purchased energy consumption for heating, cooling, water heating and lighting and appliances set forth in Section 303.1 of this Standard using the energy loss and gain associated with the minimum rated features as set forth in Table 303.7.1(1),

303.7.1.1 For existing homes, the envelope thermal characteristics of building elements 1 through 7 set forth in Table 303.7.1(1) are determined by site observation.

303.7.1.2 If data for the minimum rated features set forth in Section 303.7.1.1 of this Standard cannot be obtained by observation or without destructive disassembly of the home, default values shall be used. The default values are determined from the following sources listed in the preferential order of use:

- (a) For manufactured homes, available manufacturer's data;
- (b) Current and historical local building practices; or
- (c) Current and historical local building codes.

303.7.1.3 For existing homes, the determination of air leakage and duct leakage values set forth as building elements 10 and 11 in Table 303.7.1(1) are determined by data collected on site using the following procedures listed in preferential order of use:

303.7.1.3.1 Current on-site diagnostic tests conducted in accordance with the requirements set forth in Table 303.4.1(1); or

303.7.1.3.2 Observations of the condition of the building and duct system made by a Certified Rater. Based on these observations, values from Tables 303.4.1(3) shall be used.

303.7.1.3.3 The energy efficiency of the mechanical equipment set forth as building elements 12 through 14 in Table 303.7.1(1) is determined by data collected on site using the following sources listed in preferential order of use:

(a) Current on-site diagnostic test data as corrected using the following equation:

$$\text{Eff}_{\text{rated}} = \text{Eff}_{\text{listed}} * \text{Es}_{\text{measured}} / \text{Es}_{\text{listed}}$$

where:

Eff_{rated} = annual efficiency to use as input to the rating

Eff_{listed} = listed annual efficiency by manufacturer or directory

Es_{measured} = measured steady state efficiency of system

Es_{listed} = manufacturer's listed steady state efficiency, under the same operating conditions found during measurement

(b) Name plate data;

(c) Manufacturer's data sheet; or

(d) Equipment directories.

303.7.1.4 When information on the energy efficiency of mechanical equipment cannot be determined from the sources listed in paragraph 303.7.1.3.3 of this Standard, the values set forth in Tables 303.7.1(2); 303.7.1(3); 303.7.1(4) and 303.7.1(5) shall be used.

303.7.1.5 Any HERS provider may base annual purchased energy consumption estimates for the Rated Home on additional features if the HERS provider's energy analysis tool is capable of doing so.

Table 303.7.1(1) Minimum Rated Features

Building element	Minimum Rated Feature
1. Floor/Foundation Assembly.	Construction type (slab-on-grade, crawl space; basement), insulation value (edge, under slab, cavity, sheathing), framing material and on-center spacing, insulation installation (Grade I, II, or III), vented or unvented (crawl space), capacitance (if slab or basement receives appreciable solar gain).

Table 303.7.1(1) Minimum Rated Features

Building element	Minimum Rated Feature
2. Walls	Construction type, insulation value (cavity, sheathing), framing material and on-center spacing insulation installation (Grade I, II, or III) capacitance, color (light, medium, or dark).
3. Roof/Ceiling Assembly	Construction type, insulation value (cavity, sheathing), framing material and on-center spacing insulation installation (Grade I, II, or III), framing covered by insulation or exposed, roof color (light, medium, or dark).
4. Rim Joist	Insulation value (cavity, sheathing).
5. Doors	Construction type, insulation value.
6. Windows	Construction type, orientation, U-value (of complete assembly), solar heat gain coefficient, shading.
7. Skylights	Construction type, orientation, tilt, U-value (of complete assembly), heat gain coefficient, shading.
8. Passive Solar System (Direct Gain system)	Solar type, collector type and area, orientation, tilt efficiency, storage tank size, pipe insulation value.
9. Solar Domestic Hot Water Equipment	System type, collector type and area, orientation, tilt, efficiency, storage tank size, pipe insulation value.
10. Air Leakage	Air leakage measurement type (default estimate, blower door test, tracer gas test), volume of conditioned space.
11. Distribution System	System type, location, insulation value (duct and pipe), air leakage measurement type (default estimate, duct pressurization).
12. Heating Equipment	Equipment type, location, efficiency (AFUE, HSPF), auxiliary electric (Eae).
13. Cooling Equipment	Equipment type, location, efficiency (SEER, COP).
14. Domestic Hot Water Equipment	Equipment type, location, energy factor or seasonal efficiency, extra tank insulation value, pipe insulation value.
15. Control Systems	Thermostat type.
16. Light fixtures	Number of qualifying and non-qualifying light fixtures in qualifying locations (i.e. kitchens, dining rooms, living rooms, family rooms/dens, bathrooms, hallways, stairways, entrances, bedrooms, garage, utility rooms, home offices, and all outdoor fixtures mounted on a building or pole (excluding landscape lighting)).

Table 303.7.1(1) Minimum Rated Features

Building element	Minimum Rated Feature
17. Refrigerator(s)	Total annual energy consumption (kWh) for all units from: California Energy Commission: Appliance Database at http://www.energy.ca.gov/appliances/appliance/index.html or Association of Home Appliance Manufacturers (AHAM) directories
18. Dishwasher(s)	Energy factor (cycles/kWh) for all units from: the Federal Trade Commission's "Dishwasher Energy Data" posted at http://www.ftc.gov/bcp/online/edcams/eande/appliances/data/2004/dwasher/brand.htm
19. Ceiling Fans	Labeled cfm, Watts and cfm/Watt at medium fan speed from EPA ENERGY STAR ceiling fan label.
20. Mechanical Ventilation System(s)	Equipment type, daily run hours, and wattage (may be listed in the Certified Home Ventilating Products Directory available from the Heating and Ventilation Institute (HVI).
21. On-site Power Generation	Total annual kWh generation and total site fuel used in the production of on-site power generation as derived from manufacturer's performance ratings.

Table 303.7.1(2) Default Solid Fuel Combustion Seasonal Efficiencies for Space Heating

Type	Location	Seasonal Efficiency	Notes
EPA-Listed Stove, Furnace, or Boiler	Conditioned space	Contained in the EPA publication "Certified Wood Heaters" and posted at http://www.epa.gov/compliance/resources/publications/monitoring/programs/woodstoves/certifiedwood.pdf	
EPA-Listed Stove, Furnace or Boiler	Unconditioned space	0.85 of EPA listing	
EPA Stove – Not Listed	Conditioned space	60%	For stoves with documented EPA compliance, but not found on EPA's Web site list of certified stoves
EPA Stove – Not	Unconditioned	50%	For stoves with documented EPA

Table 303.7.1(2) Default Solid Fuel Combustion Seasonal Efficiencies for Space Heating

Type	Location	Seasonal Efficiency	Notes
Listed	space		compliance, but not found on EPA's Web site list of certified stoves
EPA-Listed Stove Insert	Enclosed, such as in fireplace	Subtract 10% from listed seasonal efficiency	
Non-EPA Stove	Conditioned space	50%	Not tested or listed by EPA
Non-EPA Stove	Unconditioned space	40%	Not tested or listed by EPA
Biomass Fuel Furnace or Boiler with Distribution System	Conditioned space	50%	Not tested or listed by EPA Distribution system efficiency shall also be considered
Biomass Fuel Furnace or Boiler with Distribution System	Unconditioned space	40%	Not tested or listed by EPA Distribution system efficiency shall also be considered
Biomass Fuel Furnace or Boiler with Distribution System	Outside	30%	Not tested or listed by EPA Distribution system efficiency shall also be considered
Solid Fuel Furnace or Boiler – Independently Tested	Central with ducted or hydronic distribution	0.85 of tested listing	Only permitted with documentation of independent testing lab documentation Distribution system efficiency shall also be considered

Table 303.7.1(3) Default Values for Mechanical System Efficiency (Age-based)

Mechanical Systems	Units	Pre-1960	1960-1969	1970-1974	1975-1983	1984-1987	1988-1991	1992 to present
Heating:								
Gas Furnace	AFUE	0.60	0.60	0.65	0.68	0.68	0.76	0.78

Table 303.7.1(3) Default Values for Mechanical System Efficiency (Age-based)

Mechanical Systems	Units	Pre-1960	1960-1969	1970-1974	1975-1983	1984-1987	1988-1991	1992 to present
Gas Boiler	AFUE	0.60	0.60	0.65	0.65	0.70	0.77	0.80
Oil Furnace or Boiler	AFUE	0.60	0.65	0.72	0.75	0.80	0.80	0.80
Air-Source Heat Pump	HSPF	4.50	4.50	4.70	5.50	6.30	6.80	6.80
Ground-Water Geothermal Heat pump	COP	2.70	2.70	2.70	3.00	3.10	3.20	3.50
Ground-Coupled Geothermal Heat Pump	COP	2.30	2.30	2.30	2.50	2.60	2.70	3.00
Cooling:								
Air-Source Heat Pump	SEER	5.00	6.10	6.50	7.40	8.70	9.40	10.00
Ground-Water Geothermal Heat Pump	EER	10.00	10.00	10.00	13.00	13.00	14.00	16.00
Ground-Coupled Geothermal Heat Pump	EER	8.00	8.00	8.00	11.00	11.00	12.00	14.00
Central Air Conditioner	SEER	5.00	6.10	6.50	7.40	8.70	9.40	10.00
Room Air Conditioner	EER	5.00	6.10	6.10	6.70	7.70	8.10	8.50
Water Heating:								
Storage Gas	EF	0.47	0.47	0.47	0.49	0.55	0.56	0.56
Storage Oil	EF	0.47	0.47	0.47	0.48	0.49	0.54	0.56
Storage Electric	EF	0.79	0.80	0.80	0.81	0.83	0.87	0.88

TABLE 303.7.1(4) Default Values for Mechanical System Efficiency (not Age-based)

	Units	Rating
Heating:		
Gas Wall Heater (Gravity)	AFUE	0.65
Gas Floor Furnace	AFUE	0.60
Gas Water Heater (Space Heating).	AFUE	0.75
Electric Furnace	HSPF	3.413
Electric Radiant	HSPF	3.413
Heat Pump Water Heater (Space)	HSPF	5.11
Electric Water Heater (Space)	HSPF	2.73
Cooling:		
Electric Evaporative Cooling	EER	30

TABLE 303.7.1(4) Default Values for Mechanical System Efficiency (not Age-based)

	Units	Rating
Gas Absorption Cooler	COP	0.40
Water Heating:		
Heat Pump	COP	2.00
Instantaneous Electric	EF	0.87
Instantaneous Gas	EF	0.75
Solar (Use SRCC Adjustment Procedures)	EF	2.00

Table 303.7.1(5) Default EAE Values

System Type	EAE
Oil boiler	330
Gas boiler	170
Oil furnace	$439 + 5.5 * \text{Capacity (kBtu/h)}$
Gas furnace	$149 + 10.3 * \text{Capacity (kBtu/h)}$

303.8 Software Rating Tools

303.8.1 Minimum capabilities. Calculation procedures used to comply with this Standard shall be computer-based rating software tools capable of calculating the annual energy consumption and HERS Index of all building elements that differ between the HERS Reference Home and the Rated Homes and shall include the following capabilities:

303.8.1.1 Compliance with the rating provisions of Section 303.1 of this Standard

303.8.1.2 Computer generation of HERS Index and star ratings in accordance with the provisions of Section 303.2 of this Standard

303.8.1.3 Automated computer generation of the HERS Reference Home using only the input for the Rated Home

303.8.1.4 The software tool shall not allow the user to directly modify the building component characteristics of the HERS Reference Home

303.8.1.5 Calculation of whole-building, single-zone sizing for the heating and cooling equipment in the HERS Reference Home residence in accordance with Section 303.5.1.4 of this Standard.

303.8.1.6 Calculations that account for the indoor and outdoor temperature dependencies and the part-load performance of heating, ventilating, and air conditioning equipment based on climate and equipment sizing

303.8.1.7 Printed rating report in accordance with Section 303.3 of this Standard

303.8.2 Approved tools. Rating software tools shall be accredited by RESNET through compliance with the “RESNET Rating Software Testing and Verification Procedures” posted on the RESNET web site at www.natresnet.org (see also Chapter 1, Section 102.2.1).

Chapter Four

RESNET STANDARDS

400 NATIONAL BUILDER OPTION PACKAGE PROVIDER ACCREDITATION PROCEDURES

401 BACKGROUND

The following procedures for accrediting Building Option Package (BOP) providers have been developed and adopted by the Residential Energy Services Network (RESNET). BOPs were developed by the U.S. Environmental Protection Agency (EPA), can be used by builders to demonstrate compliance to the ENERGY STAR® Homes Program standard. The BOPs have been demonstrated to meet the Home Energy Rating score threshold adopted by the Environmental Protection Agency under “worse case” scenarios and involve the same building performance inspection as a home energy rating.

The accreditation criteria is based upon Chapter One of the Mortgage Industry National Home Energy Rating System Accreditation.

401.1 Purpose

The purpose of this procedure is to ensure that accurate and consistent BOPs are implemented by accredited BOP providers nationwide to increase the credibility of BOPs and the ENERGY STAR Homes program

401.2 Scope

401.2.1 This document sets out the procedures for the accreditation of BOP providers so their results will be acceptable to the housing industry and consumers.

401.2.2 There may be instances in which state laws or regulations will have additional requirements to those specified in this document.

402 DEFINITIONS

Building Option Package (BOP) - Developed by EPA, a prescriptive option that builders can use to demonstrate compliance to the ENERGY STAR® Homes Program standard. The BOPs have been demonstrated to meet the ENERGY STAR Homes performance guidelines under “worse case” scenarios and involve the same building performance inspection as a home energy rating.

BOP Inspector - A person trained to inspect and evaluate the energy features of a home and conduct necessary diagnostic testing and collect all of the data necessary to confirm that the home complies with the BOP. The training shall be conducted by a RESNET accredited rater training provider.

BOP Provider - An entity accredited by RESNET that oversees the BOP inspectors and issues the BOP certification that the home meets the Energy Star guidelines.

403 ACCREDITATION CRITERIA

403.1 Minimum Standards for BOP Providers

A BOP provider must specifically meet the following minimum standards:

403.1.1 Minimum BOP Inspector Training Standards:

403.1.1.1 A BOP provider must provide for BOP inspector certification by requiring inspectors to successfully complete a RESNET accredited home energy rater training courses and to demonstrate competence in completing BOP performance inspections in the field. The following elements must be included in its BOP inspector training:

403.1.1.1.1 Basics of building science

403.1.1.1.2 Thermal resistance of insulating materials

403.1.1.1.3 Space heating/cooling equipment efficiency

403.1.1.1.4 Blower door testing procedures

403.1.1.1.5 Duct leakage and testing procedures

403.1.1.1.6 Determining the efficiency of windows

403.1.1.1.7 Basic principles of BOPs

403.1.1.1.8 BOP provider's policies and procedures for inspectors

403.1.1.1.9 Quality assurance procedures

403.1.2 Certification Standards

403.1.2.1 Certification and recertification of BOP inspectors shall be through a RESNET accredited home energy rater training provider, which shall include the following provisions:

403.1.2.1.1 Initial classroom and/or field training.

403.1.2.1.2 Performance evaluation of ability to perform accurate BOP inspections including passing the national RESNET test.

403.1.2.1.3 Continuing Education - 12 hours of education and training approved by the BOP provider during the three years of certification. Ten hours of the training shall be training approved by RESNET.

403.1.2.1.4 Recertification of BOP inspectors no less than every three years

403.1.3 Minimum Standards For BOP Provider's Operation Policies and Procedures must be written and provide for the following:

403.1.3.1 Field inspection of all homes for verifying technical specifications.

403.1.3.2 Blower Door Test completed on all homes claiming credit for reduced air infiltration lower than the default value.

403.1.3.3 Duct testing completed on all homes claiming credit for reduced air distribution system leakage lower than the default value.

403.1.3.4 Written BOP inspector discipline procedures that includes progressive discipline involving Probation - Suspension - Termination

403.1.3.5 Written inspector quality control process that at a minimum contains the following provisions:

403.1.3.5.1 Quality Assurance Designee

403.1.3.5.1.1 A BOP Provider shall designate an officer, employee, or contractor to be responsible for quality assurance within the organization. The responsibilities of the designee shall include:

403.1.3.5.1.1.1 Maintenance of quality assurance files

403.1.3.5.1.1.2 Review of ratings by inspector trainees and during the probationary period

403.1.3.5.1.1.3 Monitoring of BOP inspections by certified inspectors

403.1.3.5.1.2 The designated officer, employee, or contractor responsible for quality assurance shall demonstrate sufficient experience with the BOP inspection knowledge base and skills to review the work of trainees and certified raters. Sufficient experience shall be demonstrated by either of the following:

403.1.3.5.1.2.1 Certification as a Rater Trainer

403.1.3.5.1.2.2 Passing the RESNET Quality Assurance Designee Test

403.1.3.5.1.3 Proof of qualification shall be submitted with an application for accreditation.

403.1.3.5.1.4 If the quality assurance designee leaves the home energy rating system, the provider shall have sixty (60) calendar days to notify RESNET of the new designated officer or employee, or be subject to suspension of the accreditation under the provisions of Chapter One, Section 9, Suspension and Revocation of Accreditation.

403.1.3.5.2 Written rater quality control process that includes at a minimum the following:

403.1.3.5.2.1 The provider's quality assurance designee shall be responsible for the internal review of BOP inspections submitted by its inspectors, including:

403.1.3.5.2.1.1 Review of BOP inspections conducted during the inspectors' probation period - Prior to certifying an inspector candidate the provider shall review at least 5 probationary BOP inspections performed by the inspector candidate within 12 months of training.

403.1.3.5.2.2 Review of BOP inspection data files – For each BOP inspector, the provider's quality assurance designee shall annually evaluate a minimum of 10% of each inspector's inspection data files. The provider shall resolve any problems detected during these reviews. Excessive problems will trigger field monitoring of the BOP inspector.

403.1.3.5.2.3 Field Monitored BOP inspections - For each BOP inspector, the provider's quality assurance designee shall be responsible for an annual evaluation of the greater of one home or one percent of the inspector's annual total of homes for which BOP inspections were provided. The provider's quality assurance designee shall ensure that a BOP inspection is independently repeated to determine whether the inspection and/or diagnostic testing was accurately completed by the inspector, and determine whether information was completely collected and reported.

403.1.3.5.3 BOP Inspection Recordkeeping. Providers and/or their certified BOP inspectors shall maintain records for each BOP inspection.

403.1.3.5.3.1 The quality assurance record for each home shall contain at a minimum the electronic copy of the inspection file.

403.1.3.5.3.2 The record for each inspection shall be maintained for a minimum of three years.

403.1.3.5.4 BOP Inspector Registry

403.1.3.5.4.1 The provider shall maintain a registry of all their certified BOP inspectors. The provider will also keep on file the names and contact information for all, including company name, mailing address, voice phone number, fax number, and email address. Upon request the provider shall provide to RESNET its registry of certified raters.

403.1.3.5.5 Complaint Response System.

403.1.3.5.5.1 Each provider shall have a system for receiving complaints. The provider shall respond to and resolve complaints related to BOP inspections and field verification and diagnostic testing services and reports. Providers shall ensure that inspectors inform purchasers and recipients of ratings and field verifications about the complaint system. Each provider shall retain records of complaints received and responses to complaints for a minimum of three years after the date of the complaint.

403.1.3.5.6 RESNET Quality Assurance Review of Accredited Providers.

403.1.3.5.6.1 RESNET shall randomly select a limited number of accredited providers annually and conduct a review of their files. The RESNET Board of Directors shall determine the number of providers that shall be reviewed on an annual basis and who will provide the quality assurance review. An accredited rating provider may have the right to challenge the quality assurance reviewer for cause.

403.1.3.5.6.1.1 Records which may be reviewed include:

403.1.3.5.6.1.1.1 BOP inspection files

403.1.3.5.6.1.1.2 BOP inspection quality assurance records

403.1.3.5.6.1.1.3 Complaint files

403.1.3.5.6.1.1.4 BOP inspector agreements

403.1.3.5.6.1.1.5 BOP inspector registry

403.1.3.5.6.1.1.6 Disclosure files

403.1.3.5.6.1.2 Significant inconsistencies or errors in the files reviewed may result in a field review.

403.1.3.6 Knowledge of other EPA methods for labeling a home as ENERGY STAR.

403.1.3.7 Written conflict of interest provisions that prohibit undisclosed conflicts of interest but allow waiver with advanced disclosure. The “Home Energy Rating Standard Disclosure” form adopted by the RESNET Board of Directors shall be completed for each home that receives a BOP inspection and shall be provided to the rating client and made available to the home owner/buyer. Each form shall include, at a minimum, the name of the community/ subdivision and city and state where the home is located. Each form shall accurately reflect the proper disclosure for the home that it is rated (i.e. it should reflect the BOP inspector’s involvement with the home at the time the final ENERGY STAR certificate is issued). For the purposes of completing this Disclosure, “Rater’s employer” is defined as including any affiliate entities. Recognizing that a number of different relationships may occur between the inspector or the inspector’s employer and the rating client and/or homeowner and/or the marketplace in general, the BOP Provider shall ensure that all disclosures are adequately addressed by the Provider’s quality assurance plan, in accordance with the relevant Quality Assurance provisions of the Standards.

403.1.4 Technical Requirements for BOPs

403.1.4.1 The BOP provider can only use BOPs approved by the EPA ENERGY STAR Homes Program.

403.1.4.2 Monthly Energy Savings. For a Fannie Mae energy efficient mortgage, the BOP provider shall calculate the monthly energy savings that the BOP achieves over the HERS Reference Home in accordance with the provisions of 303.3.3.3.2.2 of Chapter 3 of this standard.

403.1.4.3 Energy Value. For a Fannie Mae energy efficient mortgage, the BOP provider shall calculate the energy savings value of the BOP in accordance with the provisions of 303.3.3.2.1 of Chapter 3 of this standard.

403.1.4.4 Specialized requirements. Where specific BOPS approved by EPA have technical requirements that are outside the normal range of BOP inspector skills, specialized training shall be provided to inspectors by the BOP provider to inspect for compliance with those BOPs.

404 ACCREDITATION PROCESS

404.1 National BOP Provider Accreditation

National BOP Provider Accreditation will be through the Residential Energy Services Network (RESNET) and recognized by the EPA ENERGY STAR Home Program.

404.2 BOP Provider Accreditation Criteria

BOP providers must meet the accreditation criteria listed above.

404.3 National Registry of BOP Providers

The Residential Energy Services Network (RESNET) will maintain the database of accredited BOP providers titled, “National Registry of BOP Providers” and is posted at http://www.natresnet.org/programs/bop_providers/default.htm

404.4 Confidentiality of Information

Any BOP provider submitting the required application information and desiring to have certain information treated as confidential in order to limit disclosure shall, at the time of submission, attach a statement specifying the proprietary information and requesting confidentiality.

404.5 Review and Notification

404.5.1 Within 15 days of receipt of the completed application, RESNET will do an initial review of the application and provisional BOP Provider accreditation can be granted to applicants during the remaining application review process. This provisional accreditation is valid during the period of application review and is terminated upon RESNET’s

determining whether the applicant meets the accreditation standard and notifying the applicant.

404.5.2 Applications reviewed under 5.D.1, “RESNET Review” Within 45 days of receipt of a complete application, the BOP accrediting review committee will review the submission for compliance to the accreditation standards set forth within and either: forward the application and review checklist to RESNET and notify the applicant of this action, or forward to the applicant a request for additional information or clarification.

404.5.3 Within 15 days of receipt of the recommendation of the BOP accrediting review committee, RESNET will review the submissions, make a determination of whether the applicant meets the accreditation standard, and if it does issue a unique BOP provider accreditation identification number. This initial accreditation is valid for a period of three years from the date of issuance. The accreditation will be incorporated into a national registry of accredited BOP providers and listed on the RESNET web site on the Internet. In order to maintain currency and credibility for the registry, renewal of accreditation is required triennially.

404.5.4 If RESNET determines that the applicant does not meet the accreditation standard, it shall inform the applicant, identify where the applicant failed to meet the accreditation standard, and inform the applicant its right of remedy under 8.B.

404.6 Responsibilities of Accredited BOP Providers

The accredited BOP provider is responsible for insuring that all of the BOP inspections conducted issued by the system comply with all of the criteria by which the system was accredited.

405 RENEWAL

405.1 BOP Provider Application for Renewal

405.1.1 Accredited BOP providers must submit an “Application for Renewal” no later than 120 days prior to the expiration of the current accreditation period. Renewal shall be required every three years after the issuance of the unique accreditation registration number by RESNET. Renewal applications will be processed in the same manner as an initial application.

405.2 Late Application

405.2.1 Applications received later than specified above will be processed, to the maximum extent feasible, so that the accreditation does not expire. Should the expiration date pass, the applicant will be granted an extension not to exceed 30 days.

405.3 Successful Renewals

405.3.1 Successful renewals will be noted on the national registry and communicated to the applicant by RESNET.

405.4 Renewal Applications Extending Beyond the Grace Period

405.4.1 Renewals extending beyond the grace period will be noted as “pending” on the national registry and the applicant will be advised to cease representing themselves as accredited until the application receives approval.

405.5 Accreditation Not Renewed

Accredited BOP providers that elect not to renew or fail to meet renewal requirements will be removed from the national registry and so advised.

405.6 Appeals

405.6.1 BOP providers whose accreditation has been revoked, and are exercising their right of appeal will be noted as pending and the BOP provider will be advised to cease representing themselves as accredited until the appeal is resolved.

405.7 Program Element Changes

405.7.1 It is the accredited BOP provider’s responsibility to provide RESNET with any proposed changes in the program’s minimum BOP inspector certification procedures, minimum inspector training standards, minimum inspector certification standards, operation policies and procedures, or other information that effects its meeting the minimum accreditation criteria. Proposed changes will be evaluated by the accrediting review body in the same manner as the original or renewal application.

406 SUSPENSION AND REVOCATION OF ACCREDITATION

406.1 For Failure to Correct Deficiencies of the Accredited BOP Provider

406.1.1 If RESNET determines at any time that an accredited BOP provider has failed to adhere to the accreditation requirements, the accreditation committee shall notify the BOP provider of the specified deficiencies and shall require that specific corrective action, set forth in the notification, be taken not later than 30 calendar days after the date set forth in such notification.

406.1.1.1 In the event that the deficiencies have not been remedied, RESNET shall have the authority to immediately begin the process of suspension by issuance of a Notice of Suspension Proceedings. Such Suspension Proceedings shall follow the due process procedures contained in 7.C below. The notice may be appealed in accordance with procedures set forth in Section 8.0.

406.1.1.2 In the event that the specified deficiencies are not corrected within the application period set forth in the Notice of Suspension, a Notice of Revocation Proceeding shall be issued by the accreditation committee. Such Revocation Proceedings shall follow the due process procedures contained in 7.C below. The Notice of Revocation may be appealed in accordance with the procedures set forth in Section 8.0.

406.2 For Cause

406.2.1 Any BOP provider accredited by RESNET may have the accreditation revoked in any of the following circumstances:

406.2.1.1 Upon a determination by RESENT that an accredited BOP provider has acted in such a manner as to impair the objectivity or integrity of the accreditation program or harm the reputation of the accreditation committee including, but not limited to submission of false information to the accreditation review body, or failure to submit to the accreditation review body any material information required to be submitted by the BOP provider, in connection with obtaining or maintaining accreditation; knowingly or negligently issuing BOP checklists that fail to meet all of the accreditation criteria; or misrepresentation by the BOP provider in advertising or promotional materials of its accreditation status in general or with respect to any service provided by the BOP provider.

406.2.1.2 Pursuant to any of the express provisions of Section 406.1 or any of the express provisions of the accreditation application, including but not limited to the following:

406.2.1.2.1 BOP provider goes out of business;

406.2.1.2.2 BOP provider does not re-apply at the end of existing accreditation period;

406.2.1.2.3 Failure to satisfy accreditation requirements on renewal;

406.2.1.2.4 Investigated and validated consumer complaints;

406.2.1.2.5 Willful misconduct;

406.2.1.2.6 Failure to disclose a self-serving interest.

406.2.1.3 Upon expiration of a BOP provider's right to appeal a suspension of accreditation pursuant to Section 7.A.1.

406.3 Suspension/Revocation Due Process

406.3.1 RESNET shall comply with the following due process procedures in considering any suspension or revocation actions against an accredited BOP provider.

406.3.1.1 Notice

406.3.1.1.1 RESNET may, at its discretion, initiate a proposed suspension or revocation action against an accredited BOP provider by providing the provider and the accrediting review body that reviewed the BOP provider's application written notice of the proposed action sent by certified mail, return receipt requested, to the last known address of the BOP provider. Such notice shall inform the subject BOP provider of the entire basis and justification for the proposed action.

406.3.1.2 Contest of Proposed Suspension/Revocation.

406.3.1.2.1 A respondent may contest a proposed suspension/revocation by filing a response with RESNET within 30 days of receipt of the notice. The response shall contain all pertinent and substantive information and argument that is in contradiction to the proposed suspension/revocation, including identification of all disputed materials and facts. If the respondent fails to file said response within the allotted time, RESNET may, in its discretion, suspend/revoke the accreditation of the respondent effective immediately upon written notification to the respondent.

406.3.1.3 Hearing

406.3.1.3.1 If the respondent files a timely response contesting the proposed suspension/revocation and requests a hearing, RESNET will appoint an independent, unbiased, and qualified hearing officer and issue a decision on the proposed suspension/revocation. The hearing officer will review the notice of suspension/revocation and the respondent's contest. If the hearing officer finds that the respondent's contest has raised substantiated and valid factual argument to the contrary of the proposed suspension/revocation, the respondent shall be afforded an opportunity to participate in an open and public telephonic hearing, and to submit additional documentary evidence, and rebuttal argument to any material contained in the original notice of suspension/revocation or developed during the course of the hearing officer's investigation. The notice shall be provided to the respondent by written notice by certified mail, return receipt requested, to the last known address of the BOP provider at a minimum of 120 days before the scheduled hearing.

406.3.1.4 Hearing Officer's Decision

406.3.1.4.1 The hearing officer shall issue a written decision on the proposed suspension/revocation that is based on all the information contained in the hearing record including statements of the factual and legal basis of the decision. If the hearing officer decides to impose suspension or revocation, the decision must include findings regarding all disputed materials, and justification for all findings. A suspension/revocation decision by the hearing officer shall take effect upon the issuance of the hearing officer's decision and the written notification of such decision to the respondent.

406.3.1.5 No Ex Parte Communication

406.3.1.5.1 No Ex Parte communication between the parties and the hearing officer shall be allowed.

407 APPEALS PROCEDURES FOR APPLICATION NOT BEING APPROVED, SUSPENSION, OR REVOCATION

407.1 Notification

407.1.1 RESNET shall notify the BOP provider and the accreditation review body of any decisions. Additionally, the committee shall clearly notify the BOP provider of the procedures and right to remedy.

407.2 Appeal

407.2.1 In the event that an accreditation application was not approved or the accreditation has been suspended, the BOP provider shall have the right, for a period of 30 calendar days after the date of notice, to appeal to RESNET.

407.2.2 In the event that a BOP provider's accreditation is suspended following the expiration of the period to appeal a suspension, in the absence of an appeal having been taken, the BOP provider shall have the right, at its election, for a period of 30 calendar days after the date of issue of a Notice of Suspension, to appeal to RESNET.

407.2.3 An appeal shall be in writing and sent by certified mail or other method which provides evidence of delivery to the Executive Director of RESNET and shall specify the basis for the appeal.

407.2.4 The appellant BOP provider may, at the time of noticing its appeal, request in writing, a hearing by RESNET. In such an event, the accreditation committee shall, not later than 7 calendar days after the filing of the notice of appeal, notify the appellant BOP provider of the date of the hearing, which shall be held as expeditiously as possible, but not later than 30 calendar days after the receipt of the notice of appeal.

Chapter Five

RESNET Standards

500 REVISION OF STANDARDS

501 REVISIONS AND AMENDMENTS

From time to time it may become necessary to revise or amend the standards set forth in this document. Circumstances that may lead to such revision or amendment include but are not limited to the following:

501.1 Periodic Reviews

To respond to periodic reviews by the promulgating bodies;

501.2 Changes in Law

To respond to changes in law;

501.3 Technical Innovations

To respond to technological innovations; and

501.4 Proposals for Change

To respond to proposals for change from interested parties.

501.4.1 Continuous review of standards

501.4.1.1 RESNET will accept on an on-going proposals to change the standards. RESNET has formed the following standing committees to consider proposals submitted: Quality Assurance and Ethics Committee, Technical Committee, and Training and Education Committee. After considering proposals the appropriate committee can submit proposals to amend the standard.

501.4.2 Process for submitting proposals to change standards:

501.4.2.1 Proposals to change these standards may be submitted in writing, at any time, to RESNET.

501.4.2.2 All proposals to change that meet the criteria set forth in this section of these procedures shall be accepted for consideration and evaluation.

501.4.2.3 Proposals to change these standards shall include the following:

501.4.2.3.1 Identification of the proposal to change, including the following minimum information:

501.4.2.3.1.1 Proponent(s) full name(s),

501.4.2.3.1.2 Organizational affiliation(s) or representation(s),

501.4.2.3.1.3 Full mailing address(es),

501.4.2.3.1.4 Daytime phone number(s),

501.4.2.3.1.5 Signature of primary proponent, and

501.4.2.3.1.6 Date

501.4.2.3.2 Specific revisions to the standards in a format that clearly identifies the manner in which the standards are to be altered (ie. underline/strikeout format or equivalent). Any proposal to change that does not include proposed alteration(s) shall be rejected and returned to the proponent.

501.4.2.3.3 Substantive reason(s) or justification for each proposed change. The lack of substantive justification for a proposed change may result in the return of the proposals to change to the proponent(s).

501.4.2.3.4 Supporting documentation that may be needed for the reasoned evaluation of the proposal.

501.4.2.4 Proposals to change these standards shall be considered and evaluated at least annually.

501.4.3 Standards Revision Process.

501.4.3.1 Revision to these standards shall occur only after the relevant proposals to change have been subjected to public scrutiny and comment using the following review process:

501.4.3.1.1 RESNET shall appoint three (3) representatives of the home energy rating industry and three (3) representatives of state energy offices to serve staggered, three-year terms on the Standards Procedure Revision Evaluation Committee. The Revision Evaluation Committee shall be responsible for conducting the periodic evaluation and the annual evaluation of proposals to change through a consensus process, whereby both consenting and the non-consenting opinions are documented and incorporated as comments into each report or proposal to change..

501.4.3.1.2 Following initial evaluation by the Revision Evaluation Committee, proposals to change shall be posted on the RESNET Web Page for a period of not less than 30 days during which public comment shall be accepted.

501.4.3.1.3 Following the public comment period, the Revision Evaluation Committee shall meet to reconcile public comments with the initial comments of the Revision Evaluation Committee and, if changes are determined necessary, a final set of recommended changes with consensus comments that considers public comments shall be prepared on each proposal for change.

501.4.3.1.4 Proposals for change receiving two-thirds majority support from the Revision Evaluation Committee after public comment shall be incorporated into a set of proposed revised amendments that will be submitted to the RESNET Board of Directors for final approval.

501.4.3.1.5 Proposed revisions from the Revision Evaluation Committee shall be approved by a simple majority of the RESNET Board of Directors. Rejection of proposals from the Revision Evaluation Committee shall require a two-thirds majority of the RESNET Board of Directors. Upon approval by the RESNET Board of Directors, the changes shall be incorporated into a set of revised standards. If a proposed revision fails to receive either a simple majority vote for approval or a two-thirds majority vote for rejection, it will be referred back to the Revision Evaluation Committee for further consideration.

501.4.3.2 The revised accreditation procedures shall be published on the RESNET Web Page not later than the end of September each year in which changes are recommended.

Chapter Six

RESNET Standards

600 ACCREDITATION STANDARD FOR SAMPLING PROVIDERS

601 GENERAL PROVISIONS

601.1 Purpose

Sampling is intended to provide certification that a group of new homes meets a particular threshold such as ENERGY STAR, energy code compliance, or qualification for an energy efficiency lending program. It is based on pre-analysis of building plans meeting the intended qualification (e.g. a HERS Index threshold), and subsequent random testing and inspections of a sample set of the homes as-built. 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.

601.2 Scope

This chapter sets out the procedures for the accreditation of sampling providers. Accredited sampling providers shall assume all warranties and liabilities associated with the sampling of homes. RESNET does not provide any warranty, either explicit or implied, that sampled homes will meet or exceed the threshold specifications for the sample set. There may be instances in which state laws or regulations differ from these Standards. In such instances, state law or regulation shall take precedence over this standard.

602 DEFINITIONS AND ACRONYMS

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.

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.

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.

Metropolitan Area - Metropolitan and micropolitan statistical areas as defined by the United States Office of Management and Budget (OMB) and published by the United States Census Bureau at www.census.gov/population/www/estimates/aboutmetro (the most current edition). In areas not included in any defined Metropolitan Area, individual counties may be substituted for the purpose of applying the sampling process.

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

Sampling - An application of the Home Energy Rating process whereby fewer than 100% of a builder's new homes are randomly inspected and tested in order to evaluate compliance with a set of threshold specifications.

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).

Sampling Provider - An entity, accredited through these standards, that oversees the sampling process and issues the sampling certifications that homes meet a particular set of threshold specifications such as the ENERGY STAR specifications adopted by the U.S. Environmental Protection Agency.

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.

603 TECHNICAL REQUIREMENTS FOR SAMPLING

603.1 Sampling Process

603.1.1 Compliance requirements. The testing and inspection of homes for minimum rated features shall be conducted in compliance with the procedures for conducting home energy ratings and Builder Option Packages (BOPs) contained in this Standard.

603.1.2 Homes eligible to be sampled. The homes being sampled shall be of the same construction type using the same envelope systems.

603.1.3 Analysis of Homes. A worst-case analysis shall be performed on each home plan, considering worst-case orientation, all known option packages, and applicable site location(s). If an option or change in the design of the structure is made that differs from those used in the initial analysis in a way that would require more stringent threshold specifications, then that home must be individually rated. At a minimum, this process shall be overseen by a certified rater.

603.1.4 Labeling of Homes

603.1.4.1 Every home plan within a given sample set shall be assigned the same HERS Index as determined by the threshold specification for that floor plan.

603.1.4.2 Every home subjected to this sampling protocol shall be provided with a label in accordance with Section 303.3 of these standards, which contains the following statement: “This home has been certified using a sampling protocol in accordance with RESNET Standards. As such, some or all of the energy features of this home may or may not have been individually inspected or tested.” This label shall be located on the electrical panel and the font shall be a minimum of 10 points.

603.1.5 Sample set of homes. Sampling controls may be applied to any sample set of homes within the same subdivision or metropolitan area and climate zone (as specified in the 2004 IECC), provided the criteria in Item 603.1.2 are met and:

603.1.5.1 Each sample set is made up of homes at the same stage of construction (e.g. pre-drywall, final).

603.1.5.2 For each stage of construction, each sample set will be comprised of homes eligible for the applicable sampling controls within a 30 calendar day period. For example: a sample set that is defined for a pre-drywall inspection must include homes that are eligible for that pre-drywall inspection within a given 30-day period. If fewer than seven (7) homes are available for that phase of inspection, the sample set must be cut off at the number of homes that are available within that 30-day period. This sample set need not be carried through to final inspection; in fact, a whole new sample set may be defined for the final inspection phase based on the homes available for that phase within a new, 30-day period applied to that phase of tests and inspections.

603.1.5.3 Each home subject to sampling is required to be part of an identified set of sampling controls for each test or inspection that is sampled.

603.1.5.4 Each participating subdivision within a metropolitan area is subject to sampling controls on at least one home in any 90 calendar day period.

603.1.5.5 Each participating subdivision within a metropolitan area must start a minimum of one home in any 90 calendar day period.

603.1.6 Application of sampling. The application of the sampling controls in this standard are only required for those tests and inspections that are not conducted on every home. Sampling controls shall be conducted for any tests and inspections not conducted on every home, according to the field testing and inspection requirements of 303.6.2.

603.1.7 Sampling Controls.

603.1.7.1 A complete set of Sampling Controls shall be performed at a minimum ratio of one (1) test or inspection per seven (7) homes within a given sample set. At a minimum, this process shall be overseen by a certified rater.

603.1.7.2 Sampling Providers may complete the sampling controls collectively on a single home or distribute the tests and inspections across several homes within a given sample set, provided the total number of individual tests and inspections meets or exceeds the minimum ratio set forth in 603.1.7.1.

603.1.7.3 To qualify for sampling in a metropolitan area, a builder shall first complete, without any incidence of failure, a complete set of sampling controls on at least seven (7) consecutive homes in that metropolitan area. For this initial phase of testing and inspections, the complete set of sampling controls shall be performed on each of the seven (7) homes.

603.1.7.3.1 Exception: A builder who has been implementing a sampling process for certifying homes in a specific metropolitan area under the EPA's Energy Star for Homes program as of January 1, 2006, will be allowed a one time exception to 603.1.7.3 for that metropolitan area.

603.1.7.3.2: For each newly started subdivision, sampling may begin only after three (3) consecutive homes have been completed without any incidence of failure.

603.1.7.4 Having successfully met the requirements of 603.1.7.3, a Sampling Provider may complete sampling controls for a builder in accordance with 603.1.5., 603.1.7.1 and 603.1.7.2, indefinitely until a “failure” occurs or any of the criteria set forth in 603.1.2 are no longer met (see 603.1.7.8).

603.1.7.5 A complete set of sampling controls, whether performed on a single home or spread across several homes, must be completed whether or not one or more failure(s) are found.

603.1.7.6 When an “initial failure” occurs, the failed item(s) shall be tested or inspected in two (2) additional homes selected from the same sample set. Testing and/or inspections for any item(s) that may become inaccessible during the construction process, (e.g. wall insulation) must be timed so additional testing and/or inspections can occur on other homes in the sample set before they become inaccessible for inspection or testing.

603.1.7.7 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 selected from the same sample set.

603.1.7.8 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.

603.1.8 Multiple “additional failures.” Action is required if three (3) “additional failures” occur within a ninety (90) calendar day period. The required action depends on whether those “additional failures” apply to the same failed item or various failed items.

603.1.8.1 If the multiple “additional failures” all apply to the same failed item, the builder shall submit to 100% inspection of that failed item, for a minimum of seven (7) homes, before resuming sampling of that item. Remaining unrelated sampling controls may be conducted on a sampled basis throughout this process.

603.1.8.2 If the multiple “additional failures” apply to various failed items, or additional failed items are found during testing and inspection of additional homes, the builder must begin again and complete 603.1.7.3 at a minimum, before continuing with sampling.

603.1.8.3 Exception: If a builder conducts a “root cause analysis” on an item or items covered under 603.1.8.1 or 603.1.8.2, and submits it in writing to the sampling provider, sampling may resume as soon as the provider deems that the solution has been implemented. The “root cause analysis” report shall contain at a minimum:

603.1.8.3.1 A written description of the problem(s) covered by the analysis.

603.1.8.3.2 A written explanation of the underlying reason(s) that the problem(s) occurred (e.g. inadequate training of subcontractor(s) or site supervisors, insufficient information or inadequate detail in the plans or specifications, etc).

603.1.8.3.3 A written description of a clearly defined process to correct the underlying cause(s).

603.1.8.3.4 A written description of when and how that process has been carried out.

603.1.8.3.5 A copy of the root cause analysis report shall be kept by the sampling provider as part of the QA file, for a period of time of three (3) years, consistent with the requirements of 102.1.4.8.2.

603.1.9 Quality Assurance. Accredited Sampling Providers shall comply with the rating provider quality assurance procedures contained in Chapter One of this standard.

603.1.9.1 Minimum QA requirements. For the purpose of the quality control requirements in 102.1.4.8, all homes that are qualified by the use of sampling shall be considered to be rated homes. QA file review and field monitoring shall be conducted on a percentage of all the homes certified or qualified under sampling, rather than the percentage of tested and inspected homes.

603.1.9.2 The field QA required in 102.1.4.8 may be conducted on any of the qualified or certified homes within the sample sets, and shall not be limited to the tested and inspected homes.

603.1.9.3 The provider’s QA designee shall be responsible for monitoring compliance with the sampling process (603) and maintaining records in accordance with the requirements of 102.1.4.8.2

604 ACCREDITATION CRITERIA

604.1 Sampling Provider/Rater Minimum Requirements

All sampling providers shall be accredited by RESNET as a Home Energy Rating Provider.

604.1.1 In order to be eligible to be a sampling provider, the RESNET accredited rating provider shall complete a minimum of twenty-five (25) confirmed ratings that have been documented to be accurate by the rating provider's quality assurance designee.

