§ 3280.508 Heat loss, heat gain and cooling load calculations.

(a) Information, values and data necessary for heat loss and heat gain determinations must be taken from the 1997 ASHRAE Handbook of Fundamentals, Inch-Pound Edition, chapters 22 through 27. The following portions of those chapters are not applicable:

23.1 Steel Frame Construction
23.2 Masonry Construction
23.3 Foundations and Floor Systems
23.15 Pipes
23.17 Tanks, Vessels, and Equipment
23.18 Refrigerated Rooms and Buildings
24.18 Mechanical and Industrial Systems
25.19 Commercial Building Envelope Leakage
27.9 Calculation of Heat Loss from Crawl Spaces

(b) The calculation of the manufactured home’s transmission heat loss coefficient (Uo) must be in accordance with the fundamental principles of the 1997 ASHRAE Handbook of Fundamentals, Inch-Pound Edition, and, at a minimum, must address all the heat loss or heat gain considerations in a manner consistent with the calculation procedures provided in the document. Overall U-values and Heating/Cooling Loads—Manufactured Homes—February 1992—PNL 8006, HUD User No. 0005945.

(c) Areas where the insulation does not fully cover a surface or is compressed shall be accounted for in the U-calculations (see §3280.506). The effect of framing on the U-value must be included in the Uo calculation. Other low-R-value heat-flow paths (“thermal shorts”) shall be explicitly accounted for in the calculation of the transmission heat loss coefficient if in the aggregate all types of low-R-value paths amount to more than 1% of the total exterior surface area. Areas are considered low-R-value heat-flow paths if:

1. They separate conditioned and unconditioned space; and
2. They are not insulated to a level that is at least one-half the nominal insulation level of the surrounding building component.

(d) High efficiency heating and cooling equipment credit. The calculated transmission heat loss coefficient (Uo) used for meeting the requirement in §3280.506(a) may be adjusted for heating and cooling equipment above that required by the National Appliance Energy Conservation Act of 1987 (NAECA) by applying the following formula:

\[
Uo \text{ adjusted} = Uo \text{ standard} \times \left[1 + (0.6) (\text{heating efficiency increase factor}) + (\text{cooling multiplier}) (\text{cooling efficiency increase factor})\right]
\]

where:

- Uo standard = Maximum Uo for Uo Zone required by §3280.506(a)
- Uo adjusted = Maximum Uo standard adjusted for high efficiency HVAC equipment

Heating efficiency increase factor = The increase factor in heating equipment efficiency measured by the Annual Fuel Utilization Efficiency (AFUE), or the Heating Seasonal Performance Factor (HSPF) for heat pumps, above that required by NAECA (indicated as “NAECA” in formula). The formula is heating efficiency increase factor = AFUE (HSPF) home – AFUE (or HSPF) NAECA divided by AFUE (HSPF) NAECA.

Cooling efficiency increase factor = the increase factor in the cooling equipment efficiency.
§ 3280.509 Criteria in absence of specific data.

(e) U values for any glazing (e.g., windows, skylights, and the glazed portions of any door) must be based on tests using AAMA 1503.1–1988, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections, or the National Fenestration Rating Council 100, 1997 Edition, Procedure for Determining Fenestration Product U-factors. In the absence of tests, manufacturers are to use the residential window U values contained in Chapter 29, Table 5 of the 1997 ASHRAE Handbook of Fundamentals, Inch-Pound Edition. In the event that the classification of the window type is indeterminate, the manufacturer must use the classification that gives the higher U value. Where a composite of materials from two different product types is used, the product is to be assigned the higher U value. For the purpose of calculating $U_o$ values, storm windows are treated as an additional pane.

(f) Annual energy used based compliance. As an alternative, homes may demonstrate compliance with the annual energy used implicit in the coefficient of heat transmission ($U_o$) requirement. The annual energy use determination must be based on generally accepted engineering practices. The general requirement is to demonstrate that the home seeking compliance approval has a projected annual energy use, including both heating and cooling, less than or equal to a similar “base case” home that meets the standard. The energy use for both homes must be calculated based on the same assumptions; including assuming the same dimensions for all boundaries between conditioned and unconditioned spaces, site characteristics, usage patterns and climate.


§ 3280.509 Criteria in absence of specific data.

In the absence of specific data, for purposes of heat-loss/gain calculation, the following criteria shall be used:

(a) Infiltration heat loss. In the absence of measured infiltration heat loss data, the following formula shall be used to calculate heat loss due to infiltration and intermittently operated fans exhausting to the outdoors. The perimeter calculation shall be based on the dimensions of the pressure envelope.

\[
\text{Infiltration Heat-Loss} = 0.7 \times (T) \times (\text{ft. of perimeter}), \text{BTU/hr.}
\]

where: $T=70$ minus the heating system capacity certification temperature stipulated in the Heating Certificate, in F.

(b) Framing areas.

Wall ......................... 15 percent of wall area less windows and doors.
Floor and Ceiling ........ 10 percent of the area.

(c) Insulation compression. Insulation compressed to less than nominal thickness shall have its nominal R-values reduced for that area which is compressed in accordance with the following graph: