Addendum 81

Adoption ANSI/RESNET/ICC 301-2022 Supplement

Date Approved: April 7, 2025

Voluntary Compliance Date: May 7, 2025

Mandatory Compliance Date[1]: July 1, 2025

Transition Period:

Proponent: SDC 300

Organization: RESNET

Purpose:

Adopts ANSI/RESNET/ICC 301-2022 Addendum C-2024 and Addendum E-2024 for implementation with the adoption of ANSI/RESNET/ICC 301-2022 and its Addendum A-2024 and Addendum B-2024 as the basis for the RESNET HERS®. The addendum also: revises the definition of *Bedroom* for consistency with RESNET ANS including Standards, 301, 310, 380 and 850; amends the reference for data in Table 7.1.2(1) and adds the reference in Normative References; and, modifies the modeling assumptions for certain appliances.

Amendment:

Note:
The underline and strikethrough text in black print shown in this draft indicate changes to the MINHERS made by Addendum 76 with its adoption of ANSI/RESNET/ICC 301-2022. The changes shown in dark blue print are changes made by this addendum.

Modify MINHERS Chapter 3 as follows:

[1] The Mandatory Compliance Date- The date on which compliance with an amendment approved for publication shall be required for any Dwelling Unit or Sleeping Unit with a Building Permit Date on or after that date. Alternatively, the date of the HERS Rater or RFI's first site visit, the date of the application of the permit, or the date of the contract on the home is permitted to be used as the Building Permit Date.

303.1 Technical Requirements

Exception 4: RESNET Home Energy Ratings shall be calculated using the modifications of Standards ANSI/RESNET/ICC 301-2019 established by MINHERS addenda:

- Addendum 66, CO_2e Index
- Addendum 79, Table 5.1.2(1) Informative Note Correction
- Addendum 81, Supplemental Criteria for Adoption of ANSI/RESNET/ICC 301-2022

304 Normative References

ANSI/ASHRAE 189.1-2020, " Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings." American Society of Heating, Refrigertating, and Air Conditioning Engineers, Atlanta, GA

ANSI/CRRC S100-2021, "Standard Test Methods for Determining Radiative Properties of Materials," Cool Roof Rating Council, Portland, OR. www.coolroofs.org

ANSI/RESNET/ICC 301-20192022, "Standard for the Calculation and Labeling of the Energy Performance of Dwelling and Sleeping Units using an Energy Rating Index.", including the amendments of addenda and normative appendices, Addendum A RECs, and Addendum B CO_2e, Addendum C Interim Updates, and Addendum E Central Fan Integrated Supply Systems, and other MINHERS adopted addenda.

ANSI/RESNET/ICC 380-20192022, "Standard for Testing Airtightness of Building, Dwelling Unit and Sleeping Unit Enclosures, Airtightness of Heating and Cooling Air Distribution Systems, and Airflow of Mechanical Ventilation Systems", including addenda and normative appendices, the amendments of Addendum A Reference Standards and Addendum B Central Fan Integrated Supply Systems, and other MINHERS adopted addenda.

Modify the ANSI/RESNET/ICC 301-2022 Sections as Follows:

(Note: Table 7.1.2(1) Data Source References is revised to be Consistent with 301-2025)

TABLE 7.1.2(1)~~1~~[a]
EMISSION FACTORS FOR HOUSEHOLD COMBUSTION FUELS

FUEL TYPE	UNITS	MBTU PER UNIT	CO_2e LB/MBU [a]	NOX LB/MBU [b]	SO2 LB/MBU [b]
Natural Gas	Therm	0.1000	147.3	0.0922	0.0006
Fuel Oil #2	Gallon	0.1385	195.9	0.1300	0.0015
Liquid Petroleum Gas (LPG)	Gallon	0.0915	177.8	0.1421	0.0002

a. Developed from ASHRAE Standard 189.1-2020, Addendum m, Appendix J, Table J-6 using combined pre-combustion and combustion values for 100-year GWP time horizon

~~a~~b. Developed from the U.S. EPA AP 42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1, Chapter 1: External Combustion Sources.

~~1 (Informative Note) Developed from the U.S. EPA AP 42, Fifth Edition Compilation of Air Pollutant Emissions Factors, Volume 1, Chapter 1: External Combustion Sources.~~

(Editorial Revision)

CHAPTER 8

CO_2e RATING INDEX

CO_2e Rating Index. The CO_2e Index shall be calculated for the Rated Home in accordance with equation 8-1 using the provisions of Sections 8.1 through 8.~~5~~4.

CO_2e Index = ACO2 / (ARCO2 × IAF_{RH}) × 100 **(Equation 8-1)**

(Note: The revise Bedroom definition and added One Bedroom Minimum requirement are implemented to ensure consistency throughout all RESNET standards.)

Chapter 3 Definitions

Bedroom – ~~For one- and two-family Dwellings and Townhouses, a room or space 70 square feet of floor area or greater, with Egress Window or skylight, and doorway to the main body of the Dwelling Unit, that can be used for sleeping.[2] For all other Dwelling Units, a room or space that can be used for sleeping. For all Dwelling or Sleeping Units, the number of Bedrooms shall not be less than one.~~ A room or space 70 square feet of floor area or greater that can be used for sleeping, with emergency escape and rescue openings or two means of egress from the dwelling unit or sleeping unit, and privacy provisions capable of isolating it from the main body of the Dwelling Unit. A room that includes equipment or appliances intended to be used for cooking, mechanical systems, sanitation, or laundry, or a room intended for use as an access or egress area to the main body of the Dwelling Unit shall not be considered a bedroom.

4.2.1.1. Modeling Assumptions. The assumptions specified in Normative Appendix C shall apply to all simulation models. The Energy Rating Reference Home and the Rated Home Shall be configured with at least one Bedroom.

(Note: The cycles per year are updated to include multi-family Dwelling Units. Also, the coefficients in the 'Service Hot Water Use' equations for refFgph and refWgph are amended by Addendum 90i)

4.2.2.7.1.4. Service Hot Water Use. Service hot water system use in gallons per hour for the Energy Rating Reference Home shall be determined in accordance with Equation 4.2-29:

$$HWgph = (refDWgph + refCWgph + F_{mix}*(refFgph + refWgph))$$ **(Equation 4.2-29**

where:

HWgph	= gallons per hour of hot water use
refDWgph	= reference dishwasher gallons per hour = $(0.7801*Nbr+1.976)*h_{DW}$
refCWgph	= reference clothes washer gallons per hour = $(0.6762*Nbr + 2.3847)*h_{CW}$
F_{mix}	= $1 - ((T_{set} – T_{use})/ (T_{set} – T_{mains}))$

where:

T_{set}	= Water heater set point temperature = 125 °F
T_{use}	= Temperature of mixed water at fixtures = 105 °F
T_{mains}	= $(T_{amb,avg} + offset) + ratio * (\Delta T_{amb,max} / 2)$

[2]. (Informative Note) A "den," "library," "home office," or other similar rooms with a closet, Egress Window and doorway to the main body of the Dwelling Unit as well as 70 square feet of floor area or greater are considered a Bedroom. However, living rooms, foyers and other rooms not intended for sleeping are not. The number of rooms identified as Bed- rooms is used to determine the number of occupants.

* sin (0.986 * (day# - 15 - *lag*) – *hemisphere**90)
(with a minimum value of 32 ºF)

where:

T_{mains} = temperature of potable water supply entering residence (ºF)

$T_{amb,avg}$ = annual average ambient air temperature (ºF)

$\Delta T_{amb,max}$ = maximum difference between monthly average ambient temperatures[3] (ºF)

0.986 = degrees/day (360/365)

day# = Julian day of the year (1-365)

offset = 6°F

ratio = 0.4 + 0.01 ($T_{amb,avg}$ – 44)

lag = 35 – 1.0 ($T_{amb,avg}$ – 44)

hemisphere = 1 for northern hemisphere, -1 for southern hemisphere

refFgph = (14.6 + 10.0*Nbr)*h_F for one- and two-family Dwellings and Townhouses
= (21.9 + 8.3*Nbr)*h_F for all other Dwelling Units
= reference climate-normalized hourly fixture water use in Energy Rating Reference Home (in gallons per hour)

refWgph = (9.8*Nbr $^{0.43}$)*h_F for one- and two-family Dwellings and Townhouses
= (11.2*Nbr$^{0.34}$) *h_F for all other Dwelling Units
= reference climate-normalized hourly hot water waste due to distribution system losses in Energy Rating Reference Home (in gallons per hour)

where:

Nbr = number of Bedrooms in the Rated Home, not to be less than 1.

4.2.2.7.2.8. Clothes Dryers. Clothes Dryer annual energy use for the Rated Home shall be determined in accordance with Equation 4.2-34 and shall be based on the clothes dryer located within the Rated Home. If no clothes dryer is located within the Rated Home, a clothes dryer in the nearest shared laundry room on the project site shall be used if available for daily use by the occupants of the Rated Home. If the shared laundry room has multiple clothes dryers, the clothes dryer with the lowest EF or CEF shall be used.

CDkWh/y = (((RMC-0.04)*100)/55.5)*(8.45/CEF)*ACY

(Equation 4.2-34)

where:

RMC = Remaining Moisture Content = (0.97 * (CAPw / IMEF) – LER/312) / ((2.0104 * CAPw + 1.4242) * 0.455) + 0.04

ACY = Annual Cycles per Year = ~~(164+46.5*Nbr)~~SCY *[~~(~~(3*2.08+1.59) / (CAPw*2.08+1.59)]~~)~~

[3] (Informative Reference) For example: $T_{amb,avg,july} – T_{amb,avg,january}$

SCY = 189.5 + 32.9*Nbr for one- and two-family Dwellings and Townhouses

= 213.9 + 27.5*Nbr for all other Dwelling Units

Nbr = Number of Bedrooms in home.

CEF = Combined Energy Factor is the clothes dryer efficiency[4] (lbs dry clothes/kWh) based on current U.S. DOE clothes dryer testing procedures. (default = 3.73 for electric dryers or 3.30 for gas dryers)

CAPw = Capacity of clothes washer (ft^3) from the manufacturer's data

IMEF = Integrated Modified Energy Factor, which has replaced MEF as the U.S. DOE Energy Factor test metric for clothes washers. (default = 1.57 for top load clothes washers or 1.84 for front load clothes washers)

LER = Labeled Energy Rating of clothes washer (kWh/y) from the Energy Guide label.

For natural gas clothes dryers, annual energy use shall be determined in accordance with Equations 4.2-35a and 4.2-35b.

Therms/y = (result of Equation 4.2-31)*3412*(1-0.07)*(3.73/3.30)/100000 **(Equation 4.2-35a)**

kWh/y = (result of Equation 4.2-31)*0.07*(3.73/3.30) **(Equation 4.2-35b)**

When a Dwelling Unit has no in-unit clothes dryer, and no shared clothes dryers are available in the building or on the project site for daily use by the Rated Home occupants or they exist, but the ratio of Dwelling Units to shared clothes dryers is greater than 14, the clothes dryer values from Table 4.2.2.7(1) shall be assumed for both the Energy Rating Reference Home and Rated Home.

Internal Gains for ventless clothes dryers shall use $f_{internal}$ = 1.0 and $f_{sensible}$ = 0.9.

4.2.2.7.2.9. Dishwashers. Dishwasher annual energy use for the Rated Home shall be determined in accordance with Equation 4.2-36a and shall be based on the dishwasher located within the Rated Home, with the highest kWh/y. If no dishwasher is located within the Rated Home, a dishwasher in the nearest shared kitchen in the building shall be used only if available for daily use by the occupants of the Rated Home.

dWkWh/y = dWkWh/cyc * dWcpy **(Equation 4.2-36a)**

where:

dWkWh/y = dishwasher annual electric use excluding water heater energy use

dWkWh/cyc = [(GHWC * 0.5497/ Gas$ - LER * Elec$ * 0.02504 / Elec$) / (Elec$ * 0.5497 / Gas$ - 0.02504)] / 208

GHWC = Labeled annual cost when used with a gas water heater

Gas$ = Labeled price of gas in $/therm

LER = Labeled dishwasher Energy Rating using electric water heater in kWh/y

Elec$ = Labeled price of electricity in $/kWh

dWcpy = dishwasher cycles per year = ~~(88.4 + 34.9*Nbr)~~SCY*12/dWcap

[4] (Informative Reference) See the CEC Appliance Efficiency Database http://www.energy.ca.gov/appliances/ or the ENERGY STAR Appliance database https://www.energystar.gov/products/appliances/clothes_dryers.