604.1.1.1 Exception: A Provider who has been implementing a sampling process for certifying homes in a specific metropolitan area under the EPA's Energy Star for Homes program as of January 1, 2006, will be allowed a one time exception to 604.1.1 for that metropolitan area.

604.1.2 The sampling provider shall demonstrate to RESNET a minimum insurance coverage of \$1,000,000 in general liability coverage and \$1,000,000 in professional liability coverage.

604.1.3 Sampling providers participating in sampling shall be required to ensure that the specifications for the minimum rated features for the sampled homes be communicated to the personnel or trades responsible for completing the work.

604.1.4 Builders shall not certify or qualify homes in which they have a financial interest, using the sampling standard.

604.2 Certification Standards

Certification and recertification of raters responsible for sampling inspections shall meet the minimum requirements for raters contained in Chapter Two of this standard.

604.3 Minimum Standards For Sampling Provider's Operation Policies and Procedures
Minimum Standards for Sampling Provider's Operation Policies and Procedures must be written and provide for the following:

604.3.1 Field inspections and tracking of all homes in the sampling control set for verifying threshold technical specifications and tracking failures and re-inspections.

604.3.2 Blower Door Testing completed for sample sets in which the threshold specification include credit for reduced air infiltration lower than the default value.

604.3.3 Duct testing completed for sample sets in which the threshold specifications include credit for reduced air distribution system leakage lower than the default value.

604.3.4 Written Sampling Inspector discipline procedures that includes progressive discipline involving Probation - Suspension – Termination.

605 ACCREDITATION PROCESS

605.1 Sampling Provider Accreditation

605.1.1 Sampling Provider accreditation will be through the Residential Energy Services Network (RESNET).

605.1.2 Sampling Providers must meet the accreditation criteria listed above and must maintain their status as accredited Home Energy Rating Providers in good standing.

605.1.3 Sampling provider's accreditation must annually be renewed by RESNET.

605.2 National Registry of Accredited Sampling Providers

The Residential Energy Services Network (RESNET) will maintain the national registry of accredited Sampling Providers and will post it on its web site.

605.3 Path to Sampling Provider Accreditation

605.3.1 RESNET Review. An entity seeking accreditation must file its application with RESNET. RESNET shall appoint a Sampling Accreditation Review Committee to review applications for sampling provider accreditation.

605.3.2 Confidentiality of Information.

Any Sampling provider submitting the required application information and desiring to have certain information treated as confidential in order to limit disclosure shall, at the time of submission, attach a statement specifying the proprietary information and requesting confidentiality.

605.3.3 Review and Notification.

605.3.3.1 Within fifteen (15) days of receipt of the completed application, RESNET staff will do an initial review of the application and forward to the Sampling Accreditation Review Committee.

605.3.3.2 Within forty five (45) days of receipt of a complete application, the Sampling Accreditation Review Committee will review the submission for compliance to the accreditation standards set forth within and either, forward the application and review checklist to RESNET and notify the applicant of this action, or forward to the applicant a request for additional information or clarification.

605.3.3.3 Within fifteen (15) days of receipt of the recommendation of the Sampling Accreditation Review Committee, RESNET will review the submissions, make a determination of whether the applicant meets the accreditation standard, and if it does, issue a unique Sampling Provider Accreditation identification number. This initial accreditation is valid for a period of one year from the date of issuance. The accreditation will be incorporated into a national registry of accredited Sampling Providers and listed on the RESNET web site. In order to maintain currency and credibility for the registry, renewal of accreditation is required annually.

605.3.3.4 If RESNET determines that the applicant does not meet the accreditation standard, it shall inform the applicant, identify where the applicant failed to meet the accreditation standard, and inform the applicant its right of remedy.

605.3.3.5 Responsibilities of Accredited Sampling Providers. The accredited Sampling Provider is responsible for ensuring that all of the Sampling inspections conducted and issued by the system shall comply with all of the criteria by which the system was accredited.

606 RENEWAL

606.1 Sampling Provider Application for Renewal

Accredited Sampling Providers must submit an “Application for Renewal” no later than one hundred twenty (120) days prior to the expiration of the current accreditation period. Renewal shall be required one year after the issuance of the unique accreditation registration number by RESNET. Renewal applications will be processed in the same manner as an initial application.

606.2 Late Application

Applications received later than specified above will be processed, to the maximum extent feasible, so that the accreditation does not expire. Should the expiration date pass, the applicant will be granted an extension not to exceed thirty (30) days.

606.3 Successful Renewals

Successful renewals will be posted on the national registry and communicated to the applicant by RESNET.

606.4 Renewal Applications Extending Beyond the Grace Period

Renewals extending beyond the grace period will be noted as “pending” on the national registry and the applicant will be advised to cease representing themselves as accredited until the application receives approval.

606.5 Accreditation Not Renewed

Accredited Sampling Providers that elect not to renew or fail to meet renewal requirements will be removed from the national registry and so advised.

606.6 Appeals

A Sampling Provider whose accreditation has been revoked, and is exercising the right of appeal (see section 608 below) will be noted as pending and the Sampling Provider will be advised to cease representing themselves as accredited until the appeal is resolved.

606.7 Program Element Changes

It is the accredited Sampling Provider’s responsibility to provide RESNET with any proposed changes in the program’s minimum sampling inspector certification procedures, minimum inspector training standards, minimum inspector certification standards, operation policies and procedures, or other information that effects its meeting the minimum accreditation criteria. Proposed changes will be evaluated by the accrediting review body in the same manner as the original or renewal application.

607 SUSPENSION AND REVOCATION OF ACCREDITATION

607.1 For Failure to Correct Deficiencies of the Accredited Sampling Provider's Sampling Procedures

If RESNET determines at any time that an accredited Sampling Provider has failed to adhere to the accreditation requirements, the Sampling Accreditation Review Committee shall notify the Sampling Provider of the specified deficiencies and shall require that specific corrective action, set forth in the notification, be taken not later than thirty (30) calendar days after the date set forth in such notification.

607.1.1 In the event that the deficiencies have not been remedied, RESNET shall have the authority to immediately begin the process of suspension by issuance of a Notice of Suspension Proceedings. Such Suspension Proceedings shall follow the due process procedures contained in 607.3 below. The notice may be appealed in accordance with procedures set forth in section 608.

607.1.2 In the event that the specified deficiencies are not corrected within the application period set forth in the Notice of Suspension, a Notice of Revocation Proceeding shall be issued by the Sampling Accreditation Review Committee. Such Revocation Proceedings shall follow the due process procedures contained in section 608. below. The Notice of Revocation may be appealed in accordance with the procedures set forth in section 608.

607.2 For Cause

Any Sampling Provider accredited by RESNET may have their accreditation revoked in any of the following circumstances:

607.2.1 Upon a determination by RESENT that an accredited Sampling Provider has acted in such a manner as to impair the objectivity or integrity of the accreditation program or harm the reputation of the Sampling Accreditation Review Committee including, but not limited to submission of false information to the accreditation review body, or failure to submit to the accreditation review body any material information required to be submitted by the Sampling Provider, in accordance with obtaining or maintaining accreditation; knowingly or negligently issuing Sampling checklists that fail to meet all of the accreditation criteria; or misrepresentation by the Sampling provider in advertising or promotional materials of its accreditation status in general or with respect to any service provided by the Sampling Provider.

607.2.2 Pursuant to any of the express provisions of section 607, or any of the express provisions of the accreditation application, including but not limited to the following:

607.2.2.1 Sampling Provider goes out of business;

607.2.2.2 Sampling Provider does not re-apply at the end of existing accreditation period;

607.2.2.3 Failure to satisfy accreditation requirements on renewal;

607.2.2.4 Investigated and validated consumer complaints;

607.2.2.5 Willful misconduct;

607.2.2.6 Failure to disclose a self-serving interest.

607.2.3 Upon expiration of a Sampling Provider's right to appeal a suspension of accreditation pursuant to section 608.

607.3 Suspension/Revocation Due Process

RESNET shall comply with the following due process procedures in considering any suspension or revocation actions against an accredited Sampling Provider.

607.3.1 Notice. RESNET may, at its discretion, initiate a suspension or revocation action against an accredited Sampling Provider by providing the provider and the accrediting review body that reviewed the Sampling Provider's application written notice of the action sent by certified mail, return receipt requested, to the last known address of the Sampling Provider. Such notice shall inform the subject Sampling Provider of the entire basis and justification for the action.

607.3.2 Contest of Proposed Suspension/Revocation. After exhausting the appeals process a respondent may contest a suspension/revocation by requesting a hearing with RESNET within 30 days of receipt of the determination of the appeal process.

607.3.3 Hearing. If the respondent files a timely response contesting the suspension/revocation and requests a hearing, RESNET will appoint an independent, unbiased, and qualified hearing officer and issue a decision on the suspension/revocation. The hearing officer will review the notice of suspension/revocation and the respondent's contest. If the hearing officer finds that the respondent's contest has raised substantiated and valid factual argument to the contrary of the proposed suspension/revocation, the respondent shall be afforded an opportunity to participate in an open and public telephonic hearing, and to submit additional documentary evidence, and rebuttal argument to any material contained in the original notice of suspension/revocation or developed during the course of the hearing officer's investigation. The notice shall be provided to the respondent by written notice by certified mail, return receipt requested, to the last known address of the rating system at a minimum of 120 days before the scheduled hearing.

607.3.4 Hearing Officer's Decision. The hearing officer shall issue a written decision on the proposed suspension/revocation that is based on all the information contained in the hearing record including statements of the factual and legal basis of the decision. If the hearing officer decides to impose suspension or revocation, the decision must include findings regarding all disputed materials, and justification for all findings. A suspension/revocation decision by the hearing officer shall take effect upon the issuance of the hearing officer's decision and the written notification of such decision to the respondent.

607.3.5 No Ex Parte Communication. No ex Parte communication between the parties and the hearing officer shall be allowed.

608 APPEALS PROCEDURES FOR APPLICATION NOT BEING APPROVED, SUSPENSION, OR REVOCATION

608.1 Notification

608.1.1 RESNET shall notify the Sampling Provider and the accreditation review body of any decisions. Additionally, the committee shall clearly notify the Sampling Provider of the procedures and right to remedy.

608.2 Appeal

608.2.1 In the event that an accreditation application has been denied or revoked, or if the Sampling Provider has been placed on probation or suspended, the Sampling Provider shall have the right, for a period of 30 calendar days after the date of notice, to appeal to the RESNET Quality Assurance and Ethics Committee's Appeals and Ethics Subcommittee. The response shall contain all pertinent and substantive information and argument that is in contradiction to the proposed suspension/revocation, including identification of all disputed materials and facts.

In the event that an accreditation application was not approved or the accreditation has been suspended, the home energy rating system shall have the right, for a period of 30 calendar days after the date of notice, to appeal to the RESNET Board of Directors.

608.2.1.1 An appeal shall be in writing and sent by certified mail or other method which provides evidence of delivery to the Chairman of the RESNET Quality Assurance and Ethics Committee and shall specify the basis for the appeal.

608.2.1.2 The appellant Sampling Provider may, at the time of noticing its appeal, request in writing, a hearing by the RESNET Quality Assurance and Ethics Committee's Appeals and Ethics Subcommittee. In such an event, the subcommittee shall, not later than 7 calendar days after the filing of the notice of appeal, notify the appellant home Sampling Provider of the date of the hearing, which shall be held as expeditiously as possible, but not later than 30 calendar days after the receipt of the notice of appeal.

608.2.1.3 In the event that a Sampling Provider's appeal of its probation or suspension is rejected by the RESNET Quality Assurance Committee and Ethics Committee's Appeals and Ethics Subcommittee, the Sampling Provider shall have the right, for a period of 30 calendar days after the date of the notification of the denial of the appeal to appeal to the RESNET Quality Assurance and Ethics Committee.

608.2.1.4 In the event that a Sampling Provider's appeal of its revocation is rejected by RESNET Quality Assurance and Ethics Committee, the Sampling Provider shall have the right for a period of 30 calendar days after the notification of the denial of the appeal to appeal to the RESNET Board of Directors.

609 REVISION OF ACCREDITATION PROCEDURES

609.1 Revision and Amending Sampling Accreditation Procedures

From time to time it may become necessary to revise or amend the accreditation procedures set forth in these standards. Circumstances that may lead to such revision or amendment include but are not limited to the following:

609.1.1 To respond to periodic reviews by the promulgating bodies;

609.1.2 To respond to changes in law;

609.1.3 To respond to technological innovations; and

609.1.4 To respond to proposals for change from interested parties.

609.2 Periodic Review of Accreditation Procedures

At least triennially, the provisions set forth in these accreditation procedures shall be reviewed by a Revision Evaluation Review Committee appointed by RESNET. The review committee may be composed of representatives of the EPA ENERGY STAR Homes Program, accredited home energy rating systems, and accredited Sampling Providers.

609.2.1 At a minimum, this review shall include consideration and evaluation of changes in the law, technological innovations, and comments received from interested parties.

609.3 Process for Submitting Proposals to Change Accreditation Procedures

609.3.1 Proposals to change these accreditation procedures may be submitted in writing, at any time, to RESNET.

609.3.2 All proposals to change that meet the criteria set forth in this section of these procedures shall be accepted for consideration and evaluation.

609.3.3 Proposals to change these accreditation procedures shall include the following:

609.3.3.1 Identification of the proposal to change, including the following minimum information:

609.3.3.1.1 Proponent(s) full name(s),

609.3.3.1.2 Organizational affiliation(s) or representation(s),

609.3.3.1.3 Full mailing address(es),

609.3.3.1.4 Daytime phone number(s),

609.3.3.1.5 Signature of primary proponent, and

609.3.3.1.6 Date

609.3.4 Specific revisions to the procedures in a format that clearly identifies the manner in which the procedures are to be altered (i.e. underline/strikeout format or equivalent). Any proposal to change that does not include proposed alteration(s) shall be rejected and returned to the proponent.

609.3.5 Substantive reason(s) or justification for each proposed change. The lack of substantive justification for a proposed change may result in the return of the proposals to change to the proponent(s).

609.3.6 Supporting documentation may be needed for the reasonable evaluation of the proposal.

609.4 Proposals to Change these Procedures Shall be Considered and Evaluated at Least Annually

609.4.1 The effective date of any annual revisions to these accreditation procedures shall be January 1.

609.4.2 Only those proposals to change that are received on or prior to the last working day of June shall be considered for the revisions to these accreditation procedures that may become effective on January 1 of the following year.

609.5 Accreditation Procedure Revision Process

609.5.1 Revision to these accreditation procedures shall occur only after the relevant proposals to change have been subjected to public scrutiny and comment using the following review process:

609.5.1.1 The Revision Evaluation Review Committee shall be responsible for conducting the periodic evaluation and the annual evaluation of proposals to change through a consensus process, whereby both consenting and the non-consenting opinions are documented and incorporated as comments into each report or proposal to change.

609.5.1.2 Following initial evaluation by the Revision Evaluation Review Committee, proposals to change shall be posted on the RESNET web site for a period of not less than thirty (30) days during which public comment shall be accepted.

