Energy Code Assistance Center

Efficiency Vermont

SECTION R405 | ALTERNATIVE TO PRESCRIPTIVE COMPLIANCE USING RESCHECK™ SOFTWARE

R405.1 Scope. This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating, cooling and service water heating energy only.

R405.2 Mandatory requirements. Compliance with this section requires that the provisions in Sections R402.1.1, R403.3.1, R403.5.3 and the mandatory provisions identified in Sections R401.3, R402, R403 and R404 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to meet the same *R*-value requirement that applies to immediately proximal surfaces.

R405.3 Performance-based compliance. Compliance is based on documentation from *REScheck*™ modeling software that indicates the home meets or exceeds the target UA for that building.

RES*check* is appropriate for insulation and window trade-off calculations in residential detached one- and two-family buildings and multi-family buildings three stories or less in height above grade, such as apartments, condominiums, and townhouses. RES*check* works by performing a simple U-factor x Area (UA) calculation for each building assembly to determine the overall UA of a building. The UA that would result from a building conforming to the code requirements is compared against the UA for your building. If the total heat loss (represented as a UA) through the envelope of your building does not exceed the total heat loss from the same building conforming to the code, the software generates a report that declares your building is compliant with the code.

RES*check* Desktop may be downloaded and installed directly to your desktop, while RES*check-Web*™ is accessible directly from the website without having to download and install.

RES*check* Version 4.7.1 supports the 2020 RBES and can be accessed and downloaded at the link below:

https://www.energycodes.gov/rescheck

The Pacific Northwest National Laboratory has also created a Technical Support Document available for download:

https://www.energycodes.gov/sites/default/files/documents/BECP_REScheck_TSD465_Mar2019.pdf

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SECTION R406 | ENERGY RATING INDEX: COMPLIANCE ALTERNATIVE

R406.1 Scope. This section establishes criteria for compliance using an Energy Rating Index (ERI) analysis. This approach uses a Home Energy Rating System (HERS) Energy Rating provided by a Vermont Department of Public Service-approved accredited HERS provider. The "ERI" referenced herein is the same as the RESNET HERS Index.

R406.2 Mandatory requirements. Compliance with this section requires that the provisions in Sections R402.1.1, R403.3.1, R403.5.3 and the mandatory provisions identified in Sections R401.3, R402, R403 and R404 be met. The *building thermal envelope* shall be greater than or equal to levels of efficiency and *Solar Heat Gain Coefficients* in Table 402.1.2 of the 2009 *International Energy Conservation Code* for Climate Zone 6. Exception: Supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of R-6.

R406.3 Energy Rating Index. The Energy Rating Index (ERI) shall be a numerical integer value that is based on a linear scale constructed such that the *ERI reference design* has an Index value of 100 and a *residential building* that uses no net purchased energy has an Index value of 0. Each integer value on the scale shall represent a 1-percent change in the total energy use of the rated design relative to the total energy use of the *ERI reference design*. The ERI shall consider all energy used in the *residential building*.

- **R406.3.1 ERI reference design**. The ERI reference design shall be configured such that it meets the minimum requirements of the 2006 International Energy Conservation Code prescriptive requirements

  The proposed residential building shall be shown to have an annual total normalized modified load less than or equal to the annual total loads of the ERI reference design.

R406.4 ERI-based compliance. Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to 61 when compared to the *ERI reference design*. Up to 5 ERI points can be earned with renewables. This includes all residential structures, including log homes. The ERI to be used to verify compliance is "HERS Index with IAF" using REM/Rate version 15.7. Up to 5 ERI points can be earned with renewables. If the HERS Index scale is revised, the Department of Public Service may update these Index points.

R406.5 Verification by approved agency. Verification of compliance with Section R406 shall be completed by *a certified HERS Rater working under the authority of a Vermont PSD-approved accredited HERS Provider*.

R406.6 Documentation. Documentation of the software used to determine the ERI and the parameters for the *residential building* shall be in accordance with Sections R406.6.1 through R406.6.3.

- **R406.6.1 Compliance software tools.** Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official* or *other authority having jurisdiction, where one exists* and be an approved Software Rating Tools in accordance with RESNET/ICC 301.

- **R406.6.2 Compliance report.** Compliance software tools shall generate a report that documents that the ERI of the *rated design* complies with Sections R406.3 and R406.4. The compliance documentation shall include the following information:

    1. Address or other identification of the residential building.

    2. An inspection checklist documenting the building component characteristics of the rated design. The inspection checklist shall show results for both the ERI reference design and the rated design, and shall document all inputs entered by the user necessary to reproduce the results.

    3. Name of individual completing the compliance report.

    4. Name and version of the compliance software tool.

        Exception: Multiple orientations. Where an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements in each of the four (north, east, south and west) cardinal orientations.

- **R406.6.3 Additional documentation.** The *code official or other authority having jurisdiction, where one exists,* shall be permitted to require the following documents:

    1. Documentation of the building component characteristics of the ERI reference design.

    2. A certification signed by the builder providing the building component characteristics of the rated design.

    3. Documentation of the actual values used in the software calculations for the rated design.

R406.7 Calculation software tools. Calculation software, where used, shall be in accordance with Sections R406.7.1 through R406.7.3

R406.7.1 Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the ERI as described in Section R406.3, and shall include the following capabilities:

1. Computer generation of the ERI reference design using only the input for the rated design.

    a. The calculation procedure shall not allow the user to directly modify the building component characteristics of the ERI reference design.

2. Calculation of whole building, as a single zone, sizing for the heating and cooling equipment in the ERI reference design residence in accordance with Section R403.7.

3. Calculations that account for the effects of indoor and outdoor temperatures and part- load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.

4. Printed code official or other authority having jurisdiction, where one exists, inspection checklist listing each of the rated design component characteristics determined by the analysis to provide compliance, along with their respective performance ratings.

- **R406.7.2 Specific approval.** Performance analysis tools meeting the applicable sections of Section R406 shall be *approved*. Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official or other authority having jurisdiction, where one exists*, shall approve tools for a specified application or limited scope.

- **R406.7.3 Input values.** Where calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from an approved source such as RESNET/ ICC 301.

Home Energy Rating System (HERS) ratings are available in Vermont through Efficiency Vermont by way of enrollment in Efficiency Vermont's Residential New Construction (RNC) program.

By meeting the requirements of the Efficiency Vermont RNC program enrollee's and the enrolled home will receive all project verification, documentation, and HERS rating certificate verifying compliance with the 2020 VT RBES at no cost to the enrollee. Financial incentives of up to $3,500 are available for successful compliance and project completion within one of Efficiency Vermont's two RNC program tiers. More information on this program can be found at the below link, or by calling Efficiency Vermont @ 888-921-5990

https://www.efficiencyvermont.com/services/renovation-construction/residential-new-construction

More information about the Residential Energy Services Network (RESNET) and the HERS rating system can be found @ https://www.resnet.us/raters/hers-raters/