SCY = 123.7 + 16.2*Nbr for one- and two-family Dwellings and Townhouses
= 135.7 + 13.5*Nbr for all other Dwelling Units
Nbr = Number of bedrooms in Rated Home
dWcap = Dishwasher capacity where Standard = 12 and Compact = 8

For dishwashers where an Energy Guide label is not available, dishwasher inputs from Table 4.2.2.7.2.9 shall be used.

Table 4.2.2.7.2.9 Default Dishwasher Inputs

Default Dishwasher Energy Guide Label Data				
Energy Guide Label Information	ENERGY STAR Defaults		NAECA minimum	ERI Reference
Dishwasher Size	compact	standard	standard	standard
Annual Energy kWh/y (LER)	203	270	307	467
Annual Gas Hot Water Cost ($/y)	$14.20	$22.23	$22.32	$33.12
Electricity Price ($/kWh)	$0.12	$0.12	$0.12	$0.12
Gas Price ($/therm)	$1.09	$1.09	$1.09	$1.09
Label Cycles per Year (LCY)	208	208	208	208

When a Dwelling Unit has no in-unit dishwasher and no shared dishwashers are available in the building for daily use of the Rated Home occupants, the energy and hot water use of the Rated Home dishwasher shall be the same as the Energy Rating Reference Home in accordance with Section 4.2.2.7.1.

4.2.2.7.2.10. Clothes Washers. Clothes Washer annual energy use and daily hot water use for the Rated Home shall be determined as follows and shall be based on the clothes washer located within the Rated Home. If no clothes washer is located within the Rated Home, a clothes washer in the nearest shared laundry room on the project site shall be used if available for daily use by the occupants of the Rated Home. If the shared laundry room has multiple clothes washers, the clothes washer with the highest LER shall be used.

Annual energy use shall be calculated in accordance with Equation 4.2-37a.

CWkWh/y = Cwappl / LCY * ACY **(Equation 4.2-37a)**

where:

Cwappl = (GHWC * gasH2O / gas$ - (LER*elec$) * elecH2O / elec$)
/
(elec$ * gasH2O / gas$ - elecH2O)

GHWC = Gas Hot Water Costs from Energy Guide Label
gasH2O = 0.3914 (gal/cyc) per (therm/y)

elecH2O = 0.0178 (gal/cyc) per (kWh/y)
LER = Label Energy Rating (kWh/y) from the Energy Guide Label.
elec$ = Electric Rate from Energy Guide Label. (default = $0.12 per kWh)
gas$ = Gas Rate from Energy Guide Label. (default = $1.09 per therm)
LCY = Label Cycles per Year from Energy Guide Label (default = 6 loads per week = 312)
ACY = Annual Cycles per Year.

and where:

ACY = SCY * [(3.0*2.08+1.59)/(CAPw*2.08+1.59)]

where:

SCY = 189.5 + 32.9*Nbr for one- and two-family Dwellings and Townhouses

= 213.9 + 27.5*Nbr for all other Dwelling Units

~~SCY = (164 + Nbr*46.5).~~

CAPw = washer capacity in cubic feet from the Energy Guide Label

Daily hot water use shall be calculated in accordance with Equation 4.2-37b.

CWgpd = (LER – Cwappl) * elecH2O * ACY / 365

(Equation 4.2-37b)

For clothes washers where an Energy Guide label is not available, clothes washer inputs from Table 4.2.2.7.2.10 shall be used.

Table 4.2.2.7.2.10 Default Inputs for Clothes Washer Based on Year

Standard Clothes Washer Models						
	ERI Ref 2006[a]	Std 2008-2017[b]	ENERGY STAR 2006-2017[c]	Std 2018-present	ENERGY STAR 2018-present	CEE Tier II 2018[d]
Clothes Washer Inputs:						
LER [Label Energy Rating in kWh/y]=	400	380	260	284	152	125
GHWC [Cost with gas hot water in $/y]=	$27	$27	$18	$18	$12	$9
elec_price [$/kWh]=	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12
gas_price [$/therm]=	$1.09	$1.09	$1.09	$1.09	$1.09	$1.09
IMEF [ft3/(kWh/cyc)]=	1	1.21	1.63	1.57	2.06	2.92
CAPw [ft3]=	3	3.2	3.5	4.2	4.2	5.2
IWF [(gal/cyc)/ft3]=	11.4	9.5	5.2	6.5	4.3	3.2
LCY [Label Cycles per Year] =	312	312	312	312	312	312