609.5.1.3 Following the public comment period, the Revision Evaluation Review Committee shall meet to reconcile public comments with the initial comments of the Revision Evaluation Committee and, if changes are determined necessary, a final set of recommended changes with consensus comments that considers public comments shall be prepared on each proposal for change.

609.5.1.4 Proposals for change receiving two-thirds majority support from the Revision Evaluation Review Committee after public comment shall be incorporated into a set of revised accreditation procedures.

609.5.2 The revised accreditation procedures shall be published on the RESNET web site and submitted to the original adopting members of these accreditation procedures not later than the end of September each year in which changes are recommended.

610 EFFECTIVE DATES

610.1 Application

April 1, 2007 – All sampling providers must submit the new Sampling Provider Application to RESNET for review and approval.

610.2 Implementation

July 1, 2007 – New Standard must be implemented by all raters and providers.

NATIONAL HOME ENERGY RATING TECHNICAL GUIDELINES

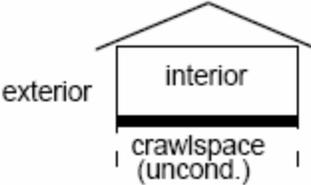
December 28, 2005

Appendix A

ON-SITE INSPECTION PROCEDURES FOR MINIMUM RATED FEATURES

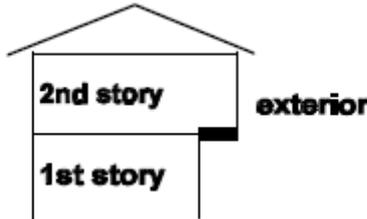
Excerpted from: *Guidelines for Uniformity: Voluntary Procedures for Home Energy Ratings, Version 2.0*, Home Energy Rating Systems Council (HERSC), August 1996.
Reprinted with the permission of the HERS Council.

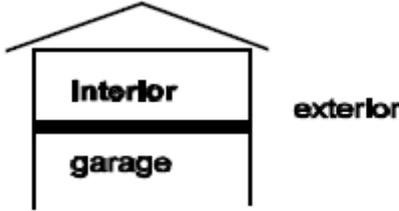
ON-SITE INSPECTION PROCEDURES FOR MINIMUM RATED FEATURES

Building Element: Foundation		
Rated Feature	Task	On-Site Inspection Protocol
Conditioning of space	Determine whether a crawl space or basement is unconditioned, indirectly conditioned or directly conditioned	<p>To determine whether a crawl space or basement is conditioned, assess the insulation placement in the walls or floor/ceiling assembly.</p> <p>A vented crawl space is considered unconditioned regardless of the location or existence of insulation. This is because the ambient temperature of the crawl space is close to the outdoor ambient temperature.</p> <div style="text-align: center;">  <p>The diagram shows a simple house cross-section. A triangle represents the roof. Below it is a rectangle representing the interior space, labeled 'interior'. Below the interior space is a thick horizontal line representing the floor/ceiling assembly. Below this assembly is a rectangular area representing the crawlspace, labeled 'crawlspace (uncond.)'. To the left of the house is the label 'exterior'.</p> </div> <p>An unvented crawl space or basement may be considered either unconditioned, indirectly conditioned, or fully conditioned, based on the following criteria:</p> <p><i>Unconditioned</i> -Foundation walls are not insulated, floor/ceiling assembly is insulated, and any heating or plumbing distribution systems in the space is insulated. The intention in an unconditioned crawl space or basement is to minimize the heating system losses into the space by means of the distribution and plumbing insulation, and to minimize heat flow through the insulated floor/ceiling assembly.</p> <p><i>Conditioned, indirectly</i> -Foundation walls are not insulated with floor/ceiling assembly insulated and distribution system in the space uninsulated, or foundation walls insulated with floor ceiling assembly insulated or non-insulated and distribution system uninsulated. In an indirectly conditioned crawl space or basement, heating or cooling is unintentionally delivered to the space either through the floor/ceiling assembly or by unintentional losses</p>

		from the heating/cooling system. Indirectly conditioned spaces are typically between the temperature of the outdoor ambient temperature and the indoor conditioned space temperature.
--	--	---

Building Element: Foundation (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Conditioning of space (continued)	Determine whether a crawl space or basement is unconditioned, indirectly conditioned or directly conditioned (continued)	<i>Conditioned, directly</i> -Foundation walls insulated or uninsulated and basement or crawl space is intentionally or unintentionally conditioned, by means of a forced air heating or cooling system, hydronic heat, electric resistance, etc. Fully conditioned spaces are typically maintained at the same temperature as the above grade spaces. The distinction between indirectly and directly conditioned basement spaces may be difficult, but is important from a heat transfer perspective. Rater judgment will have to be utilized in many cases. Interview the owner about the temperature in the basement during the heating season, and assess the potential for standby loss from the heating equipment and distribution system, e.g., jacket insulation, leakiness of ducts, insulation on distribution systems, etc.
Construction type	Identify floor over crawl space	A crawl space is typically defined as a foundation condition with a clear vertical dimension 4 feet high or less. Crawl spaces may be vented or unvented. Vented crawl spaces have some form of vent or louver in the crawl space walls, or are constructed in such a manner so that air moves freely from outside the walls to inside the crawl space. Unvented crawl spaces are constructed without any form of vents or louvers in the wall, and are constructed to exclude, to the greatest extent possible, air leakage from outside the walls to inside the crawl space. Crawl spaces may be accessed by a hatchway in the floor of the house or in the wall of the crawl space. To identify a crawl space, look for foundation vents and/or stairs leading up to floor levels from the outside of the building.
	Identify floor over full basement	A full basement has characteristics similar to an unvented crawl space, except that the clear vertical dimension is typically greater than 4 feet. Stairs that lead from the main floor to a below grade space are an indication of a basement in a house, although a house may have a basement with access similar to a crawl space access.

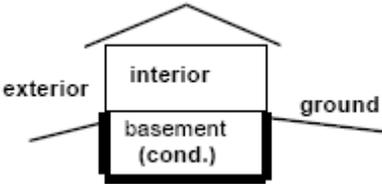
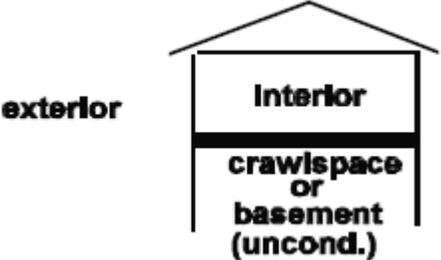
	Identify floor over exterior space	<p>Floor area that borders exterior unenclosed space above grade is considered floor to exterior. For example, in a two story house, the second story may extend horizontally further than the first story, creating some floor area that is exposed to the exterior.</p> 
--	------------------------------------	---

Building Element: Foundation (continued)		
Rated Feature	Task	On-Site Inspection Protocol
	Identify floor over unconditioned garage	<p>Identify floors over an unconditioned garage.</p> 
	Identify slab on grade foundation	<p>A slab on grade can be recognized by the absence of either a crawl space or basement. A slab on grade is constructed by pouring a concrete slab directly on the ground as the floor for the house.</p> 
	Identify walkout basement	A walkout basement, if fully conditioned, is typically considered partially slab on grade

		construction (where the floor level is above grade) and partially a basement (where the floor level is below grade).
Interior surface condition	Determine the inside surface condition of floor (exposed or covered)	<p><i>Covered</i> -If floor is covered with wall-to-wall carpet, consider it covered. Floors with only area rugs are not considered covered.</p> <p><i>Exposed</i> -If the floor has tile, linoleum or wood, consider it exposed.</p>

Building Element: Foundation (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Surface area	Measure floor dimensions	<p>Measure floor dimensions in accordance with ANSI Z765-1996 with the exception of Section 3 Paragraph 6 (floor areas with ceiling heights of less than 5' will be included in finished square footage).</p> <p>For conditioned basements and crawl spaces, find dimensions of basement walls and floor. Divide walls into above and below grade sections.</p> <p>Measure the house or assembly element (window, wall, ceiling, etc.) to the nearest inch, and record the square footage to the nearest square foot. Use exterior measurements; those measurements should start at the exterior finished surface of the outside wall. Openings to the floor below should not be included in the square footage calculation, with the exception of stairways; stairways and associated landings are counted as square footage on both the starting and ending levels. Do not include the "footprint" of protruding chimneys or bay windows. Do include the "footprint" of other protrusions like a cantilever when it includes finished floor area. Do include the square footage of separate finished areas that are connected to the main body of the house by conditioned hallways or stairways.</p> <p>Note to divide basement and crawl space walls into above and below grade.</p>
Thermal mass	Determine presence of thermal mass	<p>Concrete slabs and basement walls when uninsulated or insulated on the exterior can be considered as thermal storage mass when combined with solar gain from south fenestration. Note type of thermal mass: concrete, brick, tile, water.</p>

		<p>South fenestration is defined as fenestration oriented between 45E SE to 45E SW.</p> <p>Slab-on-grade construction in climates with more than 3600 HDD (65) may not be considered solar storage mass unless properly insulated (edge, perimeter, or under slab).</p>
--	--	---

Building Element: Floor of conditioned basement or crawl space		
Rated Feature	Task	On-Site Inspection Protocol
Insulation	Determine insulation in walls and floor of conditioned basement or crawl space	<p>If basement or crawl space is determined to be fully conditioned, its walls and floor are considered part of the building envelope. (The floor between the house's ground floor and the basement or crawl space is considered an interior boundary with no associated heat transfer calculated.)</p>  <p>Determine insulation type, thickness and R-value in walls. Wall insulation may be located inside foundation wall (studs and batts, foam under drywall, etc.), integral with foundation wall (insulated cores of block wall, insulating concrete block such as insulating formwork) or outside the foundation wall (rigid foam insulation).</p>
Insulation	Determine amount of floor insulation	

		Use the inspection guidelines under “Walls—Insulation value” to assess “Grade I”, “Grade II”, or “Grade III” installation. Note: in addition to the inspection guidelines under “Walls”, “Grade I” installation for floor insulation also requires that the insulation be installed in complete contact with the subfloor surfaces it is intended to insulate. For loose fill applications, multiply the thickness of the insulation (in inches) by the appropriate R-value per inch based on the insulation type in order to calculate the total existing floor insulation R-value. Floor insulation over unconditioned basements need not be enclosed to attain a “Grade II” or “Grade I” assessment; floor insulation over vented or ambient conditions does.
--	--	--

Building Element: Slab-on-grade		
Rated Feature	Task	On-Site Inspection Protocol
Perimeter	Determine perimeter of slab foundation	Determine the perimeter of the slab foundation by measuring each dimension to the nearest ½ foot and adding them together.
Insulation	Determine if slab perimeter insulation exists	<p>If present, slab perimeter insulation is usually installed on the outside of the slab and extends both above and below grade.</p> <p>To identify slab perimeter insulation, look for a protective coating above grade as opposed to the usual exposed slab edge at any conditioned space(s).</p> <p>Move a little bit of dirt away from an edge of the slab where conditioned space is located. If present, the rigid insulation around the perimeter of the slab may be seen. However, it may be difficult to visually verify the existence of slab perimeter insulation because of the protective covering which may be installed over the rigid insulation.</p> <p>Slab insulation may also occur between the foundation wall and the slab itself, although this is harder to assess and verify. If the floor has carpeting, a sharp needle may be poked through the carpet near the baseboard on an outside wall. If the needle penetrates beyond the depth of the carpet, there is probably foam insulation between the slab and foundation wall.</p>

		Under slab insulation cannot be assumed to exist unless visually verified by a photograph of construction, at chase way, at sump opening or at plumbing penetrations.
--	--	---

Building Element: Walls		
Rated Feature	Task	On-Site Inspection Protocol
Color	Determine the color of the wall	Identify the color of the wall as light, medium, or dark.
Construction type	Determine the structural system of walls	<p><i>Wood framing</i> -is very common in residential construction. Wood studs are located 16" or 24" on center all along the wall. Knocking on the wall will give a "hollow" sound in the cavities between the studs and a "solid" sound at the stud locations.</p> <p><i>Metal framing</i> -can be found in some newer residential construction. A strong magnet slid against the wall will hold to metal framing. Also check inside the attic at the edges for evidence of metal wall framing. <i>Masonry walls</i> - include walls constructed of concrete or brick. A wood framed wall with brick veneer would not be considered a masonry wall. Also note the siding or finish material on the wall.</p> <p><i>Foam core walls</i> - are a sandwich panel consisting of a foam center with outer layers of structural sheathing, gypsum board or outer finish materials. Foam core panels may be structural (load bearing) or non-structural. Non-structural panels are frequently used in post and beam construction.</p> <p><i>Log walls</i> - are typically solid wood walls, using either milled or rough logs or solid timbers. Some homes may have the appearance of solid log walls, yet may actually be wood frame walls with siding that looks like solid logs inside and out. Some log walls are manufactured with insulated cores. Unless manufacturer's documentation is available or visual inspection of insulation type and thickness can be made, assume no added insulation exists in a log wall.</p>

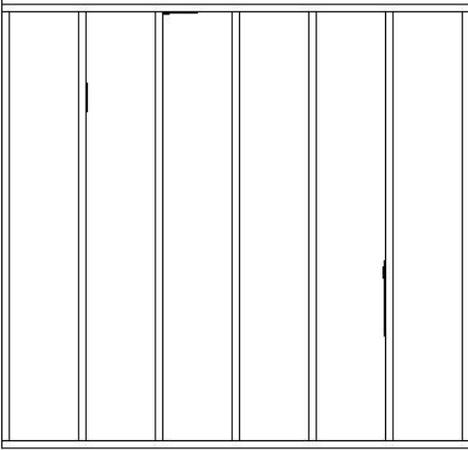
Building Element: Walls (continued)
--

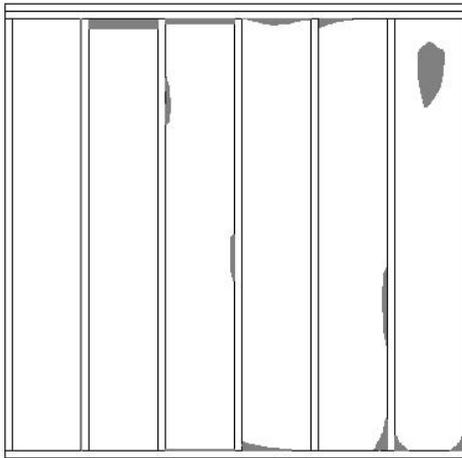
Rated Feature	Task	On-Site Inspection Protocol
Framing members	Determine framing member size for all framed walls exposed to unconditioned space	<p>To determine whether 2x4 or 2x6 framing exists:</p> <p>Measure the width of the window jambs;</p> <p>Subtract the widths of the wall coverings and sheathing materials (approximately .25" to 1.0" for stucco, .5" to .6" for interior sheetrock, and .5" to .75" for other exterior siding materials);</p> <p>Compare the remaining width to 3.5" for a 2x4 wall or 5.5" for a 2x6 wall;</p> <p>If exposed garage walls exist, examine them for reference (although they will not <i>always</i> be the same as other walls);</p> <p>If a wall does not come close to the framing width of a 2x4 or 2x6, inspect for foam sheathing on the inside or outside of the walls. In superinsulated construction, "double stud" or "strapped" walls may account for thickness greater than 5.5". For brick veneer walls, assume 4.5" - 5" for brick, airspace and sheathing material.</p> <p>Check the framing member size on all sides of the house. If an addition has been added, be sure to check the walls of the addition separately. If the house has more than one story, check the framing member size for each floor.</p>

Building Element: Walls (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Insulation value	Determine type and thickness of existing insulation and resultant R-	<p><u>Framed Walls</u></p> <p>Check at plumbing outlet under sink or, in order of preference, remove cable outlet plate, telephone plate, electrical switch plates and/or electrical outlet plates on exterior walls.</p>

	value	<p>Probe the cavity around the exposed plate with a non-metal device (such as a plastic crochet hook or wooden skewer). Determine type of insulation (fiberglass, cellulose insulation, foam, etc.). Inspect outlets/switch plates on each side of the house to verify that all walls are insulated.</p> <p>Multiply the wall framing member size (in inches) by the R-value per inch. Be sure to use the actual thickness of the insulation when calculating the total insulation R-values. Use 3.5" for 2 x 4 walls and 5.5" for 2 x 6 walls constructed after 1945.</p> <p>Parts of the house that were added later must be checked separately from the original walls.</p> <p><u>Sheathing</u> Insulated sheathing may exist on walls, but can be difficult to verify. Walls with insulated sheathing may be thicker than walls without insulated sheathing. Visual verification of insulated sheathing may be found in the attic at the top of the wall, exterior wall penetrations, and at the connection between the foundation and the wall.</p>
--	-------	--

Building Element: Walls (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Insulation Installation	Determine cavity insulation installation characteristics	<p>When it is possible to inspect insulation as installed (i.e., new construction), inspectors shall rate the installation as “Grade I, II, or III” according to the following guidelines, regardless of insulation material or installation process. Note that all insulation installation techniques require proper care to ensure they are completed correctly; if they are not, thermal performance can suffer dramatically. These guidelines apply to cavity fill insulation, continuous rigid insulation, and any other field-installed insulation products.</p> <p>1. "Grade I" shall be used to describe insulation that is generally installed according to manufacturers instructions and/or industry standards. A "Grade I" installation requires that the insulation material uniformly fills each cavity side-to-side and top-to-bottom, without substantial gaps or voids around obstructions (such as blocking or bridging), and is split, installed, and/or fitted tightly around wiring and other services in the cavity. To inspect, probe in, around, or through the insulation and/or vapor retarder in several places to see whether these requirements are met. Replace or repair the vapor retarder and insulation as necessary. During inspection (typically before drywall is installed), if the exterior sheathing is visible from the building interior through gaps in the cavity insulation material, it is not considered a “Grade I” installation.</p> <p>To attain a rating of "Grade I", wall insulation shall be enclosed on all six sides, and shall be in substantial contact with the sheathing material on at least one side (interior or exterior) of the cavity.</p> <p>For rim or band joist insulation ,, use the inspection guidelines under “Walls—Insulation value” to assess “Grade I”, “Grade II”, or “Grade III” installation..</p> <p>For exterior applications of rigid insulation, insulation shall be in firm contact with the structural sheathing materials, and tightly fitted at joints to be considered a “Grade I” installation.</p>

		<p>For faced batt insulation, Grade I can be designated for side-stapled tabs, provided the tabs are stapled neatly (no buckling), and provided the batt is only compressed at the edges of each cavity, to the depth of the tab itself, and provided it meets the other requirements of Grade I.</p> <p>For sprayed or blown-in products, density shall be sufficient that the fill material springs back when compressed slightly with a hand or finger, and provided it meets the other requirements of Grade</p> <p>Interpretation: The following illustrations represent the boundary conditions between Grade I and Grade II, that is, the installation shall be at least this good to be labeled as “Grade I”:</p>  <p>Occasional very small gaps are acceptable for “Grade I”.</p>
--	--	---



Compression or incomplete fill amounting to 2% or less, if the empty spaces are less than 30% of the intended fill thickness, are acceptable for “Grade I”.

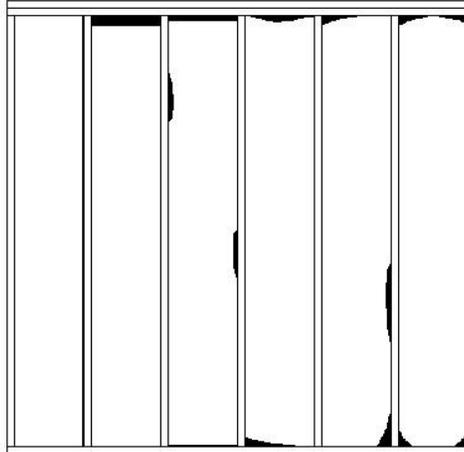
The following standards may be applied as a reference: NAIMA, Recommendations for Installation in Residential and Other Light-Frame Construction—Fiber Glass Home Insulation (PUB # BI402), Recommendations for Installation in Residential and Other Light-Frame Construction—Fiber Glass Loose Fill Insulation (PUB # BI403), CIMA, Technical Bulletin #2 -- Standard Practice for Installing Cellulose Building Insulation, Technical Bulletin #3-- Standard Practice for Installation of Sprayed Cellulosic Wall Cavity Insulation. For other products and materials, manufacturer's installation instructions will apply.

2. "Grade II" shall be used to describe an installation with moderate to frequent installation defects: gaps around wiring, electrical outlets, plumbing and other intrusions; rounded edges or “shoulders”; or incomplete fill amounting to less than 10% of the area with 70% or more of the intended thickness (i.e., 30% compressed); or gaps and spaces running clear through the insulation amounting to no more than 2% of the total surface area covered by the insulation. To attain a rating of "Grade II", wall insulation shall be enclosed on all six sides, and shall be in substantial contact with the

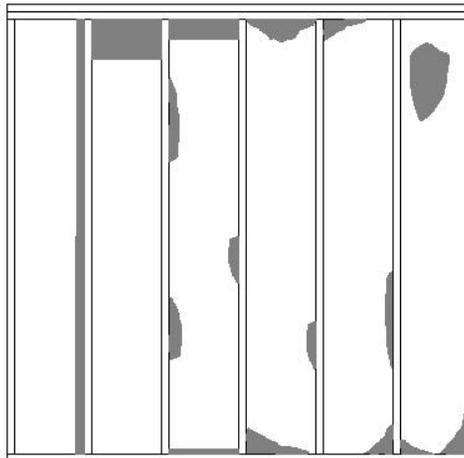
sheathing material on at least one side (interior or exterior) of the cavity.

Interpretation:

The following illustrations represent the boundary conditions between Grade II and Grade III, that is, the installation shall be at least this good to be labeled as “Grade II”:



No more than 2% of surface area of insulation missing is acceptable for “Grade II”

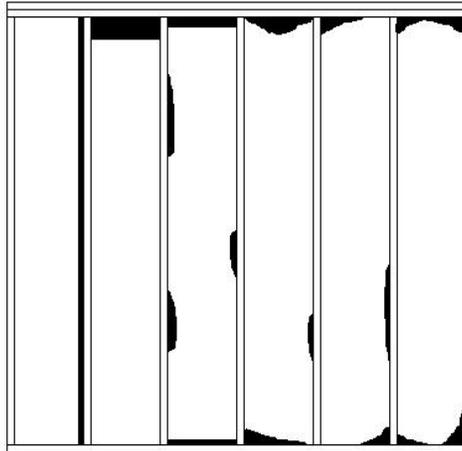


No more than 10% of surface area of insulation compressed or incomplete fill, by up to 30% (70% or more of intended thickness) is acceptable for "Grade II".

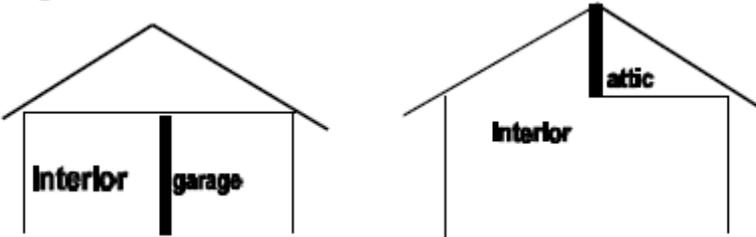
3. "Grade III" shall be used to describe an installation with substantial gaps and voids, with missing insulation amounting to greater than 2% of the area, but less than 5% of the surface area is intended to occupy. More than 5% missing insulation shall be measured and modeled as separate, uninsulated surfaces according to 3.B.5.p. This designation shall include wall insulation that is not in substantial contact with the sheathing on at least one side of the cavity, or wall insulation in a wall that is open (unsheathed) on one side and exposed to the exterior, ambient conditions or a vented attic or crawlspace. The presence of an air-impermeable barrier such as housewrap will be considered to enclose the building cavities.

Interpretation:

The following illustration represents the boundary conditions between Grade III and the situation whereby one must measure the uninsulated areas; that is, the installation shall be at least this good to be labeled as "Grade III":

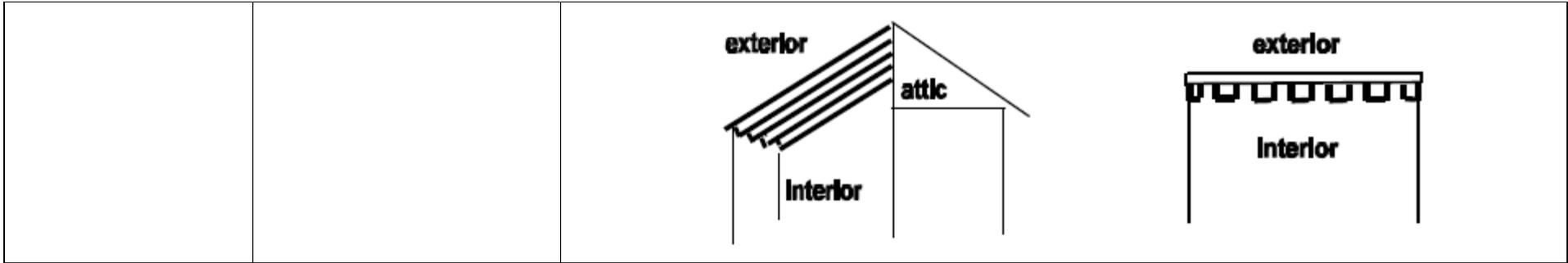


Building Element: Walls (continued)

Rated Feature	Task	On-Site Inspection Protocol
Location	Determine whether walls border exterior space, attic, garage or crawl space	<p><i>Wall to exterior</i> -Walls border exterior space.</p>  <p><i>Wall to enclosed unconditioned space</i> -Walls that border unconditioned attics, garages and crawl spaces.</p> 
Surface area	Determine surface area of all walls exposed to unconditioned space	Measure linear perimeter of the walls to the nearest 1/2 foot. Measure the interior wall height of the walls to the nearest 1/4 foot. Use these measurements to calculate surface area.
Thermal mass	Determine type and thickness of all mass walls	<p>If the dwelling's walls are constructed of concrete, masonry or brick, determine their type and thickness.</p> <p><u>Solid concrete walls (poured)</u> Measure the thickness of the poured concrete wall in inches.</p> <p><u>Concrete Masonry Unit</u> Cinder block or uninsulated concrete wall - hollow in the middle. May contain vermiculite or perlite insulation. Check for additional insulation (interior furring, foam board, foam fill).</p>

		Measure the thickness of the wall in inches.
--	--	--

Building Element: Roof/Ceiling		
Rated Feature	Task	On-Site Inspection Protocol
All ceiling areas between conditioned and unconditioned space	Obtain measurements of all ceiling areas	<p>Measure the linear perimeter of the ceiling area to the nearest ½ foot and use these measurements to calculate surface area of the ceiling.</p> <p>If a ceiling area is vaulted, it may be necessary to calculate dimensions geometrically.</p> <p>Identify the ceiling as one of the following types.</p> <p><u>Ceiling to attic</u> If the ceiling has attic space above (even if the ceiling is vaulted, as in a scissor truss) it is considered ceiling to attic. If there is a vaulted ceiling check it's angle against the angle of the roof -- if the ceiling angle is gentler there is attic space above the ceiling. Also check for an attic access, either separate or from an attic over another part of the house.</p> <div style="text-align: center;"> </div> <p>Framed ceilings fall into two categories:</p> <p><i>Roof on exposed beams or rafters</i> - when you look up from inside the room, you will see exposed beams or rafters.</p>



Building Element: Roof/Ceiling (continued)

Rated Feature	Task	On-Site Inspection Protocol
All ceiling areas between conditioned and unconditioned space (continued)	Determine ceiling construction type (continued)	<p><i>Finished framed ceiling</i> -if the ceiling is framed (has no attic space above it, but you cannot see the rafters because the ceiling is finished with drywall, plaster, paneling, etc.) consider it a finished framed ceiling.</p> 
	Determine the size of the framing members for framed ceilings	<p>Determine the framing member size for framed ceilings exposed to unconditioned spaces.</p> <p>Check the framing by looking for an access through an attic over another part of the house or by looking at the rafters from the outside.</p>
Color	Determine the color of the roof	Identify the color of the roof as light, medium or dark. Also check for a special reflective roof coating.
Construction type	Determine the roof's construction type	<p>Identify the type of roofing surface. Some common types include:</p> <ul style="list-style-type: none"> Asphalt shingle; Pebble/gravel built-up roof; Tile roof; Wood shingle roof; Rubber roof/roof coating; Metal.
Insulation value	Determine R-value of insulation in attic	Measure the average depth in four places.

Building Element: Ceiling (continued)

Rated Feature	Task	On-Site Inspection Protocol
Insulation value	Determine R-value of insulation in attic	<p>Use the inspection guidelines under “Walls—Insulation value” to assess “Grade I”, “Grade II”, or “Grade III” installation. Note: in addition to the inspection guidelines under “Walls”, “Grade I” installation for ceiling insulation also requires that the insulation be installed in complete contact with the drywall or plywood surfaces it is intended to insulate. For loose fill applications, be sure to get four readings which accurately reflect the insulation level (do not just measure the low or high spots; the depth should be representative of the entire attic area being examined). Multiply the average depth of insulation by its R-value per inch to obtain the total R-value. Ceiling insulation need not be enclosed to attain a “Grade II” or “Grade I” assessment. For ceiling insulation, eave baffles or equivalent construction is required to prevent wind washing to be considered “Grade I”.</p> <p>Note whether the cavity insulation leaves the framing exposed, or covers them; if covered, note the thickness that covers the framing.</p>
	Determine the R-value of insulation in framed ceiling	<p>Determine the insulation R-value which exists in the ceiling area (cavity). Use the following method for calculating the overall ceiling R-value:</p> <ul style="list-style-type: none"> • Determine the type of ceiling insulation present (may be a combination of more than one type); • Multiply the R-value of the material by the depth of the insulation; • If there is no access to the framed ceiling, ask the customer for documentation of insulation or use a default value based on age.

Building Element: Roof Ceiling (Continued)		
Rated Feature	Task	On-Site Inspection Protocol
Insulation value	Determine insulation value	<p>The rim joist is the band joist around the perimeter of the floor joists over a basement or crawl space, or between 2 stories of a house.</p> <p><u>Crawl space or Basement</u> From the basement or crawl space, visually identify and measure the depth of insulation at the rim joist. The insulation used is generally fiberglass batts, often folded in an L-shape and attached to the rim joist. Rigid board insulation may also be found.</p>
Insulation value (continued)	Determine insulation value (continued)	<p><u>Between Stories</u> Look for access to the area from a garage or a utility access trap door. Visually identify and measure insulation if it exists. If no access can be found, assume insulation exists at the rim joist between stories if:</p> <ul style="list-style-type: none"> • Insulation was found at the rim joist at the top of the crawl space or basement in the same house; or • Insulation is found in the walls of the same house. <p>Otherwise, assume no rim joist insulation exists.</p>

Building Element: Doors		
Rated Feature	Task	On-Site Inspection Protocol
Construction type	Determine construction type of doors	Determine if the exterior door(s) is fiberglass, metal, or wood by making a close inspection of its texture, distinguishing the sound produced when knocking on it, and checking its side view.
Insulation	Determine whether doors are insulated	<p>Judge whether the exterior door(s) is insulated (or not) by its sound, temperature transfer, labeling, or thermal break.</p> <p><i>Sound</i> - Insulated/solid door will sound dull when knocked on. An uninsulated/hollow door</p>

		<p>will sound hollow.</p> <p><i>Heat transfer</i> - Feel the inside and outside of the door with flat palms. Insulated/solid door will less readily transfer heat. The inside will feel warmer in cold outside weather and cooler in hot outside weather than an uninsulated/hollow door.</p>
Insulation (continued)	Determine whether doors are insulated (continued)	<p><i>Labeling</i> - Check the side view of the door at the hinges for a descriptive label.</p> <p><i>Thermal break</i> - Check the side view of metal doors for thermal breaks.</p>
Surface area	Determine surface area of doors	Measure the surface area of the door(s) to the nearest ½ square foot.

Building Element: Windows		
Rated Feature	Task	On-Site Inspection Protocol
Area	Determine area of windows	<p>Measure the area of the window openings using width times height to the nearest inch.</p> <p>Window openings are measured from the outside edge of the framing and include the frame width.</p>

Building Element: Windows (continued)		
Construction type	Determine window framing and glazing characteristics	<p><u>Framing Type</u> Examine each window frame in order to determine the type of material used. Open the window and examine it to see whether the frame is made of metal, wood, or vinyl. Tap the frame with fingernail or knuckle to test if it's vinyl or metal. Wood frames are usually thicker than metal.</p> <p>If the window is dual-pane or multiple-pane and is metal framed, determine if a thermal break is present by looking for two separated metal extrusions connected by a rubber spacer. Ask the customer for documentation if you can't tell.</p>

		<p>Some wood windows may have vinyl or aluminum cladding. Check both the inside and outside, since some windows will have vinyl cladding on one side only.</p> <p><u>Glazing Type</u> Check all windows in the house for number of panes and existence of tint and/or low-e coating.</p> <p>To determine whether the windows are single-paned or multiple-paned:</p> <ul style="list-style-type: none"> • Look at frame width and spacers; • Look at reflections; • Look at edge thickness. <p>To determine if glazing has a tint or low-e coating:</p> <ul style="list-style-type: none"> • Check the customer's product literature if available; • Perform a "match test" - there should be one reflection per pane or coating, including low-e and tinting (e.g., a double-paned window with low-e and tint should show 4 reflections); • Compare to glazing samples with and without tinting; • Compare the windows within the space, since tinting is often applied only to certain windows in a house; • Look for a low-e label or etching on the glass.
Orientation	Determine orientation of all windows	Use a compass (adjusting for magnetic deviation) to determine orientation of all windows.
Building Element: Windows (continued)		
Shading	Determine shading of windows	<p>Identify shading by external shade screens, house overhangs/awnings, and shade from trees and other buildings.</p> <p><u>External Shade Screens</u></p>

	<p>The most common screen is an insect screen that covers some or all of the window. If it is a full-coverage type screen, assume it is a shade screen. Compare samples of the screen's mesh pattern to those of a window screen sample to determine the type and shading coefficient of the screen. Ask customer for documentation for the shading coefficient (SC) of the screen.</p> <p>If you cannot determine the shading coefficient of the screen, use 36% SC as a default.</p> <p><u>Projection (Overhang)</u> The shading impact of an overhang can be found by measuring the distance of the projection from the exterior wall surface and the distance (height) between the top of the window and the bottom edge of the overhang.</p> <p>Measure the length of the overhangs over each exterior wall.</p> <p>Measure the height above the window to the bottom edge of the overhang.</p> <p><u>Exterior Shading</u> <i>Full (40% SC)</i> -Consider a 40% SC for an entire side of a house as being roughly equivalent to having a shade screen over a window. For trees and/or bushes to equal this effect, there should be a very dense amount of trees and/or bushes along the entire side of the house that shade both its vertical and horizontal surfaces almost totally.</p> <p><i>Partial (70% SC)</i> -Based on the above definition for full shading, partial shading is considered to be anything in between full and none (no shading).</p> <p><i>None (100% SC)</i> - No shading indicates there may be small plants or shrubs only,</p>
--	--

Building Element: Windows (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Solar heat gain factor	Determine solar heat gain factor of glazing	Check product information and consult NFRC guide.
U-value	Determine window U-value	Look for an NFRC label on new windows (it will display full window U-value). If no label can be found but customer has documentation, look up product information in NFRC Certified Products Directory to determine U-value, or consult manufacturer's literature.

Building Element: Skylights		
Rated Feature	Task	On-Site Inspection Protocol
Area	Determine area of skylights	See windows.
Construction type	Determine framing and glazing characteristics of skylights	See windows.
Orientation	Determine orientation of skylights.	Determine the orientation of the lower edge of the skylight. Use this direction as the orientation of the skylight.
Shading	Determine shading of skylights	See windows.
Solar heat gain coefficient	Determine solar heat gain coefficient of skylights	See windows.
Tilt	Determine tilt of skylights	Measure the tilt of the skylight relative to horizontal. This can be done with a level and angle finder instrument, or geometrically with a protractor (from the ceiling length and heights).
U-value	Determine skylight U-value	See windows.

Building Element: Air leakage

Rated Feature	Task	On-Site Inspection Protocol
Blower door test	Determine effective leakage area from a blower door test	<p>Use the testing protocol described in ASHRAE Standard 119 Section 5.1, with the modifications described below:</p> <p>The following protocol shall be followed in preparing the building envelope for testing:</p> <ol style="list-style-type: none"> 1. Leave all supply registers and return grills open and uncovered. 2. Leave all bathroom and kitchen fans open (i.e., in their normal operating condition). Only a permanently installed back draft damper in its normal condition may impede the flow of air. 3. Leave any combustion air ducts or louvers to the exterior open. (If a homeowner or builder has sealed them off, open them for the test.) 4. Leave any make-up air ducts with in-line dampers (e.g., for large kitchen exhaust fans or combustion air) as-is (unsealed). Only a permanently installed back draft damper or motorized damper, in its normal condition may impede the flow of air. 5. Leave the dryer vent as-is, whether or not the dryer is in place during the test. Only a permanently installed back draft damper in its normal condition may impede the flow of air. 6. Leave open any outside air duct supplying fresh air for intermittent ventilation systems (including a central-fan-integrated distribution system) 7. Operable crawl-space vents, where present, are to be left in the open position. 8. Open all interior doors within the conditioned space, including doors to conditioned basements. (Closet doors may be left closed unless the closet contains windows or access to the attic or crawl space). 9. Leave louvered openings of a whole-house fan as is. (If there is a seasonal cover in place during the test, leave it in place.) 10. Close all doors to the exterior or unconditioned spaces; if any door to the exterior or unconditioned space lacks weather-stripping at testing time, it can be temporarily

		<p>taped off.</p> <ol style="list-style-type: none"> 11. Close and latch all windows. 12. Close chimney dampers. 13. Either seal or fill with water plumbing drains with p-traps that may be empty. 14. Seal off exterior duct openings to <i>continuously operating</i> fresh-air or exhaust-air ventilation systems (preferably at the exterior envelope). 15. Close any adjustable window trickle ventilators and/or adjustable through-the-wall vents. 16. If an evaporative cooler has been supplied with a device used to seal openings to the exterior during the winter, that device should be installed for the test. <p>Use the testing protocol described in ASHRAE Standard 119 Section 5.1. Blower door and associated pressure testing instruments, which include but are not limited to hoses, and Manometers, gauges and fans shall be field tested annually for calibration by the HERS provider or rater. The provider shall use a standard for field testing of calibration provided by the equipment manufacturer. Magnehelic Gauges cannot be field tested and shall be recalibrated by the Blower Door manufacturer annually. Field check the fan and flow measuring systems for defects and maintain them according to manufacturers recommendations</p> <p>The HERS provider shall maintain a written log of the annual calibration check to verify all equipment accuracy for a period of three (3) years. These records shall be made available within 24 hours to a RESNET Quality Assurance Committee member upon request. It is recommended all pressure equipment be field checked for calibration more frequently than is required in these standards, i.e., monthly, quarterly, etc.</p>
Conditioned volume of space	Determine conditioned volume of space	Determine conditioned and indirectly conditioned volume of space by multiplying conditioned floor area by ceiling height. The house may need to be split into different spaces with different ceiling heights and added to each other for both conditioned and indirectly conditioned spaces. For areas with vaulted ceilings, volume must be calculated geometrically.

Estimate	If diagnostic equipment is not used, determine window type and distribution system to estimate leakage	To be determined.
Tracer gas test		To be determined.

Building Element: Heating & Cooling/Distribution System		
Rated Feature	Task	On-Site Inspection Protocol
Air leakage (ducts)	Determine air leakage from ducts	<p>The application of ASHRAE Standard 152 for testing of ducted distribution systems shall be implemented with the following additions and exceptions:</p> <ol style="list-style-type: none"> 1. Air Handler Fan Flow Measurement using either of the methods specified in Annex A of the standard is preferred. If such measurement is not made, default values of 275 CFM per 12,000 btu/hour of nominal HVAC capacity shall be used. For fossil-fired furnace systems, a default value of 200 CFM for every 12,000 btu/hour of nominal furnace capacity shall be used for heating. 2. Supply and return leakage may be determined by measuring the leakage of each side as in Annex B, or as an alternate the leakage of the entire system may be measured, with the duct pressurization device in the return and the duct-pressure probe in the supply side. The ratio of supply side leakage to return side leakage $Q_{25,s}$ to $Q_{25,r}$ shall be selected separately for heating and cooling based on a worst case determination. The supply side of the system shall be assigned 67% of the leakage and the return shall be assigned 33%, and the overall distribution efficiency determined; then the efficiency with the reverse conditions (67% return and 33% supply) shall be determined, and the lower of the two efficiencies will be applied. 3. Total leakage (Annex C) . The limitation of applicability of Annex C (Section C1) to leakage measurement of 10% or less of air handler air flow shall be based on tested air flow or default air flow, as appropriate according to (1) above. The calculations of 2.5% of air flow in Section C1.1,2, and 3 shall use tested air flow,

		<p>or nominal air flow of 400 CFM per ton. If the register grilles are not installed during the test (C1.2), the 2.5% of fan flow added to the measured leakage may be waived, on condition that a visual inspection, verifying effective sealing of register boot-to-drywall and/or boot-to-subfloor connections, is conducted prior to issuing the final rating.</p>
Insulation	Determine the value of distribution system insulation	<p>Air ducts may be insulated with insulation blankets or rigid insulation board. Inspect the duct or pipe insulation for R-value labeling (printed on the insulation by the manufacturer). If the insulation is not marked with the R-value, identify type and measure the thickness of the insulation to determine R-value. Check for internal insulation by tapping on the exterior and listening to the sound.</p>
Location of air ducts	Determine the location of ducts	<p>Air ducts may be located in the attic, crawl space, basement or in a conditioned area. You must locate and differentiate between supply and return ducts. Ducts may be located in more than one area (e.g., some return ducts in attic and some in conditioned space, etc.).</p>
Type	Identify type of distribution system used to provide space heating and cooling	<p><i>Forced air</i> - a central fan unit connected to ducts which supply heated or cooled air to each room in the home. Forced air systems have supply and return duct work. Supply ducts typically run to each room; return duct work may come from each room or from one or more central locations in the home.</p> <p><i>Forced hot water</i> - heated water is pumped through a series of radiator elements to supply heat. The radiator elements may be conventional radiators, baseboard "fin tube" radiators, cast iron baseboards or radiant hot water panels located at the baseboards or on walls or ceilings.</p> <p><i>Hot water radiant system</i> - heated water is circulated through plastic or metal tubing which is installed in a concrete slab or finished floor or, occasionally, in walls or ceilings.</p> <p><i>Unit heater/air conditioner</i> - heating or cooling is supplied directly from a heating or cooling device located within the space it serves. Window air conditioners and through-the-wall heaters are common examples. Unitary equipment typically has no distribution system.</p>

Building Element: Heating & Cooling/Distribution System (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Type (continued)	Identify type of distribution system used to provide space heating and cooling (continued)	<p><i>Steam heating</i> - steam systems utilize a distribution system with cast iron radiators connected to a boiler that creates steam. The steam rises into the radiators through one set of pipes, condenses into water, and drains back to the boiler through another set of pipes.</p> <p><i>Electric radiant system</i> - electric cables are installed in concrete floor slabs or in the ceiling. Electric current is passed through the cables, causing them to heat up, heating the floor or ceiling assembly which radiates the heat to the space. Electric radiant systems may also be comprised of individual radiant panels mounted on the walls or ceilings.</p> <p><i>Baseboard electric resistance</i> - electric elements are installed in baseboard enclosures. Electric current is passed through the electric element to provide heat to the space.</p>

Building Element: Heating and Cooling/Energy Source		
Rated Feature	Task	On-Site Inspection Protocol
Fuel type	Determine fuels used for heating and cooling	<p>Heating systems may use natural gas, propane, oil, electricity, or some other fuel. Typically the homeowner will know what type of heating fuel is used. Cooling is typically driven by electricity, however some cooling equipment may use natural gas or propane. Look for electric cables and dedicated fuses or circuit breakers for the cooling equipment or gas lines running to the equipment. Note that gas equipment will also have electric cables to power some of the components. Be sure to distinguish between refrigerant lines and possible gas supply lines.</p> <p><i>Oil</i> - look for a large storage tank (typically oblong-shaped) or fill pipes which would indicate a buried tank. Oil is typically supplied to the heating equipment via a 1/4" - 3/8" copper line. A fuel filter may be evident in the line.</p> <p><i>Natural gas</i> - look for a meter connected to piping on the exterior of the home. Piping to the heating equipment is typically done with 1/2" - 1" iron piping.</p> <p><i>Propane</i> - look for storage tank(s) (typically cylindrical-shaped). Large tanks may be buried with a 12" - 18" cap exposed above grade. Fuel is typically supplied to equipment through 1/4" - 3/8" diameter copper piping.</p> <p><i>Electric</i> - look for large gauge cables running to a central piece of equipment or look at circuit breaker panel for circuits marked for resistance heat circuits (electric resistance or electric radiant systems).</p> <p><i>Other fuels</i> - include coal, wood, processed wood pellets, or other combustible products.</p>

Building Element: Heating and Cooling/Equipment		
Rated Feature	Task	On-Site Inspection Protocol
Control system	Identify the control system for the heating and cooling system(s)	Determine the type of control systems. There may be separate controls for the heating and cooling systems. Thermostat controls may be programmable. Note types of features available and/or utilized.
Efficiency	Determine the heating and cooling equipment efficiency	Check nameplate for efficiency rating. If the nameplate is missing, use appropriate directories to determine an appropriate default value. SEER is used to measure the efficiency of central air conditioning and air source heat pump systems. AFUE is used to measure the efficiency of furnaces and boilers. EER is used to determine the efficiency of room air conditioners and ground source heat pumps. Check nameplate for SEER or AFUE rating. EER can be calculated from nameplate information by dividing btu output by watt input.

