



RESNET National Rater Test Study Guide Outline

The RESNET national home energy rating standard spells out a listing of the knowledge base and skills set for Home Energy Ratings. Trainers and Rating Quality Assurance Designees must have a comprehensive mastery of this knowledge base and skills set and that their training curricula are sufficiently comprehensive to effectively teach these materials to prospective Home Energy Raters. Prospective Home Energy Raters, to become certified, shall demonstrate through written examinations and observed exercises a practical, working knowledge of these materials sufficient to produce accurate and fair Home Energy Ratings. The RESNET Rater Trainer/Quality Assurance Designee test covers the below outline of knowledge base and skills set.

In addition to this outline a rater trainer/quality assurance designee may also want to review the RESNET Rating Standards of Practice that is posted on RESNET's web site at www.natresnet.org/standards/practice.htm and their rater trainer provider's rating manual.

Building Energy Performance.

- Basic energy principles
- Energy terminology, units and conversions.
- Heat transfer principles
- Conduction:
 - R-values & U-values
 - UA concepts
 - Parallel paths
- Convection
 - Film coefficients
 - Buoyancy
 - Forced air flows
- Radiation
 - Solar (absorptance + reflectance + transmittance = 1.0)
 - Far infrared (emittance = absorptance)

Moisture Principles

- Properties
 - Dewpoint
 - Relative Humidity
 - Evaporation & condensation
- Transport Mechanisms

- Rain and ground water
- Capillary action
- Air transported
- Vapor Diffusion
- Evaporation and condensation
- Impacts
 - Indoor Air Quality (IAQ)
 - Material and building durability
 - Human comfort
 - Energy use

Air flow in buildings

- Pressure differentials and measurement techniques
- Mechanisms and drivers
- Energy and comfort implications
- Health & safety issues

Heating, cooling, ventilation and hot water systems

- System types
 - Direct-fired systems
 - Condensing systems
 - Heat pumps and air conditioning systems
 - Air Source
 - Ground Source
 - Hydronic systems
 - Combo systems
 - Ductless systems
 - Solar thermal systems

Efficiency

- Measures of efficiency
- Determination of efficiency (nameplate, age-based defaults, etc.)
- Sizing & design
 - Impacts on energy use
 - Impacts on humidity control
- Controls
 - Standard thermostats
 - Programmable thermostats
 - Multi-zone
- Distribution systems
 - Duct types
 - Restricted returns
 - Closed interior doors
 - Return ducts and grills
- Leakage

Fresh air ventilation

- Supply, exhaust and balanced flow systems
- Heat exchange systems
- Energy/enthalpy exchange systems
- Exchanger efficiency, fan power and duty cycle characteristics

Renewable energy systems

- Active and passive space heating systems
- Solar hot water systems
- Photovoltaic systems
- Wind generation

Diagnostic testing procedures

- Building airtightness
 - Multipoint pressure testing
 - C, n,) p and R²

Air distribution system airtightness

- Pressure pan threshold tests
- Duct air leakage measurements
 - cfm25_total
 - cfm25_out
- Pressure measurements
 - Operational (by home and its equipment)
 - Imposed (by blower door, etc.)
- Air heat and moisture measurements
 - Airflows
 - Temperatures
 - Relative humidity

Identifying minimum rated features as defined in the *National Home Energy Rating Technical Guideline*:

- Identify basic home construction types; ramifications of these for energy usage.
- Produce a scaled and dimensioned sketch of a home.
- Identification of insulation defects and ability to account for them in energy analysis tool inputs.
- 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*.

Identifying potential building problems

- Health and safety concerns
- Building durability issues
- Potential comfort problems
- Possible elevated energy use

Rating Procedures

Understanding construction documents

Building drawings

Specifications

Field data collection (including photo documentation)

Physical measurements

Completing scaled sketches

Measuring building dimensions

Determining building orientations

Measuring window overhang lengths and heights

Determining roof slopes, gable heights, etc.

Calculating gross and net areas and volumes.

Energy feature documentation

Energy Analysis (Software) tool data requirements

Developing and using field inspection forms

Organizing data entry procedures

Characterizing envelope features

Determining wall types

Determining window and door types and characteristics

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

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

Equipment efficiencies determination

Nameplate data

ARI and GAMA guides

Age-based defaults

In situ measurements

Performance testing

Envelope leakage

Air distribution system leakage

Local climate impacts

Major US climate zones

97.5% and 2.5% design conditions

Cooling and heating design trade-offs

Utility prices

Revenue-based pricing

Reliable sources

Reports

Minimum reporting requirements

Improvement analysis

Projected and confirmed ratings

Operating Procedures and Office Administration

- National guidelines and standards
- Accreditation Procedures
- Technical Guidelines
- Training & Certification Standards

Understanding the Reference home and rating method

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.”

HERS Score computation using the Normalized Modified Loads Rating Method

Uses of a Rating

- Builder assistance
 - Cost effective building design assistance
 - Quality assurance assistance
 - Marketing
- Program qualifications
 - EPA Energy Star
 - Utility
 - Other
- Financing advantages
 - Energy Efficient Mortgages (EEM)
 - Energy Improvement Mortgages (EIM)
- Energy Code compliance
- Added appraisal value
- Consumer education

Understanding real estate, financing and economic terminology

Dealing with clients

- Understanding the business aspects of being a energy rater
- Cultivating builder, banker and real estate partners.
- Knowing who the customer is.
- Providing excellent service.

Ethics and disclosure