Notes

a: Used for standard clothes washers between 2006 – 2007
b: Used for standard clothes washers between 2008 – 2017
c: Used for ENERGY STAR clothes washers between 2006 and 2017
d: Consortium for Energy Efficiency Tier II efficiency minimum requirements

When a Dwelling Unit has no in-unit clothes washer, and no shared clothes washers are available in the building or on the project site for daily use by the Rated Home occupants or they exist, but the ratio of Dwelling Units to shared clothes washers is greater than 14, the energy and hot water use of the Rated Home clothes washer shall be the same as the Energy Rating Reference Home, in accordance with Section 4.2.2.7.1.

Modify the ANSI/RESNET/ICC 380-2022 Sections as Follows:

(Note: Revise Bedroom definition to ensure consistency throughout all RESNET standards.)

Chapter 3 Definitions

Bedroom – ~~For one- and two-family Dwellings and Townhouses, a room or space 70 square feet of floor area or greater, with Egress Window or skylight, and doorway to the main body of the Dwelling Unit, that can be used for sleeping.[5] For all other Dwelling Units, a room or space that can be used for sleeping. For all Dwelling or Sleeping Units, the number of Bedrooms shall not be less than one.~~ A room or space 70 square feet of floor area or greater that can be used for sleeping, with emergency escape and rescue openings or two means of egress from the dwelling unit or sleeping unit, and privacy provisions capable of isolating it from the main body of the Dwelling Unit. A room that includes equipment or appliances intended to be used for cooking, mechanical systems, sanitation, or laundry, or a room intended for use as an access or egress area to the main body of the Dwelling Unit shall not be considered a bedroom.

(Note: Clarify the intent for hatches & access door setting for tests. Incorporate formal interpretation IR 380-2022-001.)

5.4.2 Duct leakage to outside test.

5.4.2.1. If ducts run outside the Infiltration Volume, including Attics, garages or crawl spaces, then any vents, access panels, doors or windows between those spaces and the outside shall be opened. All exterior doors and windows between the Infiltration Volume and the outside shall be closed. Other openings to the outside with potential to hinder the ability of the air-moving fan to achieve an induced enclosure pressure difference of 25 Pa (0.1 in. H_2O) with reference to the outside shall be closed or covered in some manner. Any vents, access panels, doors, or other movable partitions that separate spaces within the Infiltration Volume ~~Interior doors~~ shall be opened.

[5]. (Informative Note) A “den,” “library,” “home office,” or other similar rooms with a closet, Egress Window and doorway to the main body of the Dwelling Unit as well as 70 square feet of floor area or greater are considered a Bedroom. However, living rooms, foyers and other rooms not intended for sleeping are not. The number of rooms identified as Bed- rooms is used to determine the number of occupants.

Modify the ANSI/RESNET/ICC 310-2020 Definition Section as Follows:

(Note: Revise Bedroom Definition. Implemented to ensure consistency throughout all RESNET standards.)

Chapter 3 Definitions

Bedroom – ~~For one- and two-family Dwellings and Townhouses, a room or space 70 square feet of floor area or greater, with Egress Window or skylight, and doorway to the main body of the Dwelling Unit, that can be used for sleeping.[6] For all other Dwelling Units, a room or space that can be used for sleeping. For all Dwelling or Sleeping Units, the number of Bedrooms shall not be less than one.~~ A room or space 70 square feet of floor area or greater that can be used for sleeping, with emergency escape and rescue openings or two means of egress from the dwelling unit or sleeping unit, and privacy provisions capable of isolating it from the main body of the Dwelling Unit. A room that includes equipment or appliances intended to be used for cooking, mechanical systems, sanitation, or laundry, or a room intended for use as an access or egress area to the main body of the Dwelling Unit shall not be considered a bedroom.

[6]. (Informative Note) A “den,” “library,” “home office,” or other similar rooms with a closet, Egress Window and doorway to the main body of the Dwelling Unit as well as 70 square feet of floor area or greater are considered a Bedroom. However, living rooms, foyers and other rooms not intended for sleeping are not. The number of rooms identified as Bed- rooms is used to determine the number of occupants.