Building Element: Heating and Cooling/Equipment (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Equipment type	Identify type(s) of equipment for heating and/or cooling	<i>Furnace</i> - comprised of a combustion chamber and heat exchanger (natural gas, propane or oil) or an electric resistance element (electric) and a fan which forces air across the heat exchanger or resistance element to provide heat in a forced air system. <i>Fan coil unit</i> - hot water from a boiler, domestic water heater, or heat pump is circulated through a coil. A fan blows air over the coil to provide heating. This device is used in a forced air system. <i>Boiler</i> - this device creates hot water or steam, and can be powered by any fuel type. Can be used with forced air (in conjunction with a fan coil unit), forced hot water, steam, or hot water

		<p>radiant slab systems.</p> <p><i>Split system central air source heat pump</i> - these systems move energy from one location to another using the vapor compression cycle. They are electrically driven, and can provide heating in winter and cooling in summer by reversing the direction of heat flow. Split system heat pumps consist of an outdoor unit and an indoor air handling unit, resembling a furnace. These systems require ductwork for air distribution. Most air source heat pumps incorporate electric resistance supplemental heat in the indoor section. However, some heat pump systems use fossil fuel furnace for supplemental heating. These are known as "dual fuel" or add-on systems.</p> <p><i>Single package central air source heat pump</i> - a single package central heat pump is similar to a split system, except it combines the functions of the indoor and outdoor units into one cabinet, usually mounted on the roof or on the ground. It also requires a separate distribution system. These are uncommon in single-family residences, however they are sometimes found in multi-family dwellings.</p>
--	--	---

Building Element: Heating and Cooling/Equipment (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Equipment type (continued)	Identify type(s) of equipment for heating and/or cooling (continued)	<p><i>Ground source heat pumps</i> - are coupled to the ground through the use of a water well sometimes the same well as used for domestic water (known as "open loop" which water or a water/antifreeze mixture is circulated (known as "closed loop"). Look for 3/4" or larger diameter piping going to and from the heat pump. Circulating pumps may be installed in this piping (closed loop systems) or the pump for the water well may be used for circulating water through the heat pump (open loop). The same piece of equipment can be used in either open or closed loop applications, however given the same piece of equipment, closed loop applications typically have lower efficiency ratings than open loop applications. Ground source heat pumps can also utilize a direct expansion of the refrigerant with copper piping</p>

		<p>buried in the ground. Look for 0.25" - 0.50" copper piping leading from the unit to the outdoors with no outdoor unit.</p> <p><i>Split system central air conditioner</i> - similar to a split system air source heat pump. Consists of an outdoor unit and a coil in the forced air distribution system, usually in a fossil fuel furnace. These systems are electrically powered and provide cooling.</p> <p><i>Single packaged central air conditioner</i> - similar to single packaged air source heat pumps, providing cooling only.</p> <p><i>Through-the-wall ductless air source heat pump</i> - a single packaged air source heat pump designed to be installed without a distribution system. Provides both heating and cooling and is usually installed through an exterior wall.</p> <p><i>Window/through-the-wall air conditioner</i> - a single packaged ductless air conditioner designed to be installed without a distribution system.</p> <p><i>Direct evaporative cooler</i> - is used primarily in very dry climates. Evaporative coolers work by blowing air over a damp pad or by spraying a fine mist of water into the air. Direct evaporative coolers add moisture to the home.</p> <p><i>Indirect evaporative cooler</i> - evaporation takes place on only one side of a heat</p>
--	--	--

Building Element: Heating and Cooling/Equipment (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Equipment type (continued)	Identify type(s) of equipment for heating and/or cooling (continued)	<p><i>Absorption cooler</i> - this is a gas air conditioner. Look for a cooling tower, an exhaust pipe, a gas burner to evaporate refrigerant and a heat exchanger similar to an electric air conditioner.</p> <p><i>Unitary space heater</i> - these are fossil fuel burning heaters which have individual controls and no distribution system. They may be equipped with a fan for forcing air circulation over a heat</p>

		exchanger, or they may use simple convective forces. These heaters are typically mounted on outside walls in order to facilitate venting and can use natural gas, kerosene, propane, or other types of fossil fuel.
Location	Determine the location of heating and cooling equipment	Note whether systems are located in conditioned or unconditioned space.

Building Element: Domestic Hot Water System

Rated Feature	Task	On-Site Inspection Protocol
Efficiency	Determine the Energy Factor or Seasonal Efficiency of the water heater	<p><u>Storage Water Heater</u> Look for the water heater's rating plate and product literature. Some water heaters will list their EF right on the rating plate.</p> <p>If the water heater is wrapped and there is no accessible information, approximate the age of the unit and use a default efficiency.</p> <p>If accessible, record the Make and Model #.</p> <p>Look up the EF rating of that model in an appropriate efficiency rating directory.</p> <p>If the EF rating is not listed in the directory use a default based on the estimated age of the water heater.</p> <p><u>Instantaneous Water Heaters</u> Check the unit's nameplate for the RE (Recovery Efficiency). If a gas model, note whether there is a standing pilot light.</p>

Building Element: Domestic Hot Water System (continued)

Rated Feature	Task	On-Site Inspection Protocol
----------------------	-------------	------------------------------------

Extra tank insulation value	Determine the insulation value of any exterior wrap	Visually determine if the water heater is wrapped with exterior insulation. If so, measure thickness of the wrap and determine R-value.
Location	Determine location of storage tank	Determine whether water heater is located in conditioned or unconditioned space.
Pipe insulation value	Determine the insulation value of the pipes	Determine whether pipe insulation is installed on all 3/4" or larger, non-recirculating hot water mains. Measure depth of insulation and identify material to determine R-value.
System type	Determine type and heat source of water heater	<p><u>Storage</u> These water heaters are the most common type. Water is heated in an insulated tank that typically ranges in capacity from 30 to 75 gallons. Storage water heaters may use electric resistance, gas, propane, oil or electric heat pump.</p> <p><i>Storage electric</i> -look for rigid or flexible 240 A/C conduit, UL seal, no vent, no burner or pilot tubing. Thermostats are usually hidden behind metal access doors. Often there is both an upper and a lower thermostat.</p> <p><i>Storage gas</i> -look for a vent connection (top of tank), gas connector and line valve, thermostat, burner and pilot tubing, burner compartment doors, and "AGA" seal rating plate. Most gas water heaters have legs to lift the unit above the floor level to provide combustion air to the burner.</p> <p><i>Storage propane</i> -look for the same features as those listed for gas water heaters. Also, look for a rating plate or tag that states "For Use with LP Gas Only."</p> <p><i>Storage oil</i> -look for features that are similar to a gas water heating storage system. In addition, oil systems are usually furnished with draft regulators which are attached to the vent pipe between the tank and chimney (hinged metal flap with counterweight to allow for variations in flue gas pressure). Vent dampers may also be apparent on the vent pipe.</p> <p><i>Storage heat pump</i> -water heaters remove heat from the air in the room where they are located and then release the heat to the water in the storage tank. Look for the same features as those</p>

		found on electric water heating systems. In addition, there will be a fan, condenser and evaporator. Also, the system may be one single unit, or may be a split system.
--	--	---

Building Element: Domestic Hot Water System (continued)

Rated Feature	Task	On-Site Inspection Protocol
System type (continued)	Determine type and heat source of water heater (continued)	<p><i>Combination DHW/furnace system</i> - natural gas combo systems use heat drawn from a hot water tank circulating through an air handling module to heat the space.</p> <p><i>Geothermal heat pump de-superheaters</i> - devices which utilize heat pump cycle superheater to heat domestic hot water. Look for insulated lines between air handler unit and storage water heater tank.</p> <p><u>Instantaneous</u> These water heaters heat water on demand, instead of storing pre-heated water in a large tank. They are usually small units, with storage of no more than 2 gallons, and are often attached to a wall close to the point of use. Instantaneous water heaters may be used in addition to a primary storage water heater to serve fixtures in a distant location of the house, so check for a main storage unit as well. Determine if the instantaneous heater uses gas or electricity.</p> <p><i>Instantaneous gas</i> - look for a connector and line valve, vent connection, thermostat, burner and pilot tubing, and AGA seal. Check whether unit has a pilot light or intermittent ignition device.</p> <p><i>Instantaneous electric</i> - look for the absence of a gas line, vent or pilot light. Look for a UL seal.</p> <p><i>Super-heater</i> - check for this supplementary heat source.</p>

Building element: Solar Domestic Hot Water System

Rated Feature	Task	On-Site Inspection Protocol
Collector	Determine area, orientation, and tilt of collector	<p>Determine the area of the collector.</p> <p>Determine the orientation of the solar collector by taking a compass reading (adjusting for magnetic deviation) in the direction toward which the collector faces.</p> <p>Determine the tilt of the collector. A site selection and angle finder instrument can be used to determine the tilt of the collector. Geometric calculations based on horizontal length and vertical height measurements can also be used.</p>
Efficiency	Determine efficiency of solar system	Look for SRCC label. Check for SRCC system and component name plates. Refer to the <u>Directory of SRCC Certified Solar Collector and Water Heating System Ratings</u> , or other SRCC literature for energy factor (EF) and other performance data.
Extra tank insulation value	Determine the insulation value of any exterior wrap	See Domestic Hot Water, above.
Pipe insulation value	Determine the insulation value of the pipes	Determine the R-value of insulation installed on pipes.
Solar collector type	Identify type of solar collector	Identify the type of solar collector by checking for the SRCC label or manufacturer's information.
Storage tank size and location	Determine the capacity of the storage tank and location	<p>To determine the size of the storage tank refer to documentation or a label indicating the tank capacity.</p> <p>Note if storage is inside or outside of conditioned space.</p>

Building element: Solar Domestic Hot Water System (continued)

Rated Feature	Task	On-Site Inspection Protocol
System type	Determine type of solar systems	Identify whether a solar domestic hot water system exists. These systems collect and store solar thermal energy for domestic water heating applications. If a solar water heating system

		<p>exists, determine system type. For systems manufactured after Jan. 1, 1995, system type, energy factor (EF), and other performance characteristics shall be determined from the SRCC label (usually affixed to the solar storage tank) and by referring to SRCC literature. For systems lacking an SRCC label, energy factor and other performance characteristics can be determined using a certified HERS modeling tool, or appropriate default values. Identify as passive or active. Base your evaluation on these criteria:</p> <p><i>Passive</i> - No purchased electrical energy is required for recirculating water through a passive solar collector. Three types of passive systems are integrated collector storage (ICS), thermosiphon systems and self-pumped systems.</p> <p><i>Integrated Collector Storage (ICS)</i> - consists of a single unit which incorporates both collector and water storage. An example is the common "bread box" design. Storage is usually outside the conditioned space.</p> <p><i>Thermosiphon</i> - consists of a flat-plate solar collector and hot water storage tank. Instead of using a pump, circulation of the fluid is achieved by natural convection action. The storage tank must be located above the collector, and is usually outside the conditioned space.</p> <p><i>Self-pumped</i> - circulates fluid from storage to collectors without purchased electrical energy. Photovoltaic and percolating systems are examples of self-pumped systems. The storage tank is usually inside the conditioned space.</p> <p><i>Active</i> -Also known as pumped systems.</p> <p><i>Pumped</i> -purchased electrical energy input is required for operation of pumps or other components. The storage tank is usually inside the conditioned space.</p>
--	--	--

Building Element: Passive Solar Heating System

Rated Feature	Task	On-Site Inspection Protocol
Direct gain	Identify system type and determine solar aperture orientation, aperture area	<p>A solar direct gain system can reduce heating, cooling, and lighting energy requirements through proper sizing, placement, orientation, and/or control of windows, skylights, shading devices, and solar storage mass within the building.</p> <p>To determine aperture area, measure width and height of south-facing glazing and indicate tilt angle. Note glass type(s) (e.g., double glazing) and presence of night insulation (if any).</p> <p>Determine orientation with a compass reading (adjusted for magnetic deviation).</p> <p>Determine the type of thermal mass, its thickness and dimensions. Determine if the mass will be lit by direct solar rays between the hours of 9:00 a.m. and 3:00 p.m. during the winter. Note any trees or other obstructions to solar gain.</p>
Greenhouse or solarium	Identify system type and determine solar aperture orientation, aperture area and information about thermal mass	<p>A greenhouse or solarium creates a South-glazed buffer zone between the house and the exterior and can help heat the living area. They may be used in conjunction with thermal mass (such as bricks or drums filled with water) to store heat and reradiate it at night.</p> <p>See Direct gain, above, for specific inspection items.</p>

Building Element: Passive Solar Heating System (continued)		
Rated Feature	Task	On-Site Inspection Protocol
Thermal storage mass	Identify system type and determine solar aperture orientation, aperture area and information about thermal mass	<p>Thermal mass systems consist of solar-exposed heavyweight materials with high heat capacitance and relatively high conductance (high thermal diffusivity) such as masonry, brick, concrete, tile, stone, or water placed in the same zones(s) as the solar collection area(s). These elements may be integral with the building or distinct elements within the building.</p> <p>Distinct components:</p> <p><i>Trombe wall</i> -uses a heat storage mass placed between the glass and the space to be heated.</p>

		<p>Measure area of storage mass, determine material, thickness, and capacitance.</p> <p><i>Water wall</i> -replaces the existing wall, or parts of it, with containers that hold water.</p>
Thermosiphon Air Panel (TAP)	Identify system type	<p><i>Thermosiphon air panel (TAP)</i> -has one or more glazing layers of glass or plastic, an air space, an absorber, another air space, and (often) an insulated backing. These are similar in appearance to active flat-plate collectors, often mounted vertically on walls, or ground-mounted, so that the living space is higher than the collector to facilitate convection from the TAP to the house.</p> <p>See Greenhouse, above, for specific inspection items.